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DiMauro et al.

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(54) **METHOD AND SYSTEM FOR CREATIVITY AND LEARNING EVALUATION AND ENHANCEMENT**

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G09B 23/02 (2006.01)
G06F 18/22 (2023.01)
G09B 5/08 (2006.01)

(52) **U.S. Cl.**
CPC ***G09B 23/02*** (2013.01); ***G06F 18/22*** (2023.01); ***G09B 5/08*** (2013.01)

(58) **Field of Classification Search**
CPC . G09B 23/02; G09B 5/08; G09B 7/00; G09B 7/02; G09B 7/06; G09B 7/08; G06F 18/22
USPC 434/21
See application file for complete search history.

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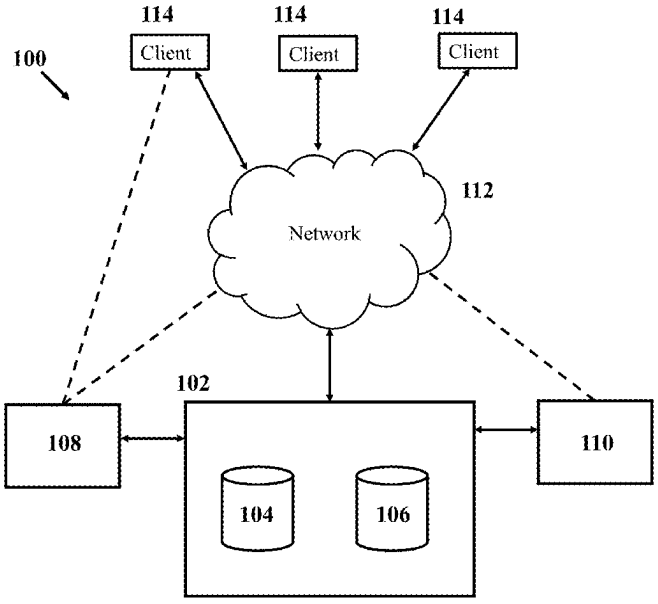
(57) **ABSTRACT**

The present invention relates to a method and system for evaluating and enhancing or improving the creativity and intelligence of a user. The creativity and intelligence of the user are evaluated by generating and evaluating mathematical representations of user answers to creativity and intelligence prompts. The mathematical representations may include positions, orientations, and scales of interactive visualization inputs and the answers may be evaluated based on the fluency, originality, elaboration, and flexibility of the answers to the prompts. The creativity and intelligence of the user are enhanced through generating user learning groups of users with similar creativity levels, generating interactive assignments, generating user workspaces for the user learning groups, verifying completed interactive assignments, and assessing the completed interactive assignments.

20 Claims, 22 Drawing Sheets



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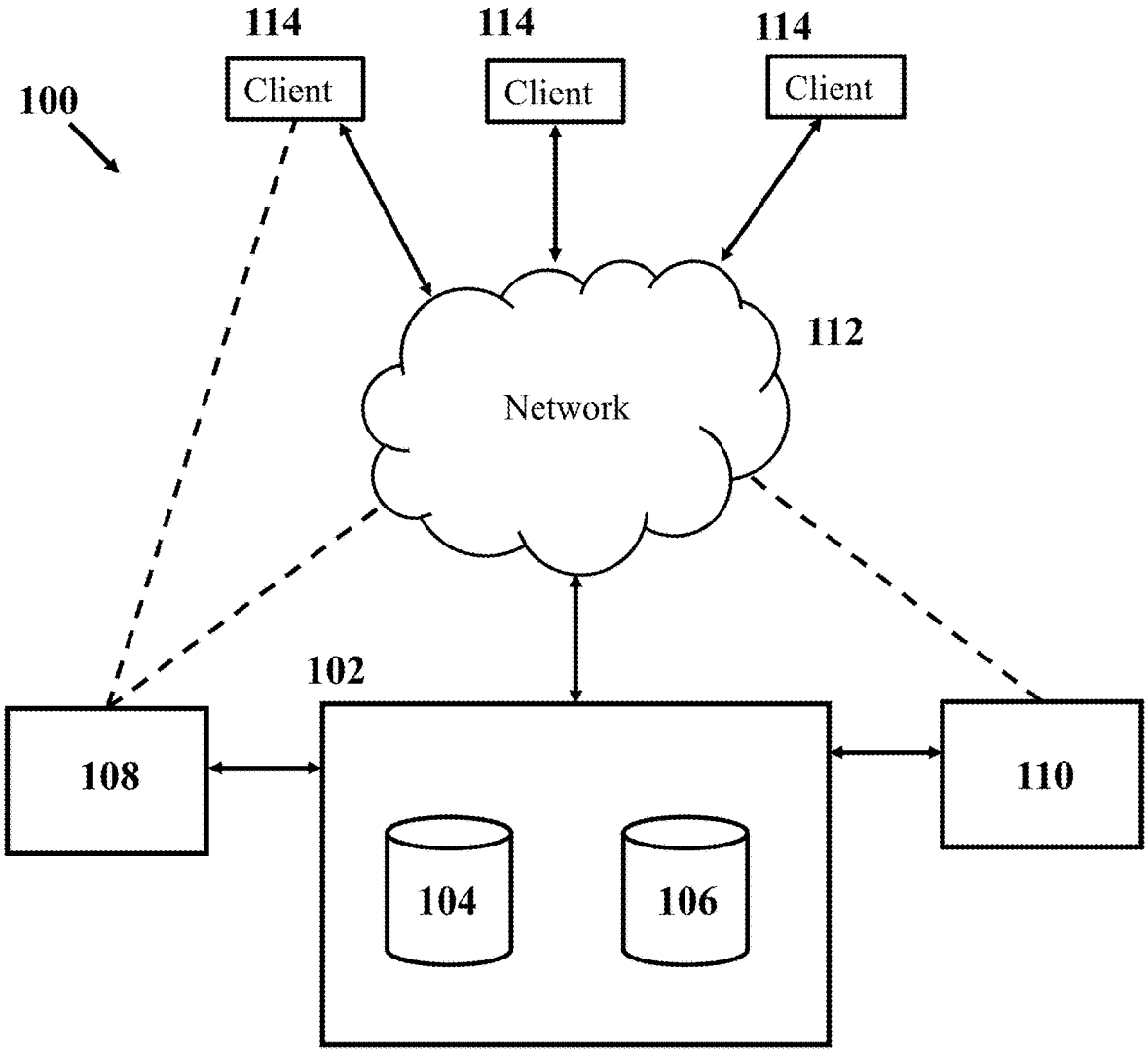
114
114
114
Client
Client
Client
100
112
Network
102
108
110
104
106

FIG. 1

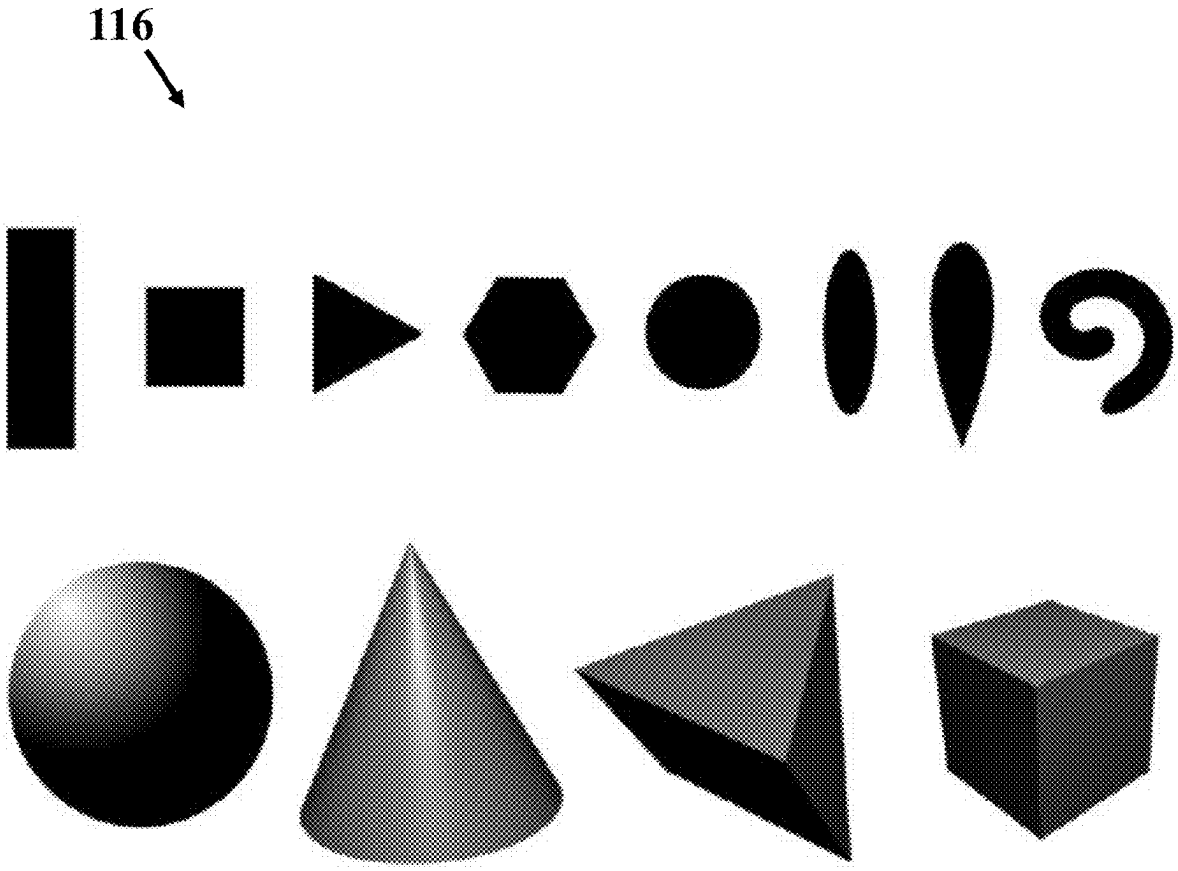

FIG. 2

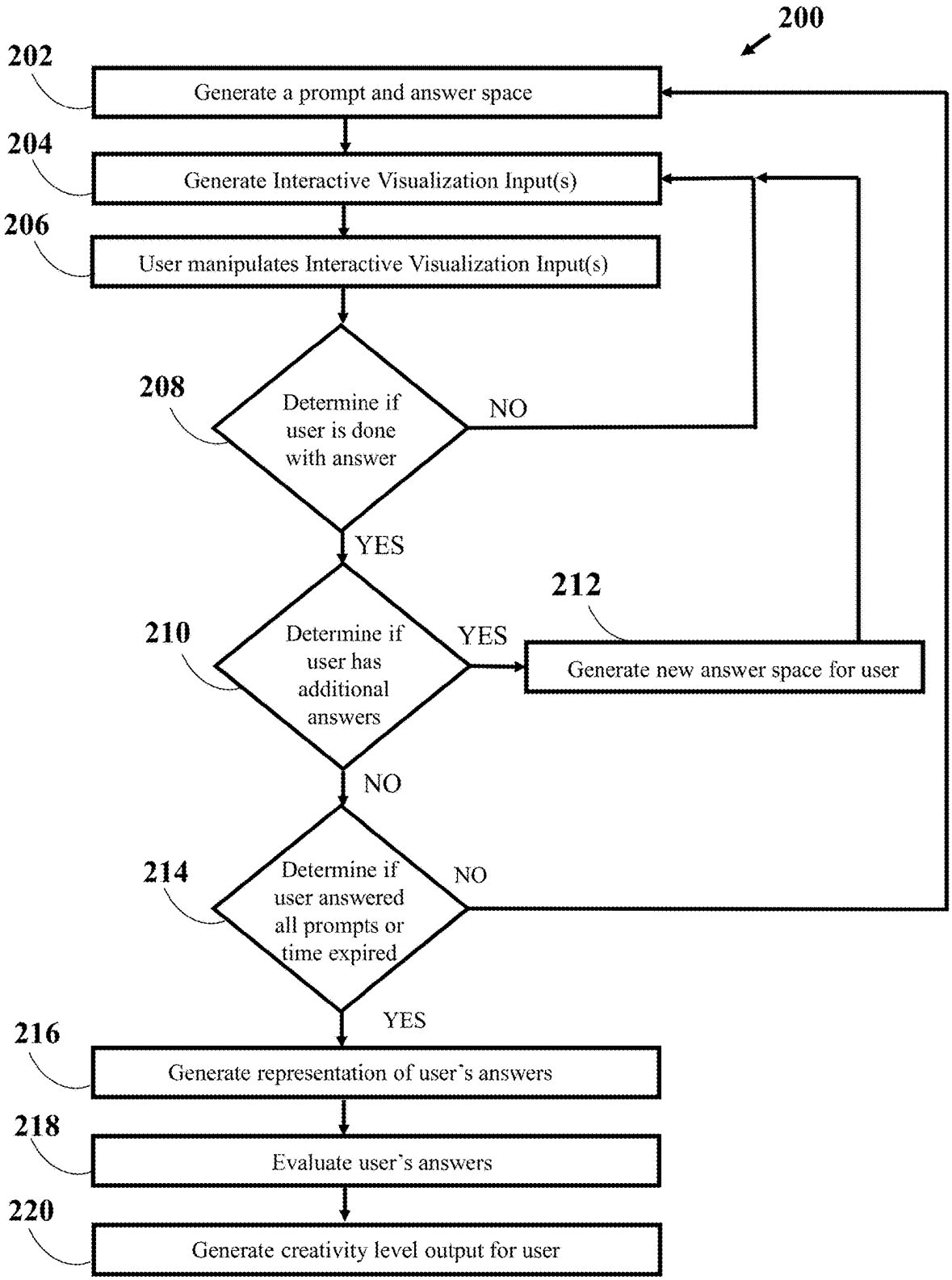
200
202
Generate a prompt and answer space
204
Generate Interactive Visualization Input(s)
206
User manipulates Interactive Visualization Input(s)
208
Determine if user is done with answer
NO
YES
210
Determine if user has additional answers
YES
212
Generate new answer space for user
NO
214
Determine if user answered all prompts or time expired
NO
YES
216
Generate representation of user's answers
218
Evaluate user's answers
220
Generate creativity level output for user

FIG. 3

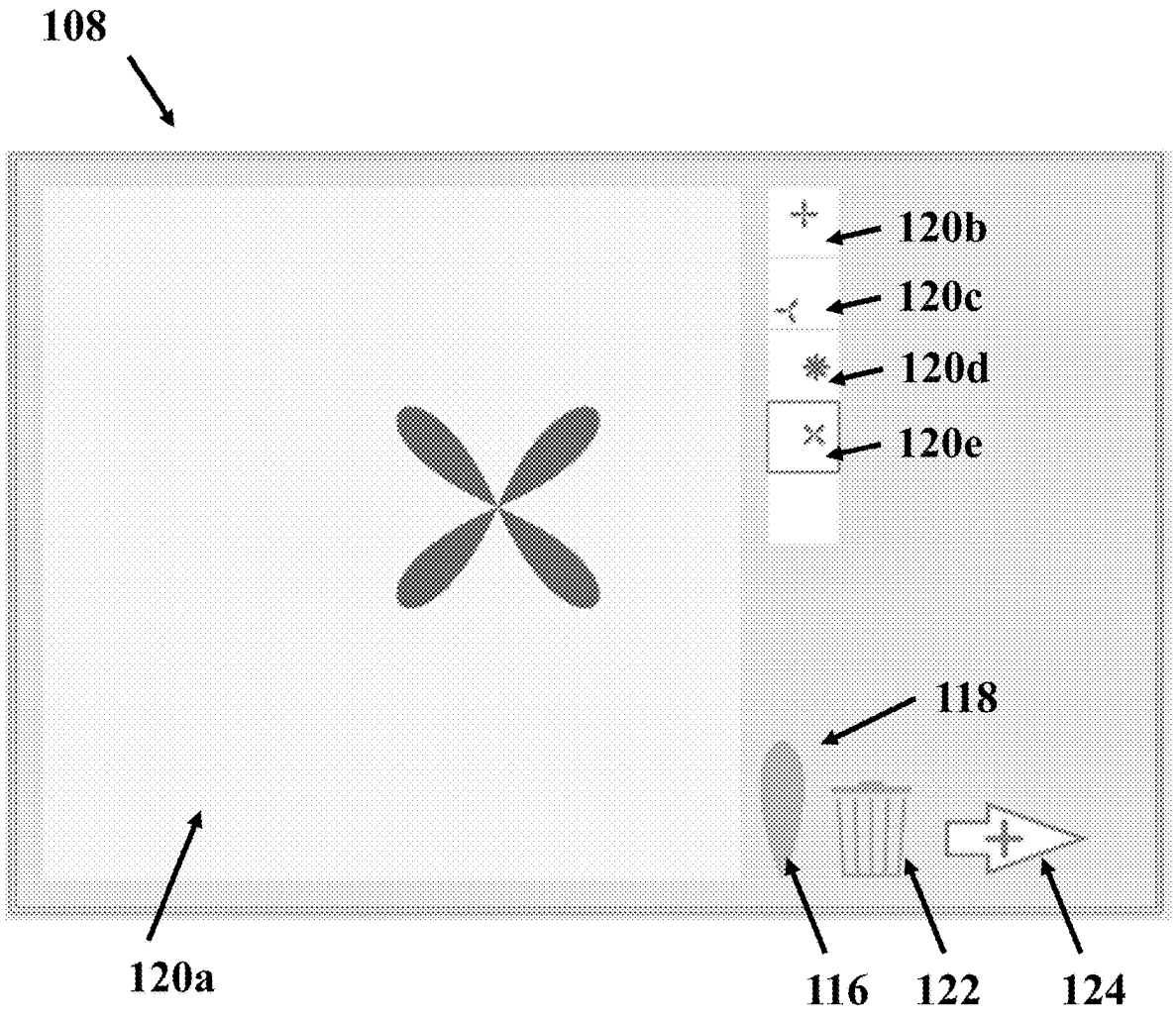

FIG. 4

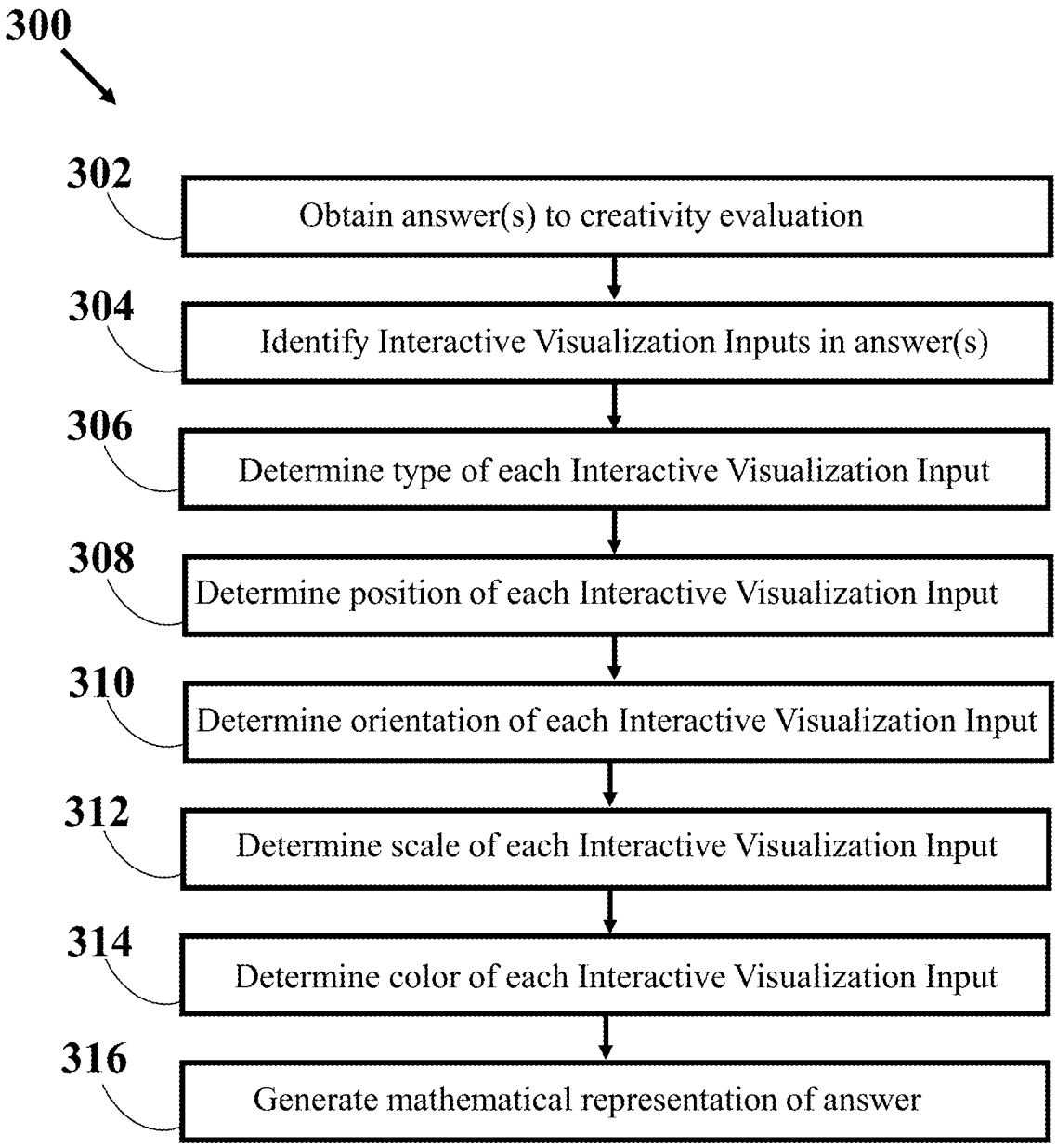
300
302
Obtain answer(s) to creativity evaluation
304
Identify Interactive Visualization Inputs in answer(s)
306
Determine type of each Interactive Visualization Input
308
Determine position of each Interactive Visualization Input
310
Determine orientation of each Interactive Visualization Input
312
Determine scale of each Interactive Visualization Input
314
Determine color of each Interactive Visualization Input
316
Generate mathematical representation of answer

FIG. 5

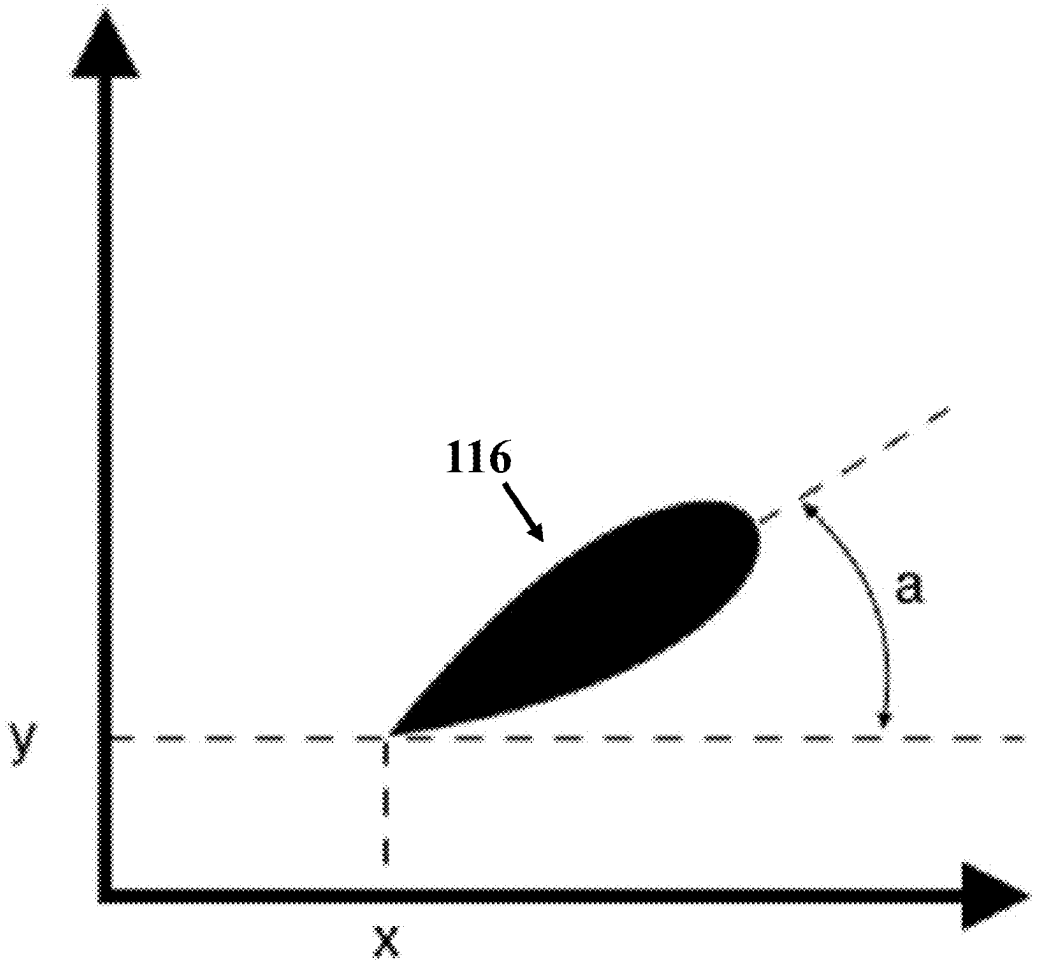

FIG. 6

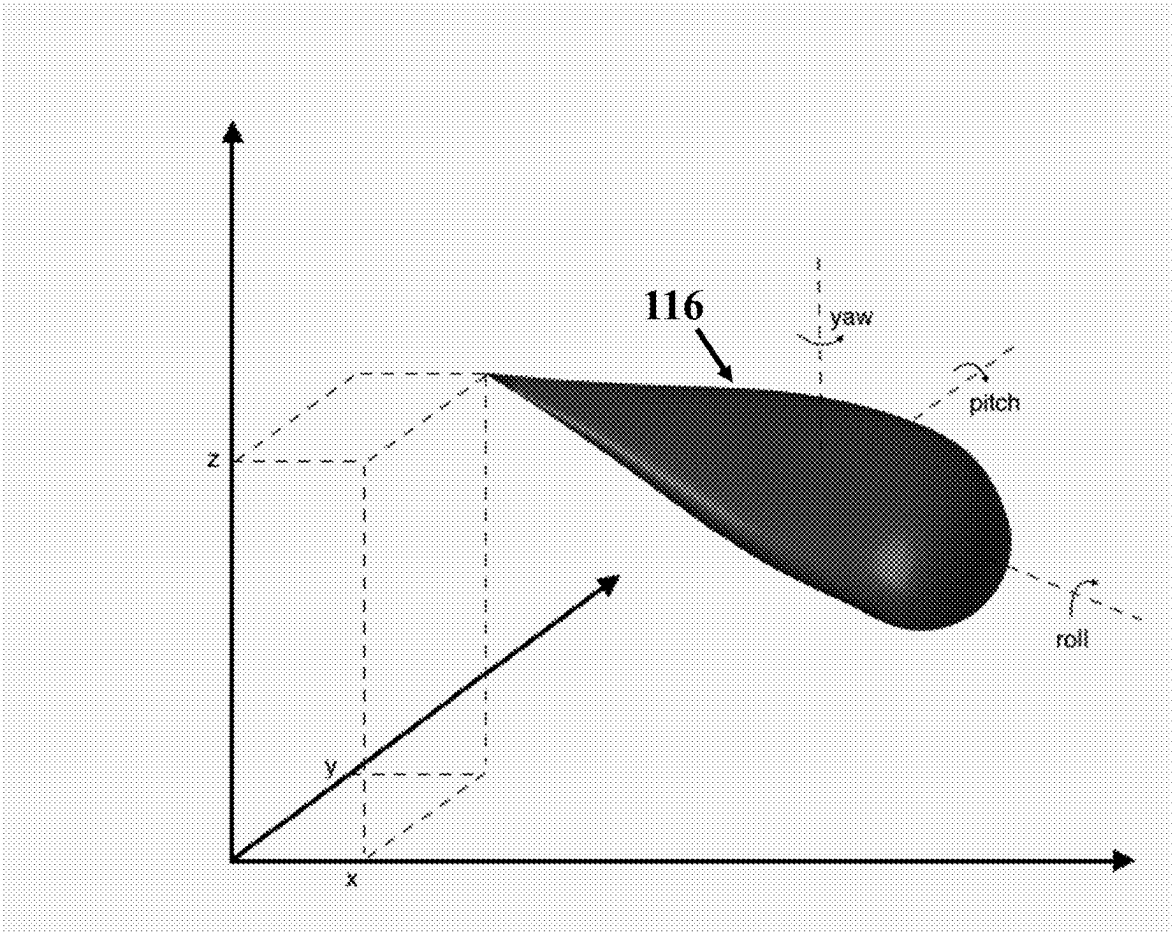

FIG. 7

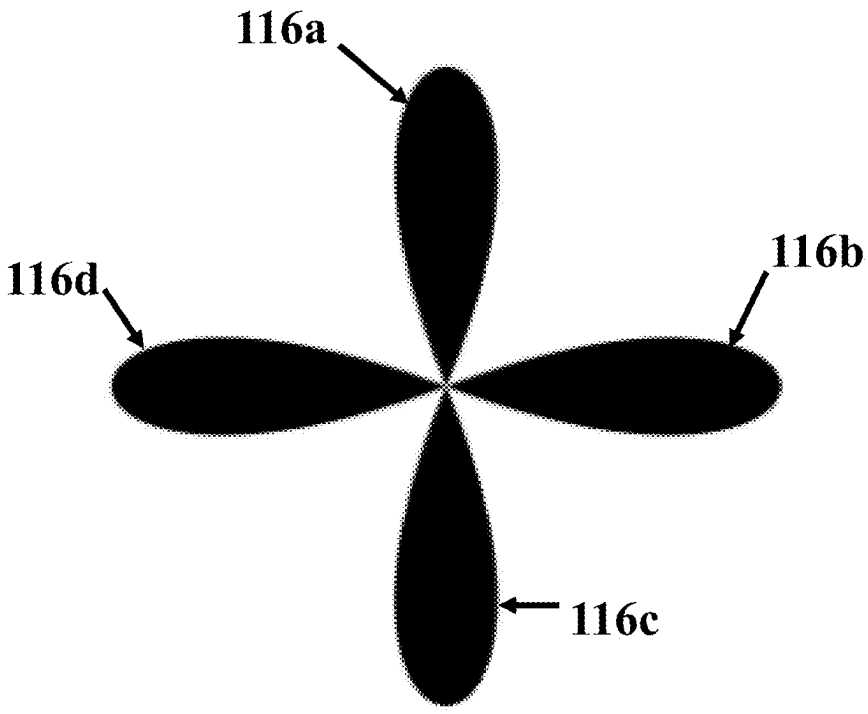

FIG. 8

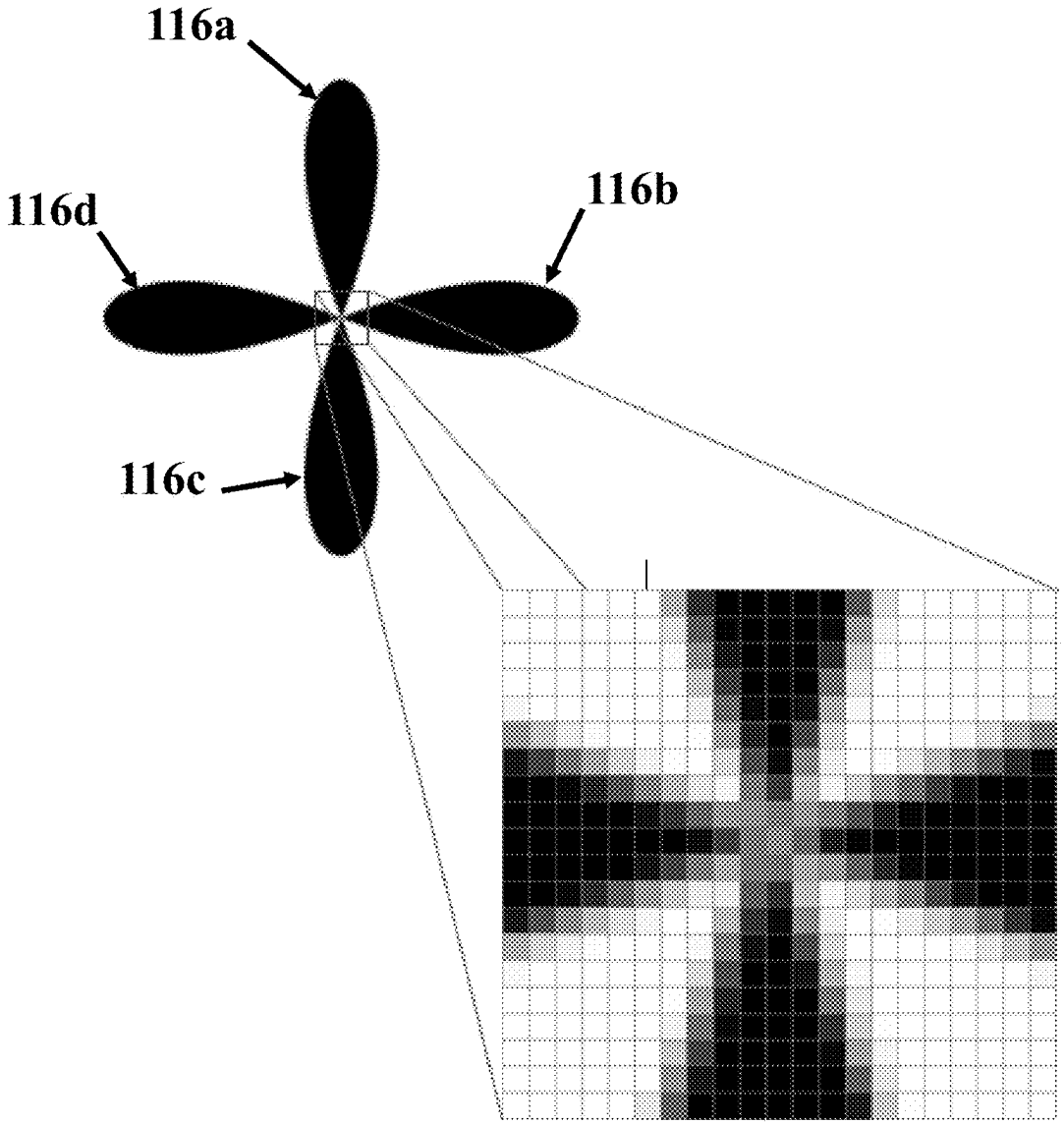

FIG. 9

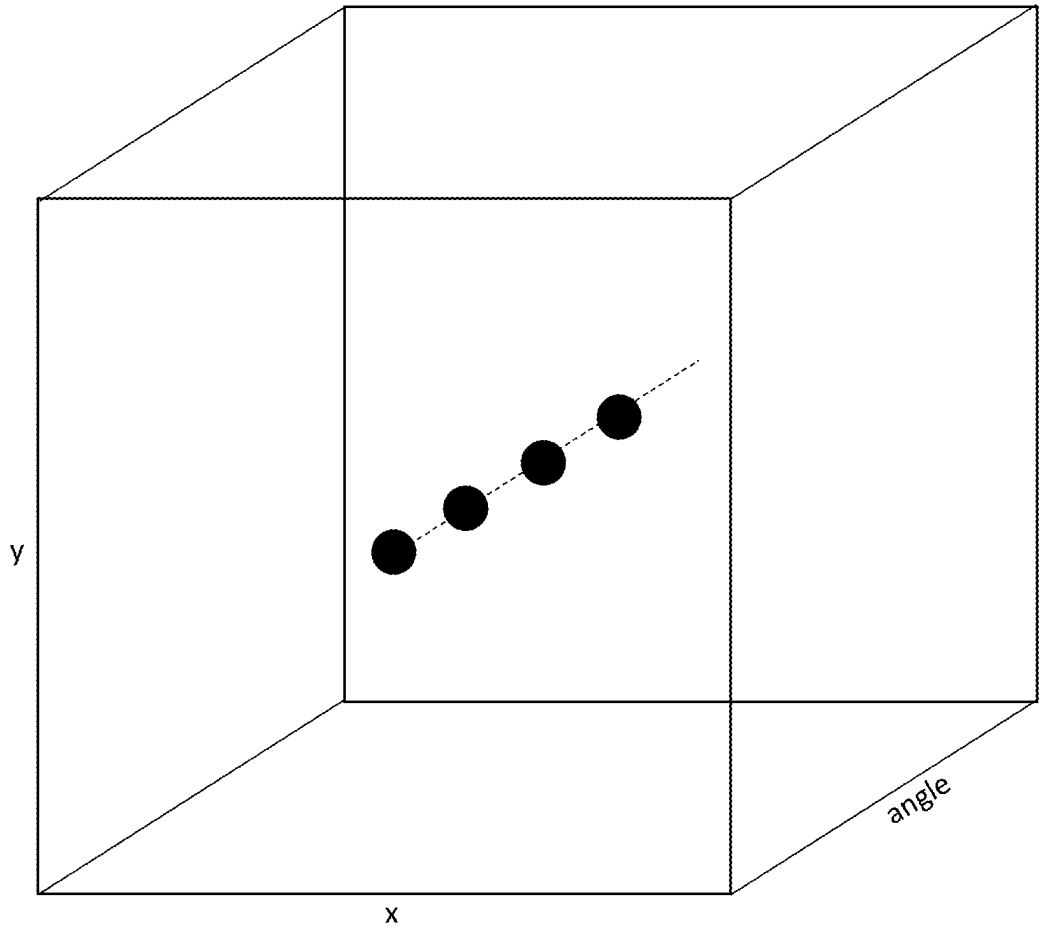

FIG. 10A

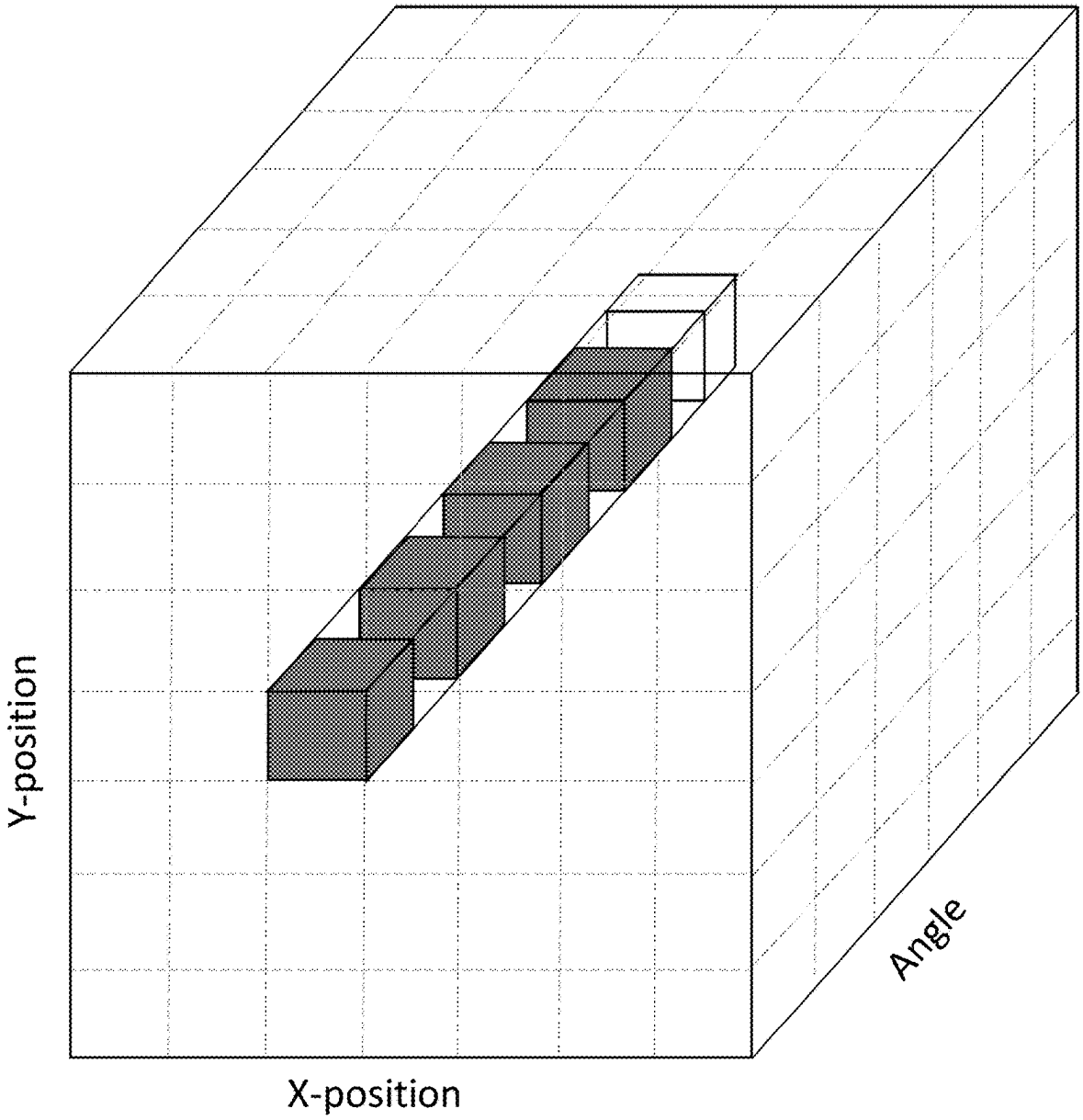

FIG. 10B

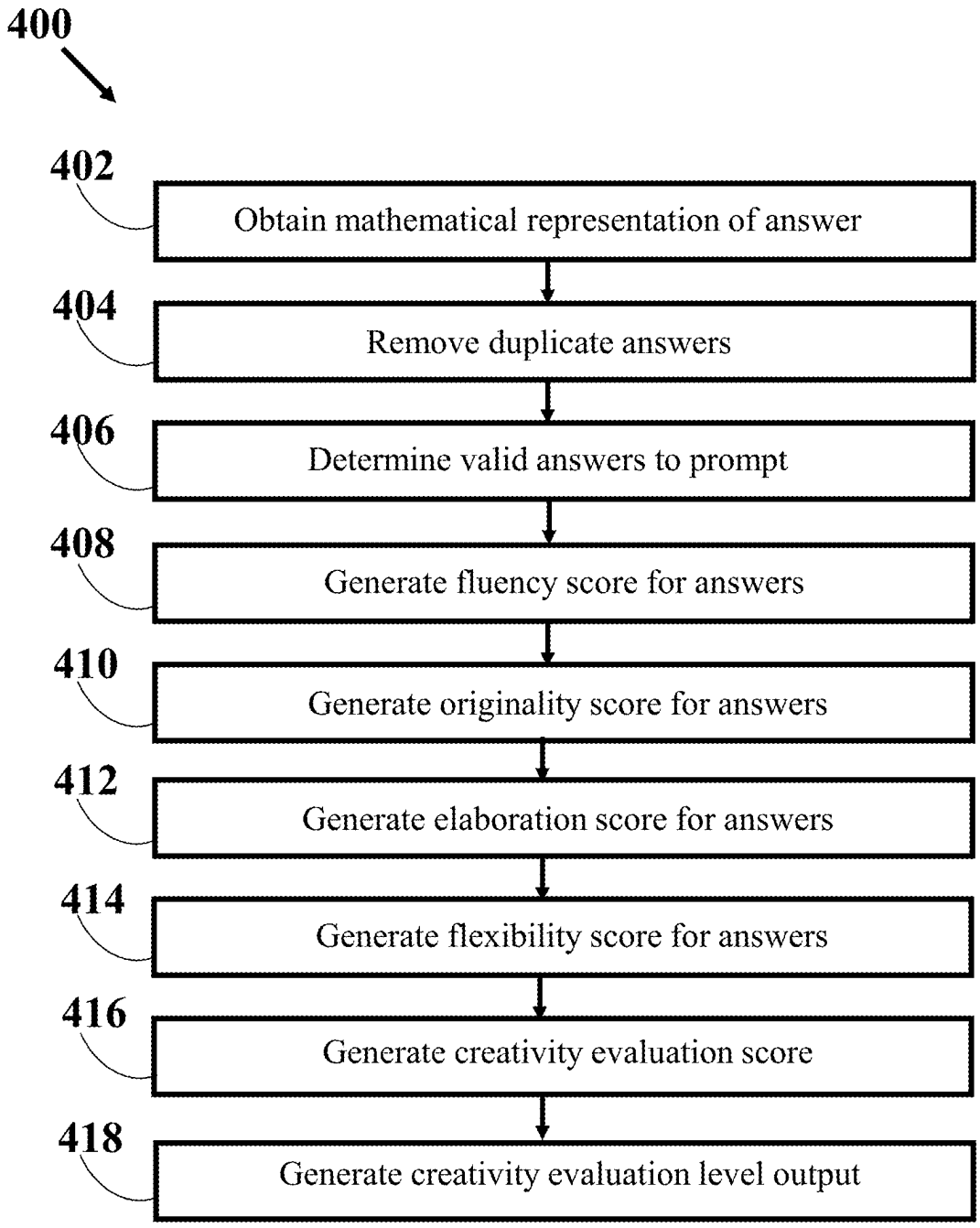
400
402
Obtain mathematical representation of answer
404
Remove duplicate answers
406
Determine valid answers to prompt
408
Generate fluency score for answers
410
Generate originality score for answers
412
Generate elaboration score for answers
414
Generate flexibility score for answers
416
Generate creativity evaluation score
418
Generate creativity evaluation level output

FIG. 11

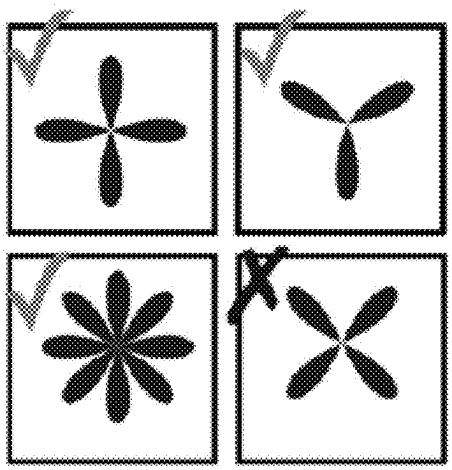

FIG. 12

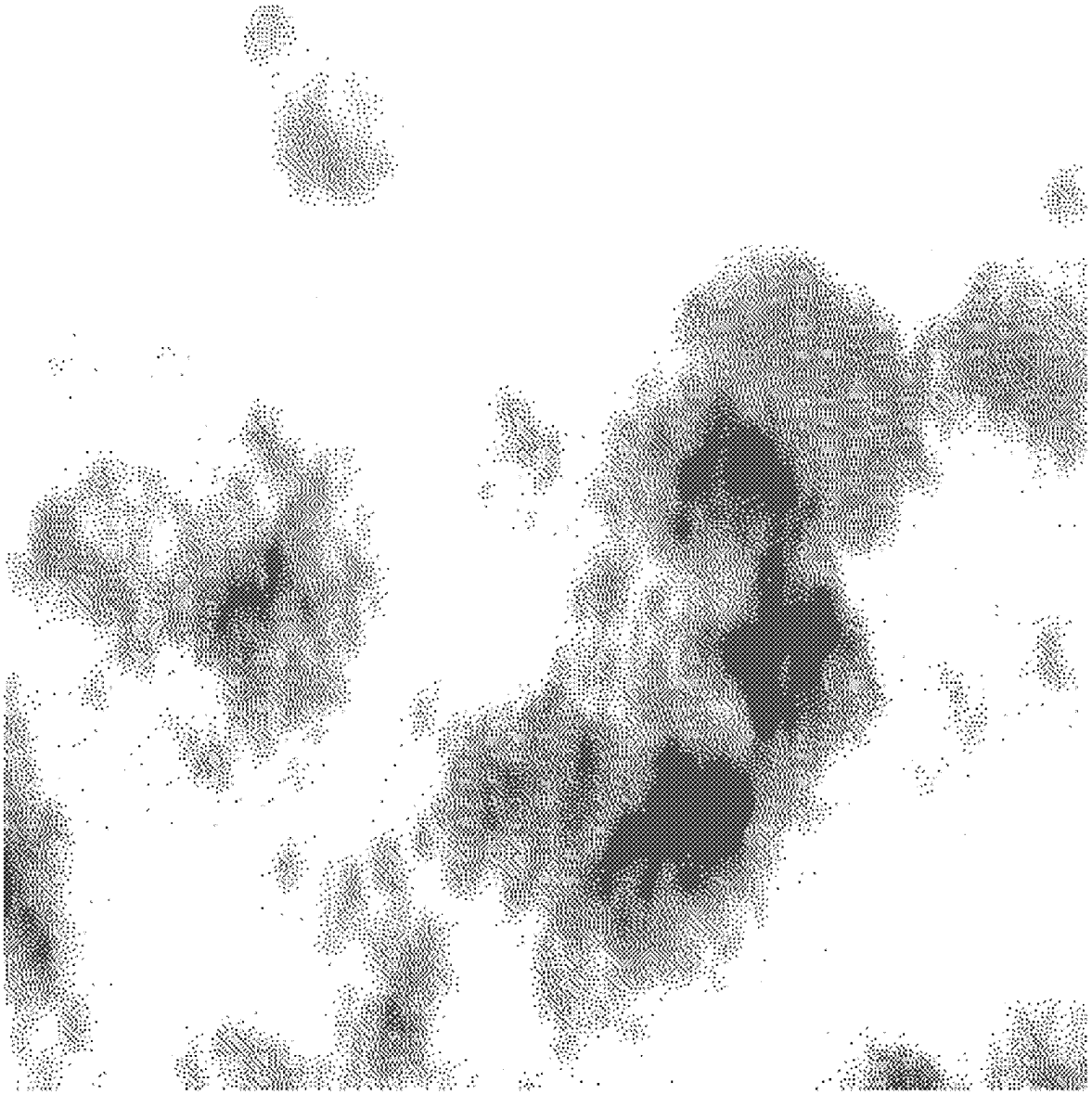

FIG. 13A

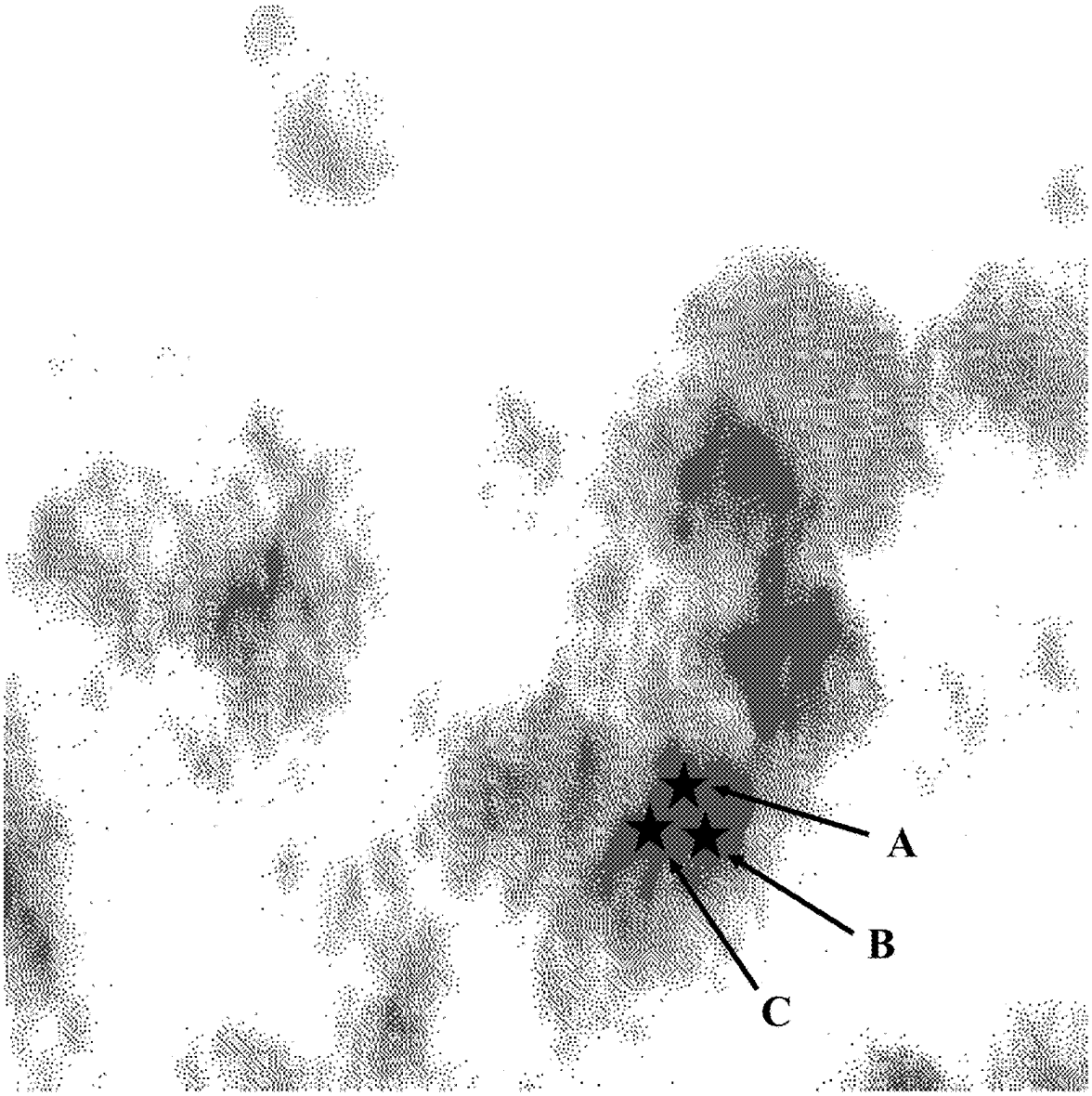

FIG. 13B

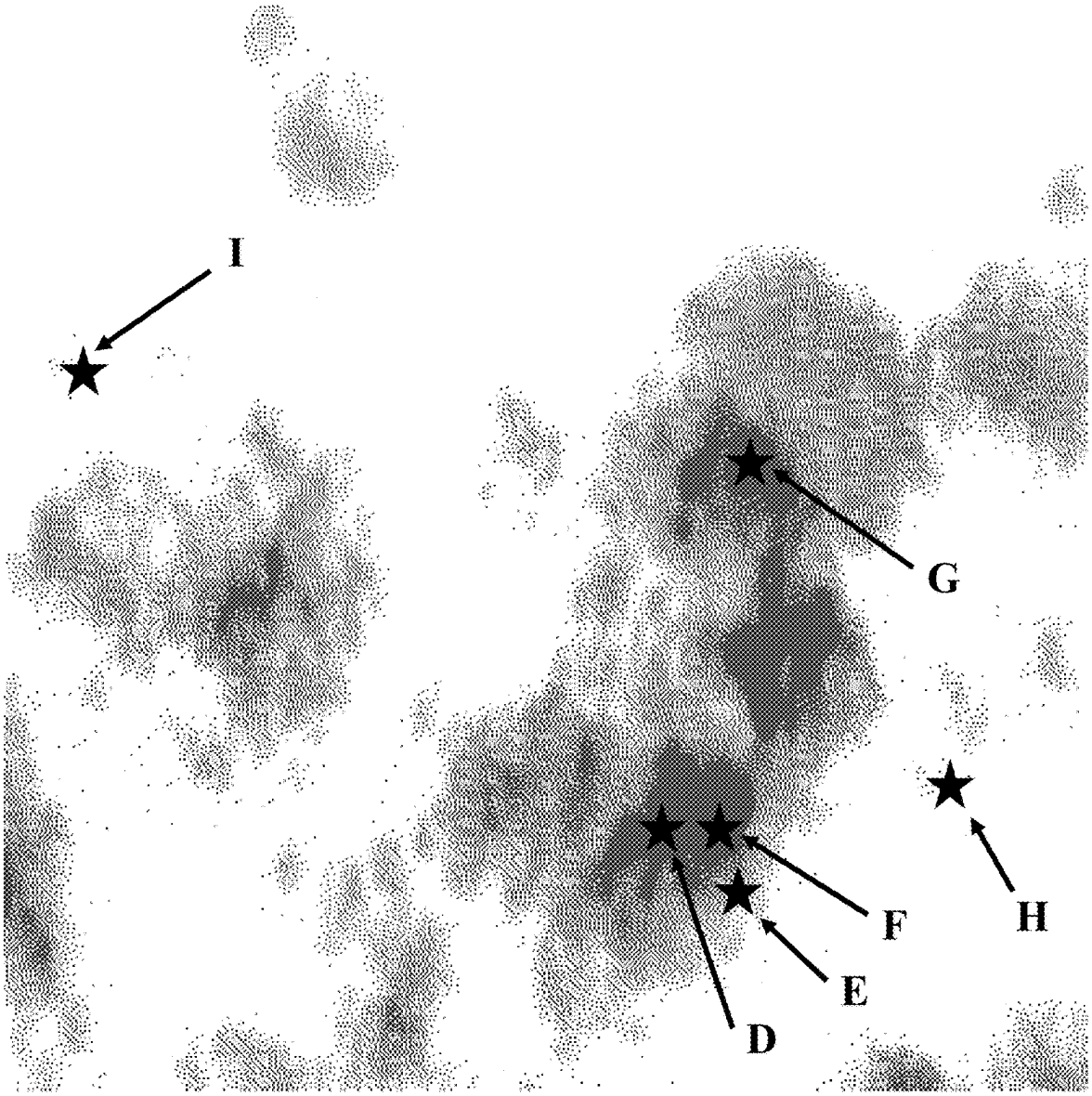

FIG. 13C

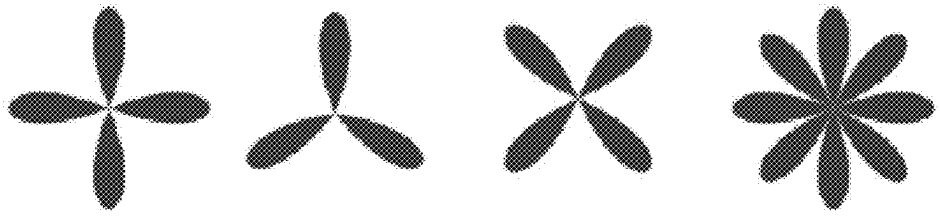

FIG. 14A

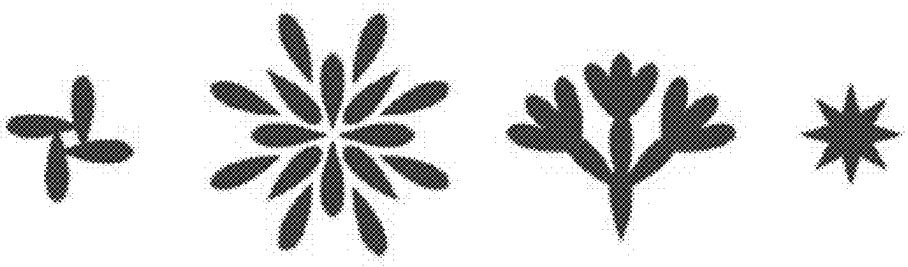

FIG. 14B

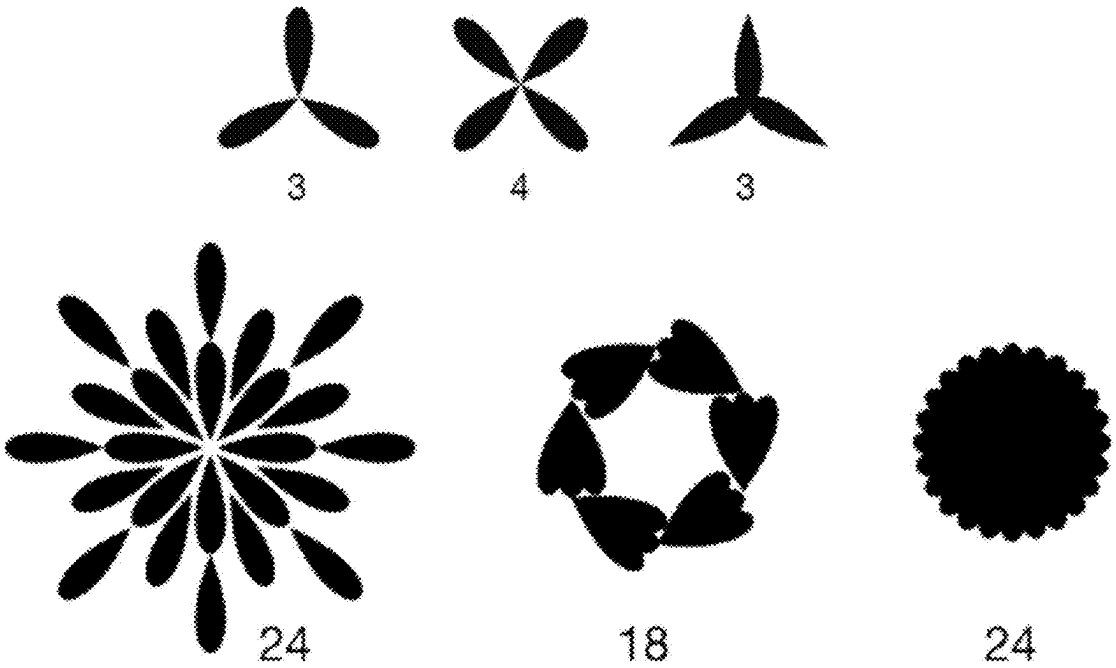

FIG. 15

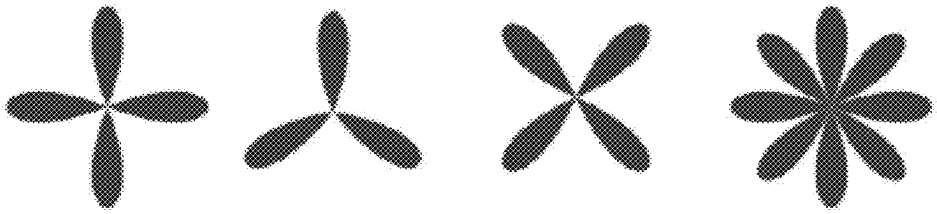

FIG. 16A

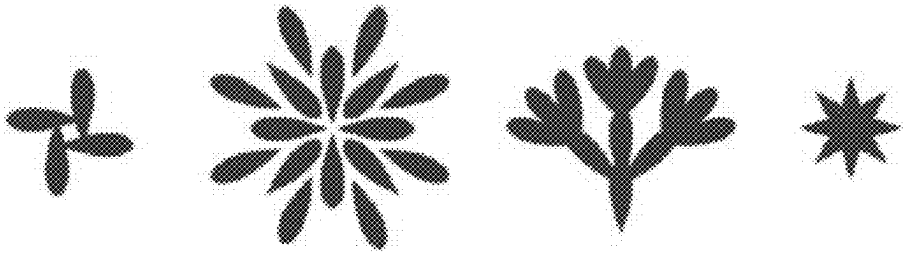

FIG. 16B

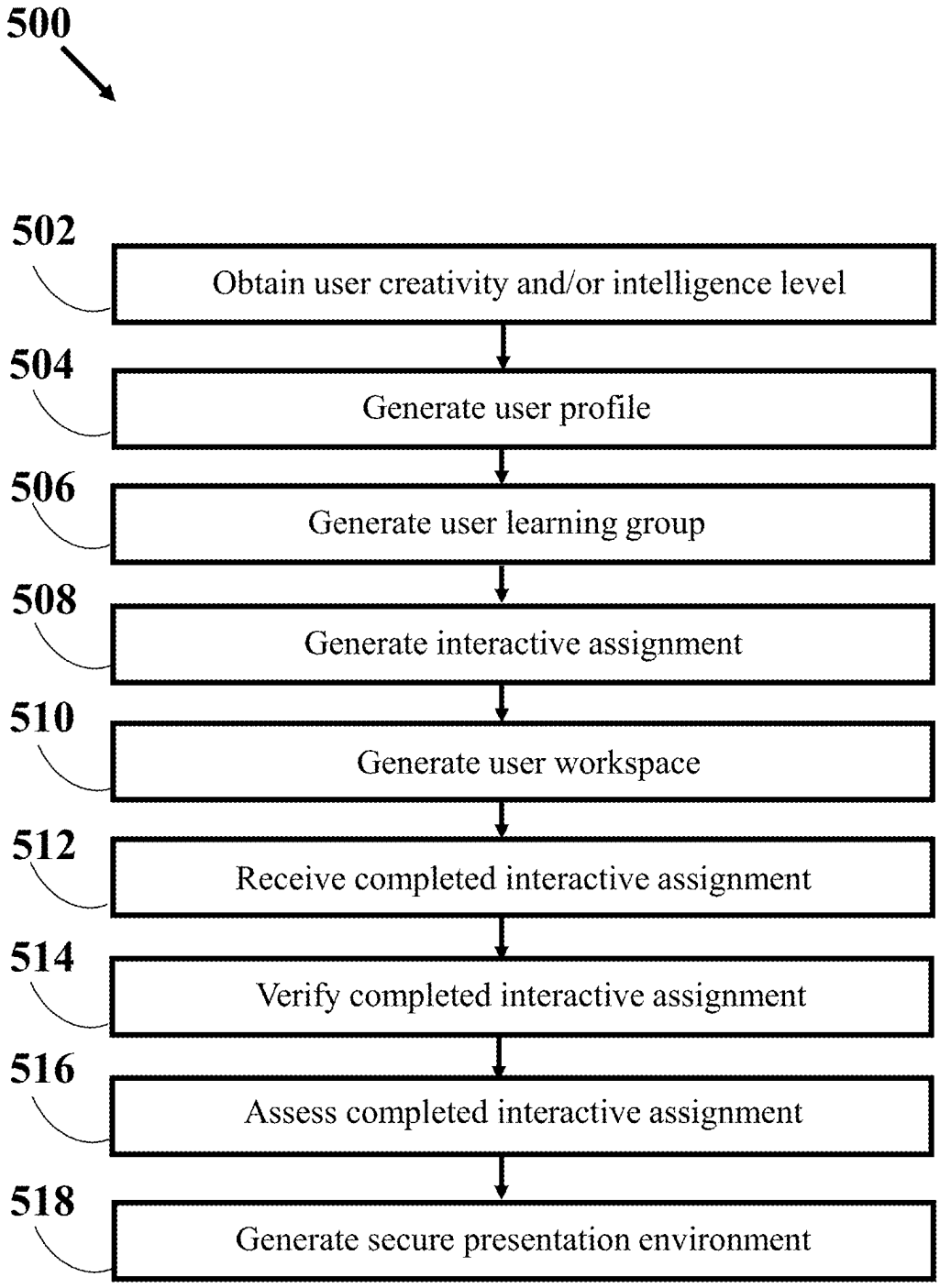
500
502
Obtain user creativity and/or intelligence level
504
Generate user profile
506
Generate user learning group
508
Generate interactive assignment
510
Generate user workspace
512
Receive completed interactive assignment
514
Verify completed interactive assignment
516
Assess completed interactive assignment
518
Generate secure presentation environment

FIG. 17

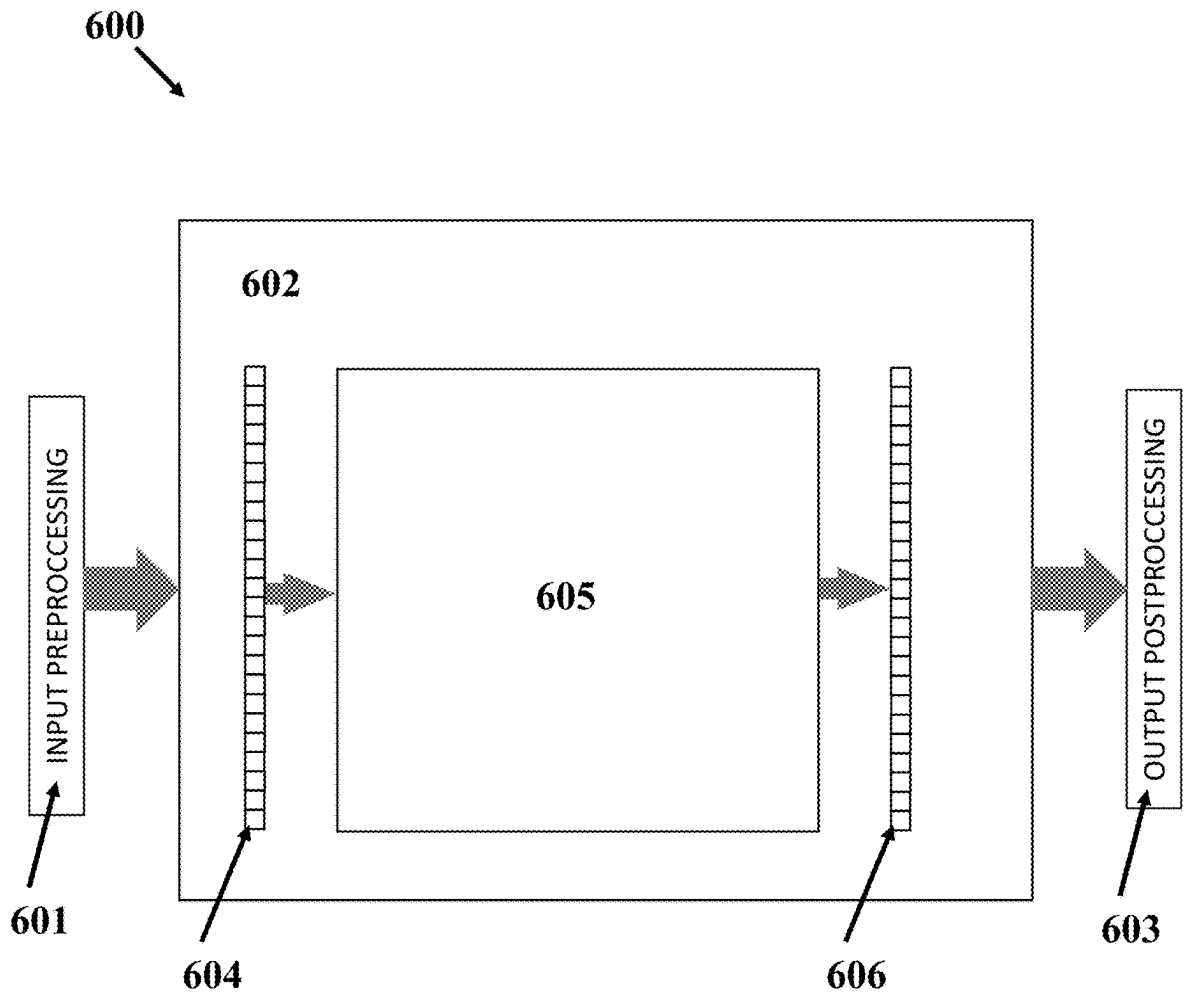
600
602
INPUT PREPROCCESSING
605
OUTPUT POSTPROCCESSING
601
604
606
603

FIG. 18

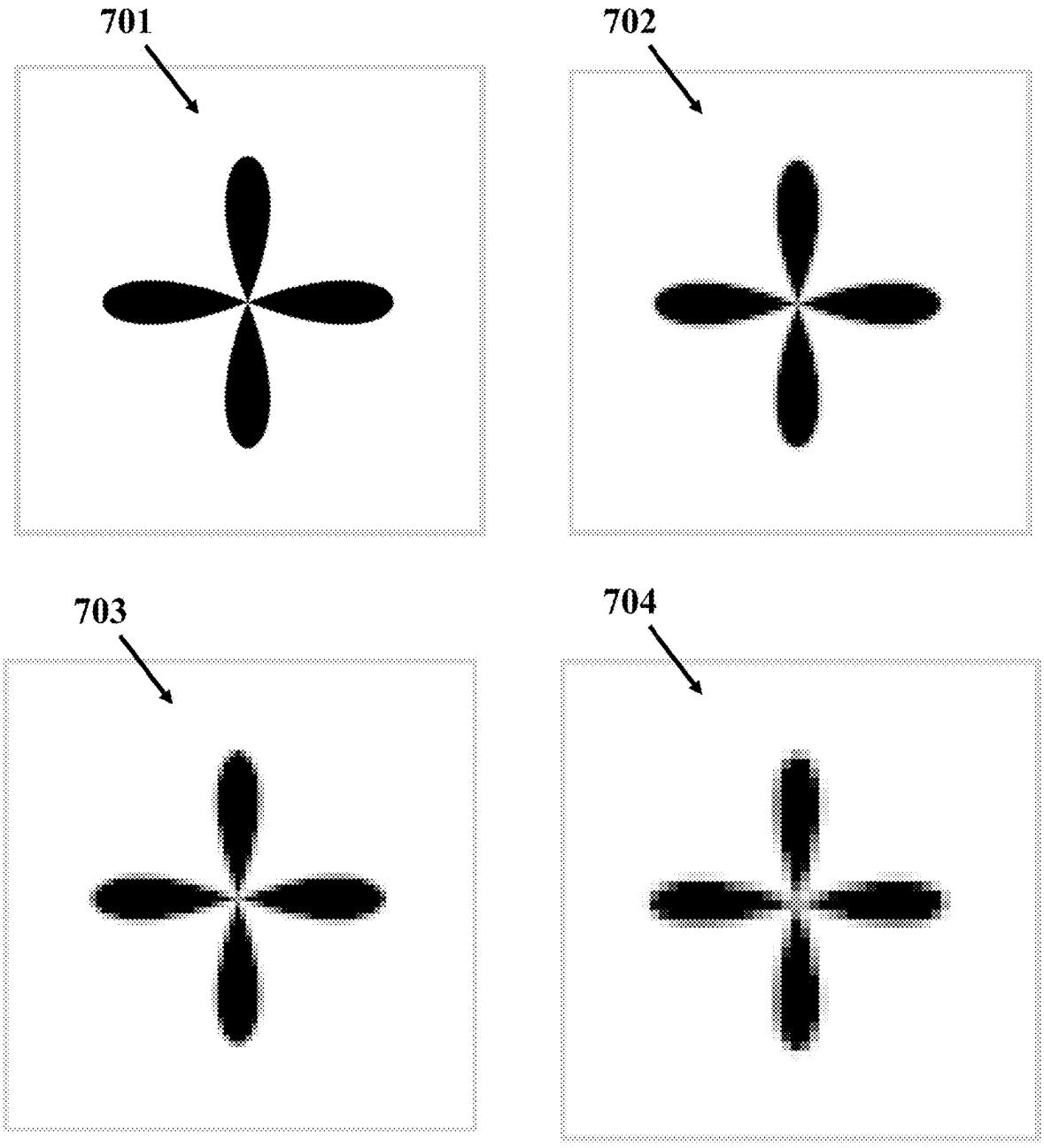

FIG. 19

METHOD AND SYSTEM FOR CREATIVITY AND LEARNING EVALUATION AND ENHANCEMENT

TECHNICAL FIELD

Aspects of the disclosed technology relate to a method and system for providing computer-based technologies to end-users for education and, more particularly, to systems and methods for testing, evaluating, scoring, and enhancing or improving creativity and intelligence.

BACKGROUND OF THE INVENTION

Education has existed for centuries. However, educational methods are often employed in-person in a class or group setting with a single lesson plan applying to all of the students or individuals in the class or group. As such, educational plans are often general and limited to the common interests and lowest aptitude of students or individuals in the class or group and collaborative opportunities are limited to the class or group. Additionally, educational lessons are limited to the languages understood by the teacher and students and are generally focused on memorizing facts instead of developing or improving intelligence or creativity. Further, accessibility to in-person education is often difficult in light of circumstances such as in remote or underserved geographical locations or during global pandemics.

Existing educational assessment tools have been used to measure or evaluate abilities and aptitudes, such as the intelligence quotient ("IQ") or creativity, of individuals. However, these tests are often culturally or linguistically biased, generally limited to intelligence testing, and require a significant amount of time to proctor and score. Notably, proctors and evaluators must be present and trained to administer, review, score, and evaluate test results, which requires time and resources. Additionally, evaluator availability is also limited based on time, language, and location. Furthermore, such evaluations are generally limited to the proctored language and the assumed knowledge base and may therefore be biased.

It is therefore appreciated that a need exists for an improved creativity and intelligence evaluation and development platform capable of quickly, accurately, and automatically evaluating and enhancing or improving a user's creativity and intelligence, that is objective, accessible, and globally collaborative. In view of the above, there is an unmet need for systems, methods, and apparatuses for testing, evaluating, scoring, and enhancing or improving creativity and intelligence.

SUMMARY

This summary is meant to provide some examples and is not intended to be limiting of the scope of the invention in any way. For example, any feature included in an example of this summary is not required by the claims, unless the claims explicitly recite the features. Also, the features, components, steps, concepts, etc. described in examples in this summary and elsewhere in this disclosure can be combined in a variety of ways. Various features and steps as described elsewhere in this disclosure can be included in the examples summarized here.

In one embodiment, a method for evaluating a creativity level of a user is disclosed. The method includes generating a prompt, generating an interactive visualization input based on the prompt, receiving user input related to modification of the interactive visualization input, generating a mathematical representation of the user input, generating a creativity evaluation score from the user input, and generating a creativity evaluation level output based on the creativity evaluation score.

In another embodiment, a system for testing a creativity level of a user is disclosed. The system includes an assessment engine including a processor and a memory, a user interface, a storage, a network, and a client. The assessment engine is operable to generate a creativity evaluation prompt, generate an interactive visualization prompt, generate a mathematical representation of an answer to the creativity evaluation prompt, evaluate the mathematical representation of the answer, and generate a creativity level output based on the evaluation of the mathematical representation of the answer.

In another embodiment, a method for enhancing or improving the creativity of a user is disclosed. The method includes obtaining a user creativity level, generating a user profile for the user, generating a user learning group for the user, generating an interactive assignment for enhancing or improving the creativity of the user learning group, generating a user workspace for the user learning group, verifying a completed interactive assignment, and assessing the completed interactive assignment.

Features that are described and/or illustrated with respect to one embodiment may be used in the same way or in a similar way in one or more other embodiments and/or in combination with or instead of the features of the other embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings, which are incorporated in and constitute a part of the specification, embodiments of the invention are illustrated, which, together with a general description of the invention given above, and the detailed description given below, serve to exemplify embodiments of this invention. It will be appreciated that illustrated element boundaries (e.g., boxes, groups of boxes, or other shapes) in the figures represent only one exemplary embodiment of boundaries. In some embodiments, one element may be designed as multiple elements or that multiple elements may be designed as one element. In some embodiments, an element shown as an internal component of another element may be implemented as an external component and vice versa. Furthermore, elements may not be drawn to scale.

FIG. **1** shows an exemplary creativity assessment system;

FIG. **2** shows example interactive visualization inputs;

FIG. **3** shows an exemplary method for generating a creativity and/or intelligence level output for a user;

FIG. **4** shows an exemplary user interface display during a creativity and/or intelligence evaluation;

FIG. **5** shows an exemplary method for generating a mathematical representation of one or more answers provided by a user in response to one or more creativity and/or intelligence evaluation prompts;

FIG. **6** shows an exemplary method for determining a mathematical representation of a two-dimensional interactive visualization input;

FIG. **7** shows an exemplary method for determining a mathematical representation of a three-dimensional interactive visualization input;

FIG. **8** shows a sample answer to a creativity assessment;

FIG. **9** shows an exemplary method for generating a mathematical representation of the sample answer of FIG. **8**;

FIGS. **10**A and **10**B show another exemplary method for generating a mathematical representation of the sample answer of FIG. **8**;

FIG. **11** shows an exemplary method for generating a creativity and/or intelligence level output of a user;

FIG. **12** illustrates an example of determining duplicate answers to a creativity assessment;

FIG. **13**A shows a sample two-dimensional representation of historical answers to a creativity and/or intelligence level assessment prompt;

FIG. **13**B shows a sample set of answers to a creativity and/or intelligence level assessment prompt compared to the sample representation of historical answers of FIG. **13**A;

FIG. **13**C shows another sample set of answers to a creativity and/or intelligence level assessment prompt compared to the sample representation of historical answers of FIG. **13**A;

FIGS. **14**A and **14**B show sample answers to a creativity assessment having different originality scores;

FIG. **15** shows sample answers to a creativity assessment having different elaboration scores;

FIGS. **16**A and **16**B show examples of answers to a creativity assessment having different flexibility scores;

FIG. **17** shows an exemplary method for enhancing a user's creativity;

FIG. **18** shows an exemplary network architecture for use in the exemplary creativity assessment system of FIG. **1**; and

FIG. **19** shows exemplary processed samples of the sample answer of FIG. **8**.

DETAILED DESCRIPTION

The following includes definitions of exemplary terms that may be used throughout the disclosure. Both singular and plural forms of all terms fall within each meaning.

"Component," as used herein can be defined as a combination of hardware, software, or a portion thereof. A component may be associated with a device. It is appreciated that components may include at least a processor and a memory, wherein the processor is configured to execute one or more instructions stored in the memory.

"Computer" or "processor," as used herein includes, but is not limited to, one or more programmed or programmable electronic device or coordinated devices that can store, retrieve, and process data and may be any processing unit, distributed processing configuration, or processor systems. Examples of processor include microprocessors, microcontrollers, central processing units (CPUs), graphics processing units (GPUs), tensor processing unit (TPU), floating point units (FPUs), reduced instruction set computing (RISC) processors, digital signal processors (DSPs), field programmable gate arrays (FPGAs), etc., in any combination. One or more cores of a single microprocessor and/or multiple microprocessor each having one or more cores can be used to perform the operation as being executed by a processor herein. The processor can also be a processor dedicated to the training of neural networks and other artificial intelligence (AI) systems. The processor may be associated with various other circuits that support operation in the processor, such as random access memory (RAM), read-only memory (ROM), programmable read-only memory (PROM), erasable programmable read-only memory (EPROM), clocks, decoders, memory controllers, or interrupt controllers, etc. These support circuits may be internal or external to the processor or its associated electronic packaging. The support circuits are in operative communication with the processor. The support circuits are not necessarily shown separate from the processor in block diagrams or drawings.

"Network interface" or "data interface," as used herein includes, but is not limited to, any interface or protocol for transmitting and receiving data between electronic devices. The network or data interface can refer to a connection to a computer via a local network or through the internet and can also refer to a connection to a portable device—e.g., a mobile device or a USB thumb drive—via a wired or wireless connection. A network interface can be used to form networks of computers to facilitate distributed and/or remote computing (i.e., cloud-based computing). "Cloud-based computing" means computing that is implemented on a network of computing devices that are remotely connected to the device via a network interface.

"Signal," as used herein includes, but is not limited to, one or more electric signals, including analog or digital signals, one or more computer instructions, a bit or bit stream, or the like.

"Logic," synonymous with "circuit" as used herein, includes but is not limited to hardware, firmware, software and/or combinations of each to perform a function(s) or action(s). For example, based on a desired application or needs, logic may include a software-controlled microprocessor, discrete logic such as an application specific integrated circuit (ASIC), or other programmed logic device and/or controller. Logic may also be fully embodied as software.

"Software," as used herein includes, but is not limited to, one or more computer readable and/or executable instructions that cause a computer, processor, logic, and/or other electronic device to perform functions, actions, and/or behave in a desired manner. The instruments may be embodied in various forms such as routines, algorithms, modules, or programs including separate applications or code from dynamically linked sources or libraries (DLLs). Software may also be implemented in various forms such as a stand-alone program, a web-based program, a function call, a subroutine, a servlet, an application, an app, an applet (e.g., a Java applet), a plug-in, instructions stored in a memory, part of an operating system, or other type of executable instructions or interpreted instructions from which executable instructions are created.

"Module" or "engine" as used herein will be appreciated as comprising various configurations of computer hardware and/or software implemented to perform operations. In some embodiments, modules or engines as described herein may be represented as instructions operable to be executed by a processor in a processor or memory. In other embodiments, modules or engines as described herein may be represented as instructions read or executed from readable media. A module or engine may operate in either hardware or software according to application specific parameters or user settings. It will be appreciated by those of skill in the art that such configurations of hardware and software may vary, but remain operable in substantially similar ways.

"Data storage device," as used herein includes, but is not limited to, a device or devices for non-transitory storage of code or data, e.g., a device with a non-transitory computer readable medium. As used herein, "non-transitory computer readable medium" mean any suitable non-transitory computer readable medium for storing code or data, such as a magnetic medium, e.g., fixed disks in external hard drives, fixed disks in internal hard drives, and flexible disks; an

optical medium, e.g., CD disk, DVD disk; and other media, e.g., ROM, PROM, EPROM, EEPROM, flash PROM, external memory drives, etc.

While the above exemplary definitions have been provided, it is Applicant's intention that the broadest reasonable interpretation consistent with this specification be used for these and other terms. Aspects and implementations of the present disclosure will be understood more fully from the detailed description given below and from the accompanying drawings of the various aspects and implementations of the disclosure. This should not be taken to limit the disclosure to the specific aspects or implementations, but explanation and understanding only.

The following description refers to the accompanying drawings, which illustrate specific embodiments of the present disclosure. Other embodiments having different structures and operation do not depart from the scope of the present disclosure. The descriptions of the invention do not limit the words used in the claims in any way or the scope of the claims or invention. The words used in the claims have all of their full ordinary meanings.

FIG. **1** shows an exemplary creativity and intelligence evaluation and enhancement system **100** of the present disclosure. The System **100** comprises at least an Assessment Engine **102** including at least a Processor **104** and a Memory **106** in data communication with one another. In exemplary embodiments, the Processor **104** may be configured to generate creativity and/or intelligence assessments, receive data from or responses to the creativity and/or intelligence assessments, generate representations of the responses to the creativity and/or intelligence assessments, evaluate said data or representations, and generate creativity and/or intelligence assessment outputs according to the data. The Processor **104** may be a single core processor, a multi-core processor, or other processor configuration as appreciated in the art. The Memory **106** is configured to store instructions which can be executed by the Processor **104**. The Memory **106** of the Assessment Engine **102** may be RAM, ROM, DRAM, SDRAM, DDR SDRAM, flash memory, or any other memory configurable to store instructions to be executed by the Processor **104**. The Processor **104** and Memory **106**, either alone or in combination, may be configured to execute one or more computer readable instructions. The Assessment Engine **102** may include a data engine, computational engine, and/or processing logic.

The System **100** may also include a Storage **110** for long term storage of captured creativity evaluation prompts, creativity test data, creativity assessment answers, assessments, databases, assignments, educational plans, interactive assignments, answers to interactive assignments, etc. The Storage **110** may be any suitable data storage or memory device and may be in data communication with the Assessment Engine **102**. It is appreciated that the data communication between the System **100** and the Storage **110** may be in real time or near real-time. In some embodiments, the Storage **110** is integrated within the Assessment Engine **102**.

In exemplary embodiments, the Assessment Engine **102** is configured to evaluate, modify, transform, etc. input data from elsewhere in the System **100**. In some embodiments, the Assessment Engine **102** is configured to automatically evaluate, modify, transform, etc. input data from elsewhere in the System **100**. In some embodiments, the Processor **104** may be configured to implement various artificial intelligence ("AI") tools and techniques, enabling analysis of extremely large structured and/or unstructured and changing data sets, deductive or inductive reasoning, complex problem solving, and computer learning based on historical patterns, expert input, and feedback loops. "Artificial intelligence," as used herein, means a wide field of tools and techniques in the field of computer science that enable a computer to learn and improve over time. For example, the Processor **104** may implement one or more neural networks, such as an artificial neural network or a convolutional neural network, to employ various learning methods including, but not limited to, statistical learning, unsupervised learning, and reinforcement learning. The neural networks may be a plurality of interconnected software nodes or neurons that are arranged into a plurality of layers (e.g., input layers, hidden layers, and output layers). The neurons can have a many-to-many relationship with other nodes and each neuron may be configured to weight and perform calculations based on input data to ultimately calculate an output. The neural network may be trained based on a variety of inputs to adjust the node hierarchy such that the outputs of the neural network reach a desired level of accuracy.

As shown in FIG. **18**, the Processor **104** of the Assessment Engine **102** may be configured to implement a Processing Architecture **600**, such as an artificial neural network, to employ various learning methods including, but not limited to, statistical learning, unsupervised learning, and reinforcement learning, to generate creativity and/or intelligence evaluation outputs based on answers provided by a user. The Processing Architecture **600** includes an Input Preprocessing Engine **601**, a Calculation Engine **602**, and an Output Postprocessing Engine **603** collectively configured to automatically process an input, such one or more answers provided by a user to a creativity evaluation prompt, automatically evaluate the input, such as determining the type, position, orientation, scale, and/or color of components of the input, generating evaluation scores of the components of the input, and automatically generate an output corresponding to the evaluation of the input, such as a creativity evaluation level output or score corresponding to one or more answers provided by a user to the creativity evaluation prompt.

The Input Preprocessing Engine **601** may be configured to receive one or more inputs, such as an image or representation of an answer to a creativity evaluation prompt, and preprocess, process, and/or reconfigure the inputs such that the one or more inputs may be received and evaluated by the Calculation Engine **602**. The Input Preprocessing Engine **601** may be configured to automatically downscale, upscale, clean, cleanse, convert, integrate, transform, reduce, enhance, or otherwise configure or process inputs such that the Calculation Engine **602** may receive the inputs, evaluate the inputs, and generate one or more outputs corresponding to the evaluation of the inputs. For example, the Input Preprocessing Engine **601** may be configured to receive a two- or three-dimensional figure as an input and automatically downscale the figure according to a fixed ratio to improve the efficiency of the Calculation Engine **602** and/or reduce the resources necessary for evaluation by the Calculation Engine **602**.

The Calculation Engine **602** may be configured to automatically receive one or more inputs from the Input Preprocessing Engine **601**, evaluate or transform the inputs, and generate an output corresponding to the evaluation of the one or more inputs. For example, the Calculation Engine **602** may be configured to automatically generate a mathematical representation of one or more answers to a creativity evaluation prompt, evaluate the one or more answers, and generate a creativity evaluation level output corresponding to the fluency, originality, elaboration, and flexibility of the answers provided by the user, as described below. In some

embodiments, the Calculation Engine **602** is configured to implement or employ an image recognition and classification neural network architecture. For example, the Calculation Engine **602** may implement or employ one or more convolutional neural networks (CNNs) with convolution using different size kernels, pooling (e.g., maximum, minimum, mean, or any other form), and fully connected layers in different configurations and combinations. Instead of or in addition to, the Calculation Engine **602** may be configured to implement or employ a transformers network structure.

The Calculation Engine **602** may include a plurality of evaluation or calculation layers, such an Input Layer **604**, one or more Hidden Layers **605**, and an Output Layer **606**. The Input Layer **604**, Hidden Layers **605**, and Output Layer **606** may each include a plurality of interconnected nodes or neurons configured to process, weight, or evaluate one or more inputs according to node parameters and/or node hierarchies to ultimately generate or calculate an output. The nodes in the Input, Hidden, and Output Layers **604**, **605**, **606** may have a many-to-many relationship such that each node may receive as inputs the outputs of one or more nodes of the previous layer and may output a weighted parameter or calculation to one or more nodes in the successive layer which receive the weighted parameters or calculations as inputs. The weights, parameters, and hierarchy of the nodes may be determined or developed from training or historical data sets with known results and may be updated according to subsequent data. The node parameters, weights, and hierarchy may be trained to implement or employ image recognition, image classification, image analysis, and creativity level evaluation, such as described below.

In some embodiments, the Input Layer **604** receives the output of the Input Preprocessing Engine **601** as an input. For example, the Input Layer **604** may receive real, float, or binary values from the Input Preprocessing Engine **602**, such as depending on whether the input received by the Input Preprocessing Engine **602** is in an image space or format (e.g., a two-dimensional image or a three-dimensional volumetric image) or in a vector space or format. In other embodiments, the Processing Architecture **600** may not include an Input Preprocessing Engine **601** and the Input Layer **604** of the Calculation Engine **602** may be configured to directly receive and process one or more inputs, such as answers to creativity and/or intelligence evaluation prompts. Each node of the Input Layer **604** may weight or evaluate some or all of input received, such as received directly or received from the Input Preprocessing Engine **601**. The weighted or evaluated parameters of each node of the Input Layer **604** may be output to one or more nodes in the first Hidden Layer **605** as inputs.

The Hidden Layers **605** may be configured to automatically generate a mathematical representation of the input received by the Input Preprocessing Engine **601** and/or the Input Layer **604**. The Calculation Engine **602** may include any number of Hidden Layers **605**. The Hidden Layers **605** may be arranged such that the outputs of one Hidden Layer **605** may be the inputs of the next or successive Hidden Layer **605**. Each node of the Output Layer **606** may receive as inputs the outputs of one or more of the nodes of the last Hidden Layer **605** and weight or evaluate the received inputs. The relationships, hierarchy, and weights of the nodes of the Hidden Layers **605** may be determined or updated according to sufficient training from historical with known results. The weighted or evaluated parameters of each node of the last Hidden Layer **605** may be output to one or more nodes in the Output Layer **606** as inputs. For example, the node weights, parameters, and hierarchies of the Hidden Layers **605** may be trained to generate a mathematical representation of one or more answers to a creativity evaluation prompt provided by a user, such as described below.

The Output Layer **606** of the Calculation Engine **602** may be configured to automatically generate, transform, or output a representation of the input received by the Input Preprocessing Engine **601** and/or Input Layer **604** and evaluated by the Hidden Layers **605**. Each node of the Output Layer **606** may receive inputs corresponding to the weighted parameters of one or more nodes of the last Hidden Layer **605**, weight or evaluate the inputs, and output weighted parameters or evaluations which may be used or combined to generate, transform, or output a representation of the evaluation of the Hidden Layers **605**. The Output Layer **606** may include a different number or artificial nodes or neurons than the Input Layer **604** and/or Hidden Layers **605**, such as depending on the format or representation of the input received by the Input Preprocessing Engine **601** and/or Input Layer **604**. For example, the Output Layer **606** may be configured to automatically generate a dimensionality reduced representation of the input received by the Input Preprocessing engine **601** and/or Input Layer **604**, as described below.

The Output Postprocessing Engine **603** may be configured to automatically process and/or postprocess one or more outputs from the Calculation Engine **602** and generate a creativity evaluation level output, such as described below. The Output Postprocessing Engine may receive as inputs the results, calculations, representations, or outputs from the Output Layer **606** to generate the creativity evaluation level output. The Output Postprocessing Engine **603** may also receive as inputs other information or values, such as the amount of time spent creating or preparing each answer to the creativity evaluation prompt. In some embodiments, the Output Postprocessing Engine **603** is configured to automatically generate a creativity evaluation level output according to the answers provided by the user and/or historical data, including historical answers or responses, known creativity and/or intelligence evaluations, and answers or responses corresponding to known creativity and/or intelligence evaluations. For example, the Output Postprocessing Engine **603** may be configured to automatically generate a frequency distribution of historical answers to creativity evaluation prompts and generate creativity outputs or scores of the answers provided by the user according to a comparison of the answers provided by the user to the frequency distribution of historical answers, as described below.

Referring back to FIG. **1**, the System **100** may further include a User Interface **108** in data communication with the Assessment Engine **102**. The User Interface **108** may also be in data communication with the Storage **110**, a Network **112**, and one or more Clients **114**. The User Interface **108** may be a graphical or digital representation generated by the Assessment Engine **102** such that a user (e.g., Client **114**) may interact with the Assessment Engine **102** via the User Interface **108**. The User Interface **108** may be capable of being displayed on any digital display such as, but not limited to, a LCD, LED, OLED, monitor, television, cellular telephone, or tablet computer. In some embodiments, the User Interface **108** displays 3D images or videos which may be interpreted by a user with or without 3D glasses, or with or without additional hardware configured to assist in the interpretation of 3D image and video data. The Assessment Engine **102** may generate windows, images, prompts, commands, menus, forms, interactive modules, or other displays

which may be displayed on or in the User Interface **108** and viewed and/or interacted with by a user, such as via one of the Clients **114**. In several exemplary embodiments, the user interacts with, or edits, or displays, or performs actions with, or views, or adds/edits/replaces information on the User Interface **108**.

The Assessment Engine **102**, the Processor **104**, the Memory **106**, the User Interface **108**, and the Storage **110** may be in data communication with one or more Networks **112** which may permit the Assessment Engine **102**, the Processor **104**, and the Memory **106** to operably communicate with each other or other components of the System **100**. The Networks **112** may be any suitable wired or wireless communication system which may permit data communication between devices, computers, processors, hardware components, or other suitable components. For example, the Network **112** may be the Internet, intranet, wired connection, or any other suitable means for enabling operable communication between devices, computers, processors, hardware components, or other suitable components. The User Interface **108** and/or the Storage **110** may be directly in data communication with the Assessment Engine **102** and/or the User Interface **108** and/or the Storage **110** may be in data communication with the Assessment Engine **102** via the one or more Networks **112**.

The System **100** may also include one or more Clients **114** in data communication and capable of operating or interacting with the User Interface **108** and/or the Assessment Engine **102** via the Network **112**. Each Client **114** may be a computer, such as a PC, a mobile terminal, a mobile computing device, a cellular telephone, a tablet computer, a smart phone, a mobile data organizer or personal data assistant (PDA), or any other suitable device. Each Client **114** may include a processor, a memory, a display device capable displaying an image, and an input device capable of implementing user inputs or commands. The input device may allow the user to interact with the Client **114** and the User Interface **108**, such as by inputting commands, selecting icons, accessing dialog boxes, typing, selecting dropdown options, navigating a page, or manipulating or adjusting a digital image. The input device may be a keyboard, mouse, stylus, microphone, speech processing means, touch screen, camera, motion sensor, motion tracker, or any other suitable means for inputting or interacting with a computer or mobile terminal as will be appreciated by those of skill in the art. The display may be a LCD, LED, OLED, monitor, television, telephone, tablet computer, virtual or augmented reality headset or glasses, or other compatible digital display configurations as will be appreciated by those of skill in the art. The display may be a standalone device operable to receive input from a variety of input devices such as a computer, tablet, phone, etc., or may be integrated with an input device. In some embodiments, the display is configured to display 3D images or videos which may be interpreted by a user with or without 3D glasses, or with or without additional hardware configured to assist in the interpretation of 3D image and video data. In certain embodiments, the display may comprise additional displays, or one or more displays configured in a display area.

In the illustrated embodiment, each Client **114** may interact with the Assessment Engine **102** and/or User Interface **108** via the Network **112**. However, it will be appreciated that the System **100** may embody other configurations. For example, the Assessment Engine **102** and/or User Interface **108** may be incorporated on one or more of the Clients **114** such that the Client **114** may interact with the Assessment Engine **102** and/or User Interface **108** directly, without the Network **112**.

In the illustrated embodiment, the System **100** includes three Clients **114**. However, it will be appreciated that the System **100** may include any suitable number of Clients **114**. For example, the System **100** may include one, two, or four or more Clients **114**, each in data communication with the Network **112**. In some embodiments, the Clients **114** may be operable without a connection to the Assessment Engine **102** and/or User Interface via the Network **112**, such as in an offline mode, and later connected with the Assessment Engine **102** and/or User Interface via the Network **112**, such as to input and/or upload answers to creativity and/or intelligence prompts created by the user or to input and/or upload interactive assignments completed by the user, as described below.

It is appreciated that the Assessment Engine **102**, Processor **104**, Memory **106**, and Storage **110** may be configured as separate devices linked by a wireless or wired control signal, or integrated as a single device. It is further contemplated that the System **100** may be comprised of additional technical elements configured to collect, interpret, assess, and generate outputs from user creativity and intelligence evaluation and enhancement data including, but not limited to, a microphone, additional cameras, motion sensors, network or data interfaces, speakers, earphones, printers, etc.

It is appreciated that the Assessment Engine **102**, User Interface **108**, Storage **110**, Network **112**, and/or Clients **114** may be configured in combination with another or similar devices configured to capture, store, display, process, evaluate, or enhance creativity assessment or creativity development data. In certain embodiments, the exemplary creativity evaluation and development system **100** may further include additional components, including but not limited to, additional computing devices (e.g., servers, workstations, client workstations, routers, switches, controllers and various computing devices) and/or mobile devices.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate a creativity and/or intelligence assessment of a user (e.g., Client **114**). In some embodiments, the user may take the creativity and/or intelligence assessment via one of the Clients **114**, such as through the User Interface **108**. In other embodiments, the user may take some or all of the creativity and/or intelligence assessment separately from the Assessment Engine **102**, Client **114**, and/or User Interface **108** and input and/or upload the user's answers to the creativity and/or intelligence evaluation to the Client **114**, User Interface **108**, and/or Assessment Engine **102**. For example, the user may form some or all answers to the creativity and/or intelligence assessment via handwriting or by positioning, assembling, manipulating, and/or otherwise configuring physical two- or three-dimensional shapes or objects and inputting the answers to the User Interface **108**, and/or Assessment Engine **102** via one or more of the inputs of the Client **114**, such as via webcams, cameras, two- or three-dimensional scanners, motion sensors, or other similar input devices.

In some embodiments, the Assessment Engine **102** may be associated with one or more Interactive Visualization Inputs **116** having predetermined sizes, shapes, and orientations. The Interactive Visualization Inputs **116** may be displayable to and manipulable by a user, such as through the User Interface **108**, and/or may be physical shapes or objects which are provided to the user to form answers to one or more creativity and/or intelligence evaluation prompts. In some embodiments, the Interactive Visualiza-

tion Inputs **116** may be generated and displayed on/in the User Interface **108** which may appear to a user on a display of one of the Clients **114**. It is appreciated that visualization of the Interactive Visualization Inputs **116** may comprise a computer generated image overlaid on a reference or composite image received from a camera. The Interactive Visualization Inputs **116** may be a digitally generated shape, design, or image and may take the form of any suitable two- or three-dimensional shape design, or image such as those illustrated in FIG. **2**. For example, each Interactive Visualization Input **116** may be a two-dimensional shape, such as, but not limited to, a rectangle, square, triangle, pentagon, hexagon, circle, oval, ellipse, petal, spiral, star, heart, semicircle, crescent, trapezium, cross, or arrow, a three-dimensional shape, such as a sphere, half sphere, cone, pyramid, cube, L-shape prism, cuboid, or cylinder, or any other suitable two- or three-dimensional shape, design, or image.

The one or more generated Interactive Visualization Inputs **116** generated by the Assessment Engine **102** and displayed on the User Interface **108** may be manipulated by a user, such as through the User Interface **108**. In some embodiments, the Assessment Engine **102** may automatically generate one or more Interactive Visualization Inputs **116** in the User Interface **108**. In some embodiments, once the Interactive Visualization Input **116** is generated, the user may use an input of the Client **114** to move, scale, rotate, or otherwise position the Interactive Visualization Input **116** through the User Interface **108**. The user may manipulate the generated and displayed Interactive Visualization Input **116** by the input of the Client **114** captured via a keyboard, mouse, camera, microphone, motion sensor, or any other suitable input means as appreciated by those of skill in the art. For example, the Assessment Engine **102** may generate one or more Interactive Visualization Inputs **116** which may be displayed in a key or queue in the User Interface **108** and the user may use the input of one of the Clients **114** to select and drag one of the Interactive Visualization Inputs **116** into a user manipulable space or grid of the User Interface **108**, such as an answer space or grid, in which the Assessment Engine **102** may generate a manipulated Interactive Visualization Input **116** correspondent to the input commands provided by the user. After the Interactive Visualization Input **116** is moved into the user manipulable space or grid, the user may manipulate the Interactive Visualization Input **116**, such as, but not limited to, by positioning, rotating, scaling, coloring, or otherwise manipulating the shape, design, or image. After the Interactive Visualization Input **116** is moved or placed into the user manipulable space or grid of the User Interface **108**, the Assessment Engine **102** may generate one or more other Interactive Visualization Inputs **116** in the key or queue and the process may be repeated such that the user manipulable space or grid of the User Interface **108** comprises multiple Interactive Visualization Inputs **116** generated by the Assessment Engine **102** and manipulated by the user. As detailed below, the user may position, rotate, scale, color, or otherwise manipulate Interactive Visualization Inputs **116** to form one or more answers to a creativity and/or intelligence task or prompt and thereby generate data indicative of any such answers.

For example, as shown in FIG. **4**, the User Interface **108** may be configured to display one or more Interactive Visualization Inputs **116** generated by the Assessment Engine **102** for a user to move, scale, rotate, color, or otherwise position, such as via an input of the Client **114**. The user may drag one of the Interactive Visualization Inputs **116** generated by the Assessment Engine **102** in a Queue **118** in the User Interface **108** to a User Manipulable Space or Grid **120**. In the illustrated embodiment, the Queue **118** contains one Interactive Visualization Input **116**. However, it will be appreciated that the Queue **118** may include any number of different Interactive Visualization Inputs **116**. The User Interface **108** may have any number of User Manipulable Spaces or Grids **120**, which may be divided into sub-spaces or sub-grids. The user may then position, rotate, scale, color, or otherwise manipulate the Interactive Visualization Input **116** in a first User Manipulable Space or Grid **120***a* via input commands. The user may then drag one or more additional Interactive Visualization Inputs **116** from the Queue **118** into the first User Manipulable Space or Grid **120***a* and position, rotate, scale, or otherwise manipulate the additional Interactive Visualization Input(s) **116** to form an answer to a creativity and/or intelligence evaluation task or prompt, as described below. The user may also adjust the position, rotation, scale, color, or configuration of one or more Interactive Visualization Inputs **116** placed and configured in the first User Manipulable Space or Grid **120***a*.

After the user forms an answer in the first User Manipulable Space or Grid **120***a*, the user may indicate that the answer is complete and input a command via the Client **114**, such as in the User Interface **108**, to indicate that the answer is complete. The Assessment Engine **102** may be configured to create and/or generate a new User Manipulable Space or Grid **120**, generate a new creativity and/or intelligence evaluation prompt, or terminate the creativity and/or intelligence assessment, as described below. In some embodiments, the user may indicate that the answer is complete and prompt the Assessment Engine **102** to generate a new User Manipulable Space or Grid **120** by selecting a Completion Indicator **124** in the User Interface **108** via the Client **114**. For example, after the user has positioned one or more Interactive Visualization Inputs **116** in one of the User Spaces or Grids **120**, the user may select the Completion Indicator **124** via an input of the Client **114** to prompt the Assessment Engine **102** to automatically generate a new User Manipulable Space or Grid **120**. After the Assessment Engine **102** generates a new User Manipulable Space or Grid **120** in the User Interface **108**, the user may drag and position, rotate, scale, color, or otherwise manipulate one or more Interactive Visualization Inputs **116** from the Queue **118** in the new User Manipulable Space or Grid **120** to form an additional answer to a creativity and/or intelligence evaluation prompt. The user may also select a previous User Manipulable Space or Grid **120** (e.g., **120***b*, **120***c*, **120***d*, **120***e* in FIG. **4**) and adjust and/or readjust the position, rotation, scale, color, or configuration of any of the Interactive Visualization Inputs **116** contained in the previous User Manipulable Spaces or Grids **120**. The user may remove one or more Interactive Visualization Inputs **116** from one of the User Manipulable Spaces or Grids **120** via a Removal Indicator **122** in the User Interface **108** which, when selected or interacted with, causes the Assessment Engine **102** to remove one or more Interactive Visualization Inputs **116** from one of the User Manipulable Spaces or Grids **120**. For example, the user may select one of the Interactive Visualization Inputs **116** via the Client **114** and then select the Removal Indicator **122** to remove the Interactive Visualization Input **116** from the User Manipulable Space **120** or the user may drag the Interactive Visualization Input **116** from the User Manipulable Space **116** to the Removal Indicator **122** to remove the Interactive Visualization Input **116** from the User Manipulable Space **120**. In some embodiments, the Removal Indicator **116** may allow the user to cause the Assessment Engine **102** to remove an indicated User Manipulable Space or Grid **120***a*, **120***b*, **120***c*,

120*d*, 120*e* such as by selecting a particular User Manipulable Space or Grid 120*a*, 120*b*, 120*c*, 120*d*, 120*e* and selecting the Removal Indicator 122 or by dragging the particular User Manipulable Space or Grid 120*a*, 120*b*, 120*c*, 120*d*, 120*e* to the Removal Indicator 122 in the User Interface 108.

In other embodiments, the Interactive Visualization Inputs 116 may be manipulable by a user separate from the User Interface 108, the Assessment Engine 102, and/or the Client 114. For example, the Interactive Visualization Inputs 116 may be physical two- or three-dimensional shapes, designs, or objects which may be provided to the user such that the user may position, rotate, manipulate, assemble, or otherwise configure the Interactive Visualization Inputs 116, such as by hand. The user may position, rotate, manipulate, assemble, or otherwise configure multiple Interactive Visualization Inputs 116 to form one or more answers to a creativity and/or intelligence task or prompt, as described below, and input and/or upload the one or more answers to the User Interface 108, Assessment Engine 102, and/or Client 114, such as via one or more of the inputs of the Client 114, such as via webcams, cameras, two- or three-dimensional scanners, motion sensors, or other similar input devices. For example, the user may position, rotate, manipulate, assemble, or otherwise configure multiple Interactive Visualization Inputs 116 to form one or more answers to a creativity and/or intelligence task or prompt and photograph, videotape, scan, or otherwise input and/or upload the one or more answers to the User Interface 108, Assessment Engine 102, and/or Client 114 via one or more inputs of the Client 114. Once input and/or uploaded, the User Interface 108, Assessment Engine 102, and/or Client 114 may generate digital representations of the one or more provided answers based on the input and/or upload from the Client 114. For example, the User Interface 108, Assessment Engine 102, and/or Client 114 may receive the one or more answers and the Assessment Engine 102 may generate digital representations of the answers in the User Interface 108 by converting the input and/or upload of the provided answers into a digital form similar to answers formed by users moving, scaling, rotating, or otherwise positioning Interactive Visualization Inputs 116 digitally generated in the User Interface 108 in the user manipulate space or grid of the User Interface 108. In some embodiments, the digital representations of provided answers generated by the Assessment Engine 102 and displayed in the User Interface 108 may be further manipulated by a user, such as via input commands from the Client 114, as described above. Data is generated that is indicative of any answers to the prompt and of any user manipulations of the prompt to create any such answers.

In some embodiments, the Assessment Engine 102 may automatically generate one or more creativity and/or intelligence tasks or prompts which may be displayed on the User Interface 108 for a user to complete. Each task or prompt may ask the user to manipulate one or more Interactive Visualization Inputs 116 to construct one or more answers or responses to the prompt, as described below. Each task or prompt may include one or more user manipulable spaces or grids corresponding with the task or prompt. In certain embodiments, the Assessment Engine 102 may generate a separate user manipulable space or grid in the User Interface 108, such as sub-spaces or sub-grids, for each answer or response the user has to the task or prompt. In other embodiments, the Assessment Engine 102 may generate a single user manipulable space or grid in the User Interface 108 for the task or prompt such that each of the user's answers or responses to the task or prompt may be separate. In other embodiments, the Assessment Engine 102 may generate one or more creativity and/or intelligence tasks or prompts which may be presented or provided to the user separately from the User Interface 108 and/or Client 114. For example, the Assessment Engine 102 may generate one or more creativity and/or intelligence tasks or prompts which may be printed out and provided to the user and provided along with physical two- or three-dimensional Interactive Visualization Inputs 116 for the user to form one or more answers to the one or more creativity and/or intelligence tasks or prompts.

In certain embodiments, the Assessment Engine 102 may be operable to automatically generate and implement a timer to control an amount of time that a user may access the User Interface 108 via one of the Clients 114 to take creativity and/or intelligence assessment. After the amount of time expires, the Assessment Engine 102 may disable the User Interface 108 or otherwise prevent the user from further answering or responding to the prompt of the creativity and/or intelligence evaluation, prevent the user from manipulating any of the Interactive Visualization Inputs 116 generated and displayed in the User Interface 108, and/or prevent the user from further accessing or answering or responding to the creativity and/or intelligence evaluation generated in the User Interface 108. For example, upon expiration of the timer, the Assessment Engine 102 may cause the User Interface 108 to terminate the current prompt or task of the creativity and/or intelligence evaluation and generate a new prompt or task in the User Interface 108 or the Assessment Engine 102 may cause the User Interface 108 to terminate the creativity and/or intelligence evaluation.

In some embodiments, the Assessment Engine 102 may be operable to automatically monitor and/or record the manner by which a user positions, rotates, scales, colors, assembles, or otherwise manipulates Interactive Visualization Inputs 116 to form one or more answers to one or more creativity and/or intelligence evaluation prompts. In certain embodiments, the Assessment Engine 102 may be operable to generate a record of each time a user positions, rotates, scales, colors, assembles, or otherwise manipulates one or more Interactive Visualization Inputs 116. For example, the Assessment Engine 102 may be operable to generate a unique timestamp including the time and change each time a user positions, rotates, scales, colors, assembles, or otherwise manipulates one or more Interactive Visualization Inputs 116, and the Assessment Engine 102 may be operable to separate the timestamps by answer and/or by prompt. In some embodiments, in addition or in the alternative, the Assessment Engine 102 may be operable to generate a recording or recreation of the process by which a user positions, rotates, scales, colors, assembles, or otherwise manipulates Interactive Visualization Inputs 116 to form one or more answers to one or more creativity and/or intelligence evaluation prompts. For example, the Assessment Engine 102 may be operable to generate a video or recording of the entire process by which a user positions, rotates, scales, colors, assembles, or otherwise manipulates Interactive Visualization Inputs 116, such as in the User Interface 108, to form one or more answers to one or more creativity and/or intelligence evaluation prompts. The Assessment Engine 102 may also be operable to generate separate videos or recordings for the process by which a user positions, rotates, scales, colors, assembles, or otherwise manipulates Interactive Visualization Inputs 116 to form each separate answer to each creativity and/or intelligence evaluation

prompt. All of these types of data related to user interactions and manipulations are stored in the Memory **106** or Storage **110**.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate a creativity and/or intelligence evaluation output based on one or more answers or responses provided by a user via the User Interface **108** to one or more tasks or prompts generated by the Assessment Engine **102**. The Assessment Engine **102** may be operable to automatically generate a digital representation, such as a mathematical representation, of each answer or response or groups or answers or responses provided by the user in response to the one or more tasks or prompts. The Assessment Engine **102** may be operable to automatically generate a creativity and/or intelligence evaluation output from the mathematical representations generated from the answers or responses provided by the user in response to the one or more tasks or prompts. For example, the Assessment Engine **102** may automatically generate the creativity and/or intelligence evaluation output indicative of the creativity and/or intelligence level of the user from the responses or answers provided by the user in the User Interface **108** based on one or more factors, such as, but not limited to, the fluency, originality, elaboration, and flexibility of the valid answers or responses provided by the user, as described below. In certain embodiments, the Assessment Engine **102** may compare or otherwise evaluate the user's answers or responses to the tasks or prompts to historical data, including historical answers or responses, known creativity and/or intelligence evaluations, and answers or responses corresponding to known creativity and/or intelligence evaluations, to determine, generate, and output the creativity and/or intelligence evaluation of the user.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate a user profile for a user. The Assessment Engine **102** may generate the user profile based on the user's creativity and/or intelligence evaluation output, age, geographical location, education level, natural or native language, learning style(s), expression style(s), interests, skills, cognition, educational or mental abilities, or any other suitable information about a user as will be appreciated in the art. The user may input information about the user in the User Interface **108**, such as through one of the Clients **114**, and may input preferences, such as graphical or display preferences, which may update the user profile. Alternatively or in combination, the Assessment Engine **102** may generate the user profile based on historical information or data contained in the Storage **110** or from any other suitable location. The Assessment Engine **102** may alter the User Interface **108**, such as the display of the User Interface **108**, based on the user profile of a user. For example, the Assessment Engine **102** may translate the User Interface **108** such that it displays in the native language of the user and/or the User Interface **108** may alter the display or font of the User Interface **108** based on one or more learning or expression style of the user, such as if the user has dyslexia.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate a creativity and/or intelligence enhancement module for one or more users to enhance one or more areas of creativity and/or intelligence of the users. The creativity and/or intelligence enhancement module may comprise learning or educational modules unique to the user, which may include educational assignments, tasks, evaluations, or programs, to enhance the creativity and/or intelligence of the user. The Assessment Engine **102** may generate the creativity and/or intelligence enhancement module based, in part, on the creativity and/or intelligence evaluation output generated by the Assessment Engine **102**. In some embodiments, the Assessment Engine **102** may also generate the creativity and/or intelligence enhancement module based on any other suitable factor to an individual, alone, in combination with the creativity and/or intelligence evaluation output, or in any combination thereof. For example, the Assessment Engine **102** may generate the creativity and/or intelligence enhancement module for a user also based on the user's interests, skills, native language, educational level, educational progress, learning style(s), expression style(s), and/or any other suitable factor, as described below. The Assessment Engine **102** may also generate the creativity and/or intelligence enhancement module for a user to enhance identified areas of creativity and/or intelligence, such as areas of creativity and/or intelligence in which the user scored below a certain threshold or lower during the creativity and/or intelligence evaluation assessment.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate an evaluator interface in the User Interface **108** for an administrative user, such as a teacher, instructor, or evaluator of one or more users. The evaluator interface may allow a teacher, instructor, or evaluator accessing the User Interface **108** via one of the Clients **114** to facilitate, monitor, track, and evaluate the creativity and/or intelligence enhancement of one or more users. For example, the teacher, instructor, or evaluator may access the user profile, creativity and/or intelligence evaluation output, and creativity and/or intelligence enhancement module of each user in the teacher's class or group and may access, edit, mark-up, grade or otherwise evaluate materials submitted by the users in the teacher's class, as described below. The Assessment Engine **102** and User Interface **108** may also be operable to generate a class environment by which the teacher via one of the Clients **114** may teach or instruct or communicate with one or more users via one of the Clients **114**, such as by generating a video call or conference between the Clients **114**. In certain embodiments, the Assessment Engine **102** and/or User Interface **108** may prevent the teacher, instructor, or evaluator from accessing or communicating with users or Clients **114** that the teacher does not have access to, such as users or Clients **114** not in the teacher's class.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate a secure presentation environment which may be displayed via the User Interface **108** and viewed from one or more Clients **114** with permissions provided by the Assessment Engine **102** and/or User Interface **108**. The secure presentation environment may be operable to display or completed interactive assignments via the User Interface **108** to one or more users with enabled permission via one or more Clients **114**. For example, one of the users may submit an assignment or project, such as a completed interactive assignment, to the secure presentation environment which may be accessed through the User Interface **108** by one of the Clients **114** with the requisite permission. The user may limit the access of the submission to the secure presentation environment to users or Clients **114** in the class, district, region, state, country, or other suitable group. Alternatively, the user may select that the submission may be viewed or accessed by any Client **114** connected to the Network **112**.

FIG. **3** shows steps according to an exemplary method **200** for generating a creativity and/or intelligence level output for a user. It will be appreciated that the illustrated method and associated steps may be performed in a different

order, with illustrated steps omitted, with additional steps added, or with a combination of reordered, combined, omitted, or additional steps. The steps may be implemented in one or more computer readable instructions, such as by the Assessment Engine **102**.

At step **202**, a creativity and/or intelligence evaluation prompt and one or more corresponding answer spaces may be generated. The creativity and/or intelligence evaluation prompt may be any question or task which may test or assess the creativity and/or intelligence of a user. In some embodiments, the Assessment Engine **102** may be operable to automatically generate a prompt for a user to answer which may be displayed on the User Interface **108** and viewed by a user via one of the Clients **114**. The Assessment Engine **102** may generate a unique prompt or may select from one of a number of stored or historical prompts, such as a prompt stored in the Storage **110**. The prompt may ask the user a question or ask the user to complete a task. The prompt may be any suitable question or task to test the creativity and/or intelligence of a user. For example, the prompt may ask the user the user to, using one or more Interactive Visualization Inputs **116**, create or draw as many of the following designs, items, or figures as possible: flowers, birds or animals (such as a specific type of bird or animal), buildings, vehicles, trees, robots, fish, fruits, or hats.

In other embodiments, the Assessment Engine **102** may generate one or more creativity and/or intelligence evaluation tasks or prompts which may be presented and/or provided to the user separately from the User Interface **108** and/or Client **114**. For example, the Assessment Engine **102** may generate one or more creativity and/or intelligence tasks or prompts which may be printed out and provided to the user. The provided creativity and/or intelligence evaluation tasks or prompts may be any of the creativity and/or intelligence evaluation prompts which may be automatically generated, displayed on the User Interface **108**, and viewed by a user via one of the Clients **114** as described above.

At step **204**, one or more Interactive Visualization Inputs **116** may be generated for the user to manipulate to create an answer or response to the creativity and/or intelligence evaluation prompt. In some embodiments, the Assessment Engine **102** may be operable to automatically generate one or more Interactive Visualization Inputs **116** for the user to manipulate or otherwise use to form an answer to the prompt and the Interactive Visualization Inputs **116** may be generated and displayed in the User Interface **108** and viewed by the user via one of the Clients **114**. In certain embodiments, the Interactive Visualization Inputs **116** generated by the Assessment Engine **102** may be displayed in a key or queue in the User Interface **108**. The Interactive Visualization Inputs **116** may be digitally generated two- or three-dimensional shapes, designs, or images with known sizes, shapes, and orientations. Depending on the prompt, the Assessment Engine **102** may generate any number or types of Interactive Visualization Inputs **116**. In some embodiments, the Assessment Engine **102** may be operable to generate one Interactive Visualization Input **116** in the User Interface **108** for the creativity and/or intelligence evaluation prompt. In other embodiments, the Assessment Engine **102** may generate two or more Interactive Visualization Inputs **116** for the creativity and/or intelligence evaluation prompt.

For example, as shown in FIG. **4**, the Assessment Engine **102** may generate one or more Interactive Visualization Inputs **116** in the Queue **118** in the User Interface **108**. In the illustrated embodiment, the Queue **118** contains one Interactive Visualization Input **116**. However, it will be appreciated that the Queue **118** may include any number of different Interactive Visualization Inputs **116**.

In other embodiments, one or more Interactive Visualization Inputs **116** may be generated and provided to the user separately from the Assessment Engine **102**, User Interface **108**, and/or Client **114**. For example, the Interactive Visualization Inputs **116** may be physical two- or three-dimensional shapes, designs, or objects which may be provided to the user such that the user may position, rotate, manipulate, assemble, or otherwise configure the Interactive Visualization Inputs **116**, such as by hand. The physical two- or three-dimensional may be physical representations of any of the Interactive Visualization Inputs **116** described above which may be physically positioned, rotated, assembled, combined, interlocked, or otherwise manipulated by a user to form an answer to a creativity and/or intelligence evaluation prompt. Any of the user manipulations of the prompt and answers to the prompt create data stored in memory that is indicative of such manipulations or answers.

As shown in FIG. **3**, at step **206**, the user may manipulate the one or more Interactive Visualization Inputs **116** to create an answer or response to the creativity and/or intelligence evaluation prompt. In some embodiments, the Assessment Engine **102** may be operable to permit the user to manipulate the one or more Interactive Visualization Inputs **116** displayed in the User Interface **108** via an input of one of the Clients **114**. Using the input of the Client **114**, the user may move one of the Interactive Visualization Inputs **116** displayed in the User Interface to a user manipulate space or grid of the User Interface **108**. In certain embodiments, the user may utilize the input of the Client **114** to move one of the Interactive Visualization Inputs **116** from the key or queue of the User Interface **108** to an answer space or grid of the User Interface **108**, such as a user manipulable space or grid. After the Interactive Visualization Input **116** is moved into the user manipulable space or grid, the user may utilize the input of the Client **114** to manipulate the Interactive Visualization Input **116** in the User Interface **108**, such as by positioning, repositioning, rotating, scaling, coloring or otherwise manipulating the Interactive Visualization Input **116** as will be appreciated by those of skill in the art. The Assessment Engine **102** may generate and display one or more Interactive Visualization Inputs **116** in the user manipulable space or grid of the User Interface **108** according to the user manipulations via the Client **114**. In some embodiments, the Assessment Engine **102** may also be configured to monitor and/or record the process by which a user process by which a user positions, rotates, scales, colors, assembles, or otherwise manipulates Interactive Visualization Inputs **116** to form one or more answers to one or more creativity and/or intelligence evaluation prompts, such as by recording timestamps or videos of the manipulations. For example, as shown in FIG. **4**, the user may drag one of the Interactive Visualization Inputs **116** from the Queue **118** into a User Manipulable Space or Grid **120**, such as the first User Manipulable Space or Grid **120***a*. The user may then position, rotate, scale, color, or otherwise manipulate the Interactive Visualization Input **116** in the User Manipulable Space or Grid **120** via input commands from the input of the Client **114**.

In other embodiments, the Interactive Visualization Inputs **116** may be manipulable by a user separately from the User Interface **108**, the Assessment Engine **102**, and/or the Client **114**. For example, the Interactive Visualization Inputs **116** may be physical two- or three-dimensional shapes, designs, or objects which may be provided to the user such that the user may position, rotate, manipulate, assemble, or other-

wise configure the Interactive Visualization Inputs **116**, such as by hand. The user may position, rotate, manipulate, assemble, combine, interlock, or otherwise configure multiple Interactive Visualization Inputs **116** to form one or more answers to a creativity and/or intelligence task or prompt, as described below, and input and/or upload the one or more answers to the User Interface **108**, Assessment Engine **102**, and/or Client **114**, such as via one or more of the inputs of the Client **114**. For example, the user may position, rotate, manipulate, assemble, or otherwise configure multiple Interactive Visualization Inputs **116** to form one or more answers to a creativity and/or intelligence task or prompt and photograph, videotape, scan, or otherwise input and/or upload the one or more answers to the User Interface **108**, Assessment Engine **102**, and/or Client **114** via one or more inputs of the Client **114**. Once input and/or uploaded, the User Interface **108**, Assessment Engine **102**, and/or Client **114** may generate digital representations in the User Interface **108** of the one or more answers based on the input and/or upload from the Client **114**. For example, the User Interface **108**, Assessment Engine **102**, and/or Client **114** may receive the one or more answers and the User Interface **108** may generate digital representations of the answers by converting the input and/or upload of the one or more answers into a digital form similar to answers formed by users moving, scaling, rotating, or otherwise positioning Interactive Visualization Inputs **116** digitally generated in the User Interface **108** in the user manipulate space or grid of the User Interface **108**.

At step **208**, it may be determined whether the user has completed his or her answer or response to the creativity and/or intelligence evaluation prompt. In some embodiments, the Assessment Engine **102** may be operable to automatically determine whether the user is done with the answer to the prompt. In certain embodiments, after the user has manipulated the Interactive Visualization Input **116**, the Assessment Engine **102** may generate an alert or prompt in the User Interface **108** that the user may select, respond to, or otherwise interact with via the Client **114** to indicate that the user is done with the answer to the prompt. For example, the Assessment Engine **102** may generate a drop down menu or selectable button in the User Interface **108** which the user may select via the input of the Client **114** to indicate that the user is done with the answer to the prompt. If the Assessment Engine **102** determines that the user is done with the answer to the prompt, the Assessment Engine **102** may move to step **210**. As shown in FIG. **4**, the user may select the arrow button in the bottom-right of the User Interface **108** to indicate that the user is done with the answer to the prompt. In other embodiments, the Assessment Engine **102** may determine that the user is done with the answer to the prompt when the user inputs and/or uploads one or more answers to the User Interface **108**, Assessment Engine **102**, and/or Client **114** via one or more inputs of the Client **114** and the User Interface **108**, Assessment Engine **102**, and/or Client **114** generates digital representations in the User Interface **108** of the one or more answers based on the input and/or upload from the Client **114**.

If the Assessment Engine **102** determines that the user is not done with the answer to the prompt, the Assessment Engine **102** may go back to step **204** and generate one or more additional Interactive Visualization Inputs **116** in the User Interface **108** which the user may manipulate via the input of the Client **114**. The additional Interactive Visualization Inputs **116** may be the same as or different from the Interactive Visualization Inputs **116** previously generated in the User Interface **108**. The user may manipulate the additional Interactive Visualization Inputs **116** generated and displayed in the User Interface **108** as previously described. For example, the user may manipulate the additional Interactive Visualization Inputs **116** in the user manipulable space or grid of the User Interface **108** such that the generated Interactive Visualization Inputs **116** displayed in the user manipulable space of the User Interface **108** may collectively form a design, shape, or image corresponding to an answer to the prompt generated by the Assessment Engine **102**. In certain embodiments, the user may manipulate any Interactive Visualization Inputs **116** previously placed, manipulated, generated, and/or displayed in the user manipulable space or grid of the User Interface **108** along with any subsequently generated, displayed, and manipulated Interactive Visualization Inputs **116**. As shown in FIG. **4**, the user may drag one or more additional Interactive Visualization Inputs **116** from the Queue **118** into the User Manipulable Space or Grid **120** and position, rotate, scale, or otherwise manipulate the additional Interactive Visualization Input(s) **116** to form an answer to the creativity and/or intelligence evaluation task or prompt. Using inputs of the Client **114**, the user may also adjust the position, rotation, scale, color, or configuration of one or more Interactive Visualization Inputs **116** placed and configured in the User Manipulable Space or Grid **120**. In some embodiments, the user may also remove or delete one or more Interactive Visualization Inputs **116** that have been placed in the User Manipulable Space or Grid **120**. For example, the user may prompt the Assessment Engine **102** to remove or delete one or more Interactive Visualization Inputs **116** in the User Manipulable Space or Grid **120** by selecting the Interactive Visualization Inputs **116** via the Client **114** and then selecting the Removal Indicator **122** or the user may drag the one or more Interactive Visualization Inputs **116** to the Removal Indicator **122** in the User Interface **108**.

In some embodiments, the Assessment Engine **102** may limit the number of Interactive Visualization Inputs **116** which may be positioned or manipulated in the User Manipulable Space or Grid **120**. For example, the Assessment Engine **102** may limit the number of Interactive Visualization Inputs **116** which may be positioned or manipulated in the User Manipulable Space **120** to a maximum number of Interactive Visualization Inputs **116**, such as between 100 and 300, such as 200. If the Assessment Engine **102** determines that the maximum number of Interactive Visualization Inputs **116** have been placed in the User Manipulable Space or Grid **120**, the Assessment Engine **102** may prevent the user from adding additional Interactive Visualization Inputs **116** to the User Manipulable Space or Grid **120** and/or may proceed to step **210**.

As shown in FIG. **3**, at step **210**, it may be determined whether the user has additional answers or responses to the creativity and/or intelligence evaluation prompt. In some embodiments, the Assessment Engine **102** may be operable to automatically determine whether the user has additional answers to the prompt. In certain embodiments, the Assessment Engine **102** may generate an alert or prompt in the User Interface **108** that the user may select, respond to, or otherwise interact with via the Client **114** to indicate whether the user has additional answers to the prompt. For example, the Assessment Engine **102** may generate a drop down menu or selectable button in the User Interface **108** which the user may select via the input of the Client **114** to indicate whether the user has additional answers to the prompt. In other embodiments, the Assessment Engine **102** may determine that the user does not have additional answers to the prompt when the user does not have additional answers to input

and/or upload to the Assessment Engine **102**, User Interface **108**, and/or Client **114** in response to the creativity and/or intelligence evaluation prompt. If the Assessment Engine **102** determines that the user does not have additional answers to the prompt, the Assessment Engine may proceed to step **214**. If the Assessment Engine **102** determines that the user has additional answers to the prompt, the Assessment Engine may proceed to step **212**.

In step **212**, a new answer space, such as a user manipulable space or grid, may be generated for the user to create additional answers or responses to the creativity and/or intelligence evaluation prompt. In some embodiments, the Assessment Engine **102** may be operable to automatically generate a new user manipulable answer space or grid in the User Interface **108** for the user to create or provide an additional answer to the creativity and/or intelligence evaluation prompt generated by the Assessment Engine **102**. In certain embodiments, the Assessment Engine **102** generates a separate user manipulable space or grid, such as a sub-space or sub-grid, for the additional answer to the prompt. The additional user manipulable space generated in the User Interface **108** may be separate or distinct from the user manipulable space or spaces in the User Interface **108** in which the user manipulated Interactive Visualization Inputs **116** in the previous answer(s) to the prompt. It will be appreciated that the new user manipulable answer space in the User Interface for the additional answer may not be distinct or separate from the user manipulable answer spaces in the User Interface in which the user manipulated Interactive Visualization Inputs **116** in the previous answer(s) to the prompt. For example, the additional user manipulable answer space in the User Interface **108** for the additional answer may not be separate or distinct from the previous user manipulable spaces and may be a sub-portion of the previous user manipulable spaces, such as a separate sub-space or sub-grid, in which the additional answers to the prompt may be separated or distinct from the answers the user previously created in response to the prompt.

As shown in FIG. **4**, the Assessment Engine **102** may generate a new User Manipulable Space or Grid **120**, such as User Manipulable Spaces or Grids **120***b*, **120***c*, **120***d*, **120***e*. In some embodiments, the user may cause the Assessment Engine **102** to automatically generate the new User Manipulable Space or Grid **120** by selecting the Completion Indicator **124** in the User Interface **108** via an input of the Client **114**. In some embodiments, the new User Manipulable Space or Grid **120** may be generated in the User Interface **108** in the position or location of the first User Manipulable Space or Grid **120***a* and the first User Manipulable Space or Grid **120***a* may be generated or moved to another position in the User Interface **108**, such as the position of any of the other additional User Manipulable Spaces **120***b*, **120***c*, **120***d*, **120***e* shown in FIG. **4**. Additionally, the user may select a previous User Manipulable Space or Grid **120** (e.g., **120***b*, **120***c*, **120***d*, **120***e* in FIG. **4**) and adjust the position, rotation, scale, color, or configuration of any of the Interactive Visualization Inputs **116** contained in the previous User Manipulable Spaces or Grids **120**.

Referring back to FIG. **3**, after the Assessment Engine **102** generates the additional user manipulable space or grid in the User Interface **108**, the Assessment Engine **102** may proceed to step **204**. The Assessment Engine **102** may be operable to automatically generate one or more Interactive Visualization Inputs **116** in the User Interface **108** and the user may manipulate the one or more Interactive Visualization Inputs **116** generated and displayed in the User Interface **108**, as described in step **206**. Repeating steps **204** through **208**, the user may utilize the input of the Client **114** to manipulate one or more Interactive Visualization Inputs **116** generated by the Assessment Engine **102** in the additional user manipulable space or grid to create an additional answer to the prompt, which may be different from a previous answer. Steps **204** through **210** may be repeated until the Assessment Engine **102** determines that the user has no additional answer to the prompt. Steps **202** through **212** may be repeated as many times as desired. For example, as shown FIG. **4**, the user may drag one or more Interactive Visualization Inputs **116** from the Queue **118** into any of the User Manipulable Spaces or Grids **120** and position, rotate, scale, or otherwise manipulate the additional Interactive Visualization Input(s) **116** to form one or more answers to the creativity and/or intelligence evaluation task or prompt. The user may also adjust or readjust the position, rotation, scale, color, or configuration of any number of Interactive Visualization Inputs **116** placed in any of the User Manipulate Spaces or Grids **120** (e.g., User Manipulable Spaces or Grids **120***a*, **120***b*, **120***c*, **120***d*, **120***e*).

At step **214**, it may be determined whether the user has answered all of the creativity and/or intelligence evaluation prompts and/or whether a timer generated by the Assessment Engine **102** expired. In some embodiments, the Assessment Engine **102** may be operable to automatically determine whether the user has answered all of the prompts generated by the Assessment Engine **102**. In certain embodiments, the Assessment Engine **102** may generate an alert or prompt in the User Interface **108** that the user may select, respond to, or otherwise interact with via the Client **114** to indicate whether the user has answered all the prompts generated by the Assessment Engine **102**. For example, the Assessment Engine **102** may generate a drop down or selectable button in the User Interface **108** which the user may select via the input of the Client **114** to indicate whether the user has answered all prompts of the creativity and/or intelligence evaluation. In other embodiments, the Assessment Engine **102** may be operable to determine whether the user has answered a predefined or predetermined number of prompts as desired for the creativity and/or intelligence evaluation. In other embodiments, the Assessment Engine **102** may determine that the user has answered all the creativity and/or intelligence evaluation prompts when the user does not have additional answers to input and/or upload to the Assessment Engine **102**, User Interface **108**, and/or Client **114** in response to any of the creativity and/or intelligence evaluation prompts. If the Assessment Engine **102** determines that the user has answered all of the prompts generated by the Assessment Engine **102**, the Assessment Engine **102** may proceed to step **216**. If the Assessment Engine **102** determines that the user has not answered all the prompts of the creativity and/or intelligence evaluation, the Assessment Engine **102** may proceed back to step **202** and the Assessment Engine **102** may be operable to generate an additional creativity and/or intelligence evaluation prompt for a user to answer which may be displayed in the User Interface **108** and viewed by the user via the Client **114**. The Assessment Engine **102** may generate a unique prompt that is different from any previously generated prompts or the Assessment Engine **102** may select a unique prompt that is different from any previously generated prompts from a number of stored or historical prompts, such as a prompt stored in the Storage **110**. The generated prompt may be similar to any of the prompts generated in step **202** to test or evaluate a user's creativity and/or intelligence. After the Assessment Engine **102** generates the additional prompt, steps **204** through **214** may be repeated until the Assessment Engine **102** deter-

mines that the user has answered all the prompts to the creativity and/or intelligence evaluation.

Alternatively or in addition, the Assessment Engine **102** may be operable to automatically determine whether a timer generated by the Assessment Engine **102** and set to a predetermined amount of time expired. If the Assessment Engine **102** determines that the generated timer expired, the Assessment Engine **102** may proceed to step **216**. If the Assessment Engine **102** determines that the generated timer has not expired, the Assessment Engine **102** may proceed back to step **202** and the Assessment Engine **102** may be operable to generate an additional creativity and/or intelligence evaluation prompt for a user to answer which may be displayed in the User Interface **108** and viewed by the user via the Client **114**, as described above.

In certain embodiments, the Assessment Engine **102** may terminate any of the steps, such as any of steps **202** through **214**, and proceed to step **216** upon expiration of the timer generated by the Assessment Engine **102**. For example, the Assessment Engine **102** may terminate user's access to the creativity and/or intelligence evaluation through the User Interface **108** upon the expiration of a predetermined amount of time.

While steps **202-214** have been described as being implemented or performed in the User Interface **108**, it will be appreciated that steps **202-214** may be implemented or performed separately from the Assessment Engine **102**, User Interface **108**, and/or Client **114**. For example, the Assessment Engine **102** may generate one or more creativity and/or intelligence tasks or prompts which may be printed out and provided to the user and provided along with physical two- or three-dimensional Interactive Visualization Inputs **116** for the user to form one or more answers to the one or more creativity and/or intelligence tasks or prompts. The user may then position, rotate, scale, color, combine, assemble, interlock or otherwise manipulate the Interactive Visualization Inputs **116** separately from the User Interface **108**, the Assessment Engine **102**, and/or the Client **114**, such as by hand. The user may position, rotate, manipulate, assemble, interlock, or otherwise configure multiple Interactive Visualization Inputs **116** to form one or more answers to a creativity and/or intelligence task or prompt and input and/or upload the one or more answers to the User Interface **108**, Assessment Engine **102**, and/or Client **114**, such as via one or more of the inputs of the Client **114**. For example, the user may position, rotate, manipulate, assemble, combine, interlock, or otherwise configure multiple Interactive Visualization Inputs **116** to form one or more answers to a creativity and/or intelligence task or prompt and photograph, videotape, scan, or otherwise input and/or upload the one or more answers to the User Interface **108**, Assessment Engine **102**, and/or Client **114** via one or more inputs of the Client **114**. Once input and/or uploaded, the User Interface **108**, Assessment Engine **102**, and/or Client **114** may generate digital representations in the User Interface **108** of the one or more answers based on the input and/or upload from the Client **114**. For example, the User Interface **108**, Assessment Engine **102**, and/or Client **114** may receive the one or more answers and the User Interface **108** and/or Assessment Engine **102** may generate digital representations of the answers by converting the input and/or upload of the one or more answers into a digital form similar to answers formed by users moving, scaling, rotating, combining, assembling, interlocking, or otherwise positioning Interactive Visualization Inputs **116** digitally generated in the User Interface **108** in the user manipulate space or grid of the User Interface **108**.

At step **216**, representations of the one or more answers provided by the user may be generated. In some embodiments, the Assessment Engine **102** may be operable to automatically generate a representation of each of the answers or responses provided by the user via the User Interface **108** or input and/or uploaded to the Assessment Engine **102**, User Interface **108**, and/or Client **114** by the user in response to the one or more prompts generated by the Assessment Engine **102**. The Assessment Engine **102** may generate a representation of the Interactive Visualization Inputs **116** in each of the user manipulable spaces or grids (e.g., User Manipulable Spaces or Grids **120***a*, **120***b*, **120***c*, **120***d*, **120***e* in FIG. **4**) in the User Interface **108** or input and/or uploaded to the Assessment Engine **102**, User Interface **108**, and/or Client **114** by the user for each of the answers provided by the user such that the Assessment Engine **102** may evaluate each of the answers provided by the user and generate a creativity level output for the user, as described below. For example, the Assessment Engine **102** may be operable to generate a mathematical representation of the answers corresponding to the type, position, orientation, scale, and color of each Interactive Visualization Input **116** in the answers provided by the user.

At step **218**, the one or more answers to the creativity and/or intelligence evaluation prompts may be evaluated. In some embodiments, the Assessment Engine **102** may be operable to automatically evaluate or score the answers provided by the user to the prompts generated by the Assessment Engine **102**. The Assessment Engine **102** may be operable to automatically evaluate the answers provided by the used based on the representation of the answers generated in step **216**. The Assessment Engine **102** may be operable to evaluate the answers provided by the user according to any number of factors, methods, and/or algorithms to generate a creativity and/or intelligence level output for the user, such as described below. For example, the Assessment Engine **102** may be operable to automatically evaluate the generated mathematical representations corresponding to the Interactive Visualization Inputs **116** in the answers provided by the user based on the fluency, originality, elaboration, and flexibility of the of the answers, as described below. The Assessment Engine **102** may also be operable to evaluate the answers provided by the user in relation to historical answers (e.g., answers stored in the Storage **110**) of similar users, such as users with similar ages and/or educational levels.

At step **220**, a creativity and/or intelligence level output may be generated based at least in part on the answers provided by the user and corresponding to a creativity and/or intelligence level of the user. In some embodiments, the Assessment Engine **102** may be operable to automatically determine the creativity and/or intelligence level of the user and automatically generate a creativity and/or intelligence level output for the user based on the creativity and/or intelligence level of the user. The Assessment Engine **102** may be operable to automatically determine the creativity and/or intelligence level of the user based on one or more calculation methods for evaluating the answers provided by the user or comparison to historical data corresponding to the evaluations determined by the Assessment Engine **102** in step **218**. For example, as described below, the Assessment Engine **102** may automatically add, weight, or otherwise factor the evaluation scores of the fluency, originality, elaboration, and flexibility of the users answers according to a weighted formula and compare the weighted score to historical data of known scores corresponding to known creativity and/or intelligence levels, such as creativity and/or

intelligence levels stored in the Storage **110**. In some embodiments, the Assessment Engine **102** may also consider or factor the age and/or educational grade or level of the user in generating the creativity and/or intelligence level output, such as by generating a rank or percentile grade for the fluency, originality, elaboration, and/or flexibility score of the user compared to scores of other users with the same or similar age and/or educational grade or level. The Assessment Engine **102** may then automatically generate a creativity and/or intelligence level output corresponding to the user's creativity and/or intelligence level. The generated creativity and/or intelligence level output may be displayed in the User Interface **108** and may be used to update the user profile.

FIG. **5** shows steps according to an exemplary method **300** for generating a mathematical representation of one or more answers provided by a user in response to one or more creativity and/or intelligence evaluation prompts. It will be appreciated that the illustrated method and associated steps may be performed in a different order, with illustrated steps omitted, with additional steps added, or with a combination of reordered, combined, omitted, or additional steps. The steps may be implemented in one or more computer readable instructions, such as by the Assessment Engine **102**.

At step **302**, one or more user answers to one or more creativity and/or intelligence evaluation prompts may be obtained. In some embodiments, the Assessment Engine **102** may be operable to automatically obtain one or more answers comprising one or more Interactive Visualization Inputs **116** displayed or stored in one or more user manipulable spaces or grids in the User Interface **108** (e.g., User Manipulable Spaces or Grids **120***a*, **120***b*, **120***c*, **120***d*, **120***e* in FIG. **4**). The Assessment Engine **102** may obtain or receive the answers to one or more prompts directly from the User Interface **108**, from the Storage **110**, through the Network **112**, or through any suitable means as would be appreciated by those of skill in the art. In other embodiments, the user may input or upload the user's answers to the creativity and/or intelligence test to the Client **114**, User Interface **108**, and/or Assessment Engine **102**. For example, the user may take some or all of the creativity and/or intelligence assessment via handwriting or positioning, assembling, manipulating, assembling, combining, interlocking, and/or otherwise configuring two- or three-dimensional shapes or objects and inputting and/or uploading the answers to the User Interface **108**, and/or Assessment Engine **102** via one or more of the inputs of the Client **114**.

At step **304**, the Interactive Visualization Inputs **116** in the user answers to one or more creativity and/or intelligence evaluation prompts may be identified. In some embodiments, the Assessment Engine **102** may be operable to automatically identify each Interactive Visualization Input **116** in each of the answers provided by the user in the user manipulable spaces or grids in the User Interface **108**. The Assessment Engine **102** may be operable to identify each Interactive Visualization Input **116** in the user manipulable spaces or grids in the User Interface **108** in isolation or separate from the other Interactive Visualization Inputs **116** in the user manipulable spaces or grids in the User Interface **108** for each of the answers provided by the user. In certain embodiments, the Assessment Engine **102** may be operable to identify each Interactive Visualization Input **116** in each of the separate user manipulable spaces or grids, such as each sub-space or sub-grid, in isolation or separate from the other Interactive Visualization Inputs **116** in the respective user manipulable space, grid, sub-space, or sub-grid. In other embodiments, the Assessment Engine **102** may be operable to isolate or separate each Interactive Visualization Input **116** into a unique or separate user manipulable space, grid, sub-space, or sub-grid.

At step **306**, the type of each Interactive Visualization Input **116** in each of the answers to the creativity and/or intelligence prompts may be determined. In some embodiments, the Assessment Engine **102** may be operable to automatically determine the type of each Interactive Visualization Input **116** in each of the answers provided by the user in each answer to the one or more prompts. The Assessment Engine **102** may determine whether the Interactive Visualization Input **116** in the user manipulable space, grid, sub-space, or sub-grid or input and/or uploaded to the Assessment Engine **102**, User Interface **108**, and/or Client **114** is a two- or three-dimensional shape, design, or image. For example, the Assessment Engine **102** may be operable to determine whether the Interactive Visualization Input **116** in the answer is a petal, triangle, ellipse, sphere, pyramid, or cube. In certain embodiments, the Assessment Engine **102** may not determine the type of each Interactive Visualization Input **116** in one or more answer to one or more prompts, such as when the Assessment Engine **102** generated a single Interactive Visualization Input **116** in the User Interface **108** for a user to manipulate in response to a prompt.

At step **308**, a position of each Interactive Visualization Input **116** in each of the answers to the creativity and/or intelligence prompts may be determined. In some embodiments, the Assessment Engine **102** may be operable to automatically determine the position of each Interactive Visualization Input **116** in the user manipulable spaces, grids, sub-spaces, or sub-grids in the User Interface **108** or generated by the Assessment Engine **102** based on inputs and/or uploads from the user for each answer generated or provided by the user. In certain embodiments, the Assessment Engine **102** may be operable to determine a mathematical representation of the position of each Interactive Visualization Input **116** corresponding to the spatial coordinates of each Interactive Visualization Input **116** relative to a point on the user manipulable space, grid, sub-grid, or sub-space in the User Interface **108**, such as an origin or center point of the user manipulable space, grid, sub-grid, or sub-space. For example, the Assessment Engine **102** may determine or identify the x-y coordinates of each two-dimensional Visualization Input **116** or the x-y-z coordinates of each three-dimensional Interactive Visualization Input **116**. The Assessment Engine **102** may determine the position of each Interactive Visualization Input **116** based on a center point of the Interactive Visualization Input **116**, a unique feature of the Interactive Visualization Input **116**, the edges or corners of the Interactive Visualization Input **116**, or any other suitable point of reference of the Interactive Visualization Input **116**. For example, the Assessment Engine **102** may determine the position of a petal-shaped Interactive Visualization Inputs **116** by its point, the position of a circular or spherical Interactive Visualization Inputs **116** by the center point, the position of a rectangular or cuboid-shaped Interactive Visualization Input **116** by the corners, or any other suitable method as would be appreciated by those of skill in the art. Alternatively, the Assessment Engine **102** may determine the position of each Interactive Visualization Input **116** using radial coordinates by determining a distance of a reference point of the Interactive Visualization Input **116** from a pole, such as the origin or center of the user manipulable space, grid, sub-grid, or sub-space and determining the angular coordinate from the x-axis, the polar angle from the y-axis, and the azimuth from the z-axis.

At step **310**, an orientation of each Interactive Visualization Input **116** in each of the answers to the creativity and/or intelligence prompts may be determined. In some embodiments, the Assessment Engine **102** may be operable to automatically determine the orientation of each Interactive Visualization Input **116** in the user manipulable spaces, grids, sub-spaces, or sub-grids for each answer generated by the user in the User Interface **108** or generated by the Assessment Engine **102** based on inputs and/or uploads provided by the user. The Assessment Engine **102** may be operable to determine a mathematical representation of the orientation of each Interactive Visualization Input **116** corresponding to the orientation of each Interactive Visualization Input **116** relative to a normal position of on the Interactive Visualization Inputs **116** in the user manipulable space, grid, sub-grid, or sub-space of the User Interface **108**, such as the orientation of each Interactive Visualization Input **116** relative to the position in which the Interactive Visualization Input **116** is generated or presented in the queue in the User Interface **108**. The Assessment Engine **102** may be operable to measure or determine an angle corresponding to the rotation of each two-dimensional Interactive Visualization Input **116** and the pitch, yaw, and roll of each three-dimensional Interactive Visualization Input **116** in each of the user manipulable spaces, grids, sub-grids, or sub-spaces as manipulated by the user. For example, the Assessment Engine **102** may be operable to measure or otherwise determine the angle corresponding to the rotation, pitch, yaw, and/or roll of each Interactive Visualization Input **116** in relation to a base or normal orientation of the Interactive Visualization Input **116**, such as the orientation of the Interactive Visualization Input **116** as it is originally generated and displayed in the User Interface **108**, such as in the key or queue of the User Interface **108**. The Assessment Engine **102** may be operable to generate a representation of the pitch, yaw, and roll of three-dimensional Interactive Visualization Inputs **116** according to the a, B, y of Euler Angles or the pitch, yaw, and roll of Tait-Bryan Angles, respectively.

As shown in FIGS. **6** and **7**, the Assessment Engine **102** may be operable to determine the position and orientation of two- and three-dimensional Interactive Visualization Inputs **116** in a user manipulable space, grid, sub-space, or sub-grid. As shown in FIG. **6**, the Assessment Engine **102** may be operable to automatically determine the position of a two-dimensional Interactive Visualization Input **116** in a user manipulable space, grid, sub-space, or sub-grid (the x-y coordinates from the origin corresponding to the tip of the petal-shaped Interactive Visualization Input **116**) and the angle of rotation of the Interactive Visualization Input **116** in the user manipulable space, grid, sub-space, or sub-grid (the angle a corresponding to the rotation of the Interactive Visualization Input **116** from a horizontal axis). As shown in FIG. **7**, the Assessment Engine **102** may be operable to determine the position of a three-dimensional Interactive Visualization Input **116** in a user manipulable space, grid, sub-space, or sub-grid (the x-y-z coordinates from the origin corresponding to the tip of the petal-shaped Interactive Visualization Input **116**) and the angle of roll (the angle corresponding to the rotation of the Interactive Visualization Input **116** about the x-axis), pitch (the angle corresponding to the rotation of the Interactive Visualization Input **116** about the y-axis), and the yaw (the angle corresponding to the rotation of the Interactive Visualization Input **116** about the z-axis) of the Interactive Visualization Input **116** in the user manipulable space, grid, sub-space, or sub-grid.

Referring back to FIG. **5**, at step **312**, a scale or size of each Interactive Visualization Input **116** in each of the answers to the creativity and/or intelligence prompts may be determined. In some embodiments, the Assessment Engine **102** may be operable to automatically determine the scale of each Interactive Visualization Input **116** in the user manipulable spaces, grids, sub-spaces, or sub-grids for each answer generated by the user in the User Interface **108** or generated by the Assessment Engine **102** based on inputs and/or uploads provided by the user. In certain embodiments, the Assessment Engine **102** may be operable to determine a mathematical representation of the size of each Interactive Visualization Input **116** corresponding to the scale of the Interactive Visualization Input **116** in the user manipulable space, grid, or sub-grid relative to a normal or original size of the Interactive Visualization Input **116**. For example, the Assessment Engine **102** may be operable to measure or otherwise determine the ratio between the size of the Interactive Visualization Input **116** in the user manipulable space, grid, sub-space, or sub-grid and the size of the Interactive Visualization Input **116** as it generated and displayed in the User Interface **108**, such as in the key or queue of the User Interface **108**.

At step **314**, a color of each Interactive Visualization Input **116** in each of the answers to the creativity and/or intelligence prompts may be determined. In some embodiments, the Assessment Engine **102** may be operable to automatically determine the color of each Interactive Visualization Input **116** in the user manipulable spaces, grids, sub-spaces, or sub-grids for each answer generated by the user in the User Interface **108** or generated by the Assessment Engine **102** based in inputs and/or uploads provided by the user. In certain embodiments, the Assessment Engine **102** may be operable to determine a mathematical representation of each Interactive Visualization Input **116** corresponding to the color of the Interactive Visualization Input **116** as manipulated by the user in the User Interface **108**. For example, the Assessment Engine **102** may be operable to determine a mathematical code corresponding to the color of each Interactive Visualization Input **116** in the user manipulable spaces, grids, sub-spaces, or sub-grids, such as an HTML color code for the Interactive Visualization Input **116**. In certain embodiments, the of each Interactive Visualization Input **116** in one or more answers to one or more prompts may not be determined, such as when the Assessment Engine **102** and/or the User Interface **108** generate a single color for the Interactive Visualization Input **116** in the User Interface **108** and do not permit the user to manipulate the Interactive Visualization Input **116** in response to a prompt.

At step **316**, a mathematical representation of each answer to the one or more creativity and/or intelligence prompts may be generated. In some embodiments, the Assessment Engine **102** may be operable to automatically generate a mathematical representation of each answer provided by the user in the user manipulable spaces, grids, sub-spaces, or sub-grids or generated by the Assessment Engine **102** based on inputs and/or uploads provided by the user in response to the one or more prompts generated by the Assessment Engine **102**. The Assessment Engine **102** may automatically generate the mathematical representation of each answer as the culmination of mathematical representations of each Interactive Visualization Input **116** in each user manipulable space, grid, sub-space, or sub-grid corresponding to a particular answer provided by the user or answer generated by the Assessment Engine **102** based on inputs and/or uploads provided by the user. For example, the Assessment Engine **102** may generate the mathematical representation of each

answer as a culmination or combination of the mathematical representations of type, position, orientation, scale, and color of each Interactive Visualization Input **116** in the answer. In certain embodiments, the Assessment Engine **102** may evaluate the mathematical representations of Interactive Visualization Inputs **116** in each answer and remove the mathematical representations of one or more redundant or superfluous Interactive Visualization Inputs **116** from the mathematical representation of the answer. For example, the Assessment Engine **102** may evaluate the mathematical representations of Interactive Visualization Inputs **116** in each answer and remove the mathematical representations of each Interactive Visualization Input **116** that is entirely covered up or overlapped by other Interactive Visualization Inputs **116** in the user manipulable space, grid, sub-space, or sub-grid corresponding to the answer provided by the user.

In some embodiments, such as in embodiments in which a user may only position and rotate a two-dimensional Interactive Visualization Input **116** (e.g., FIG. **6**), the Assessment Engine **102** may automatically generate a mathematical representation of the Interactive Visualization Input **116** containing three variables in the format of [x-position, y-position, angle of rotation]. The x-position may be determined as the x coordinate in the user manipulable space, grid, sub-space, or sub-grid of an identifying point of the Interactive Visualization Input **116**. The y-position may be determined as the y coordinate in the user manipulable space, grid, sub-space, or sub-grid of the identifying point of the Interactive Visualization Input **116**. The angle of rotation may be determined as the angle or rotation of the Interactive Visualization Input **116** in the user manipulable space, grid, sub-space, or sub-grid from a normal position from the horizontal axis.

In some embodiments, such as in embodiments in which a user may only position and rotate a three-dimensional Interactive Visualization Input **116** (e.g., FIG. **7**), the Assessment Engine **102** may automatically generate a mathematical representation of the Interactive Visualization Input **116** having six variables in the format of [x-position, y-position, z-position, angle of roll, angle of pitch, angle of yaw]. The x-position may be determined as the x coordinate in the user manipulable space, grid, sub-space, or sub-grid of an identifying point of the Interactive Visualization Input **116**. The y-position may be determined as the y coordinate in the user manipulable space, grid, sub-space, or sub-grid of the identifying point of the Interactive Visualization Input **116**. The z-position may be determined as the x coordinate in the user manipulate space, grid, sub-space, or sub-grid of the identifying point of the Interactive Visualization Input **116**. The angle of the roll may be determined as the angle or rotation of the Interactive Visualization Input **116** from a normal position about the x-axis. The angle of the pitch may be determined as the angle or rotation of the Interactive Visualization Input **116** from a normal position about the y-axis. The angle of the yaw may be determined as the angle or rotation of the Interactive Visualization Input **116** from a normal position about the z-axis.

In other embodiments, the generated mathematical representation of each Interactive Visualization Input **116** may contain different or additional variables. For example, the mathematical representation of one or more of the Interactive Visualization Inputs **116** automatically generated by the Assessment Engine **102** may include variables corresponding to the type or shape of the Interactive Visualization Input **116**, the scale or size of the Interactive Visualization Input **116**, and/or the color of the Interactive Visualization Input **116**. Further, the Assessment Engine **102** may be configured to automatically generate a similar mathematical representation of each Interactive Visualization Input **116** in embodiments where the user forms one or more answers to one or more creativity and/or intelligence evaluation prompts separately from the User Interface **108**, inputs and/or uploads the one or more answers to the Client **114**, User Interface **108**, and or Assessment Engine **102**, and the User Interface **108**, Assessment Engine **102**, and/or Client **114** generates digital representations in the User Interface **108** of the one or more answers based on the input and/or upload from the Client **114**. For example, the Assessment Engine **102** may generate digital representations of the one or more answers substantially similar to answers formed by a user in the User Interface **108** by positioning, rotating, scaling, coloring, or otherwise manipulating one or more Interactive Visualization Inputs **116** and generate mathematical representations of each Interactive Visualization Inputs **116** in each of the answers as described above.

A sample answer to a creativity and/or intelligence evaluation prompt (e.g., using a two-dimensional petal-shaped Interactive Visualization Input **116**, draw as many flowers as possible) is shown in FIG. **8**. The sample answer may have been formed by a user positioning, rotating, scaling, coloring, or otherwise manipulating Interactive Visualization Inputs **116** in the User Interface **108**, such as the User Interface **108** with Queue **118** of FIG. **4**, or the sample answer may have been generated by the Assessment Engine **102** based on an answer input and/or uploaded to the User Interface **108**, Assessment Engine **102**, and/or Client **114** by the user. The answer includes a first Interactive Visualization Input **116***a*, a second Interactive Visualization Input **116***b*, a third Interactive Visualization Input **116***c*, and a fourth Interactive Visualization Input **116***d*. The Assessment Engine **102** may automatically generate a representation of the answer based on generated representations of each of the Interactive Visualization Inputs **116***a*, **116***b*, **116***c*, **116***d*. The Assessment Engine **102** may automatically generate the representation for each of the Interactive Visualization Inputs **116***a*, **116***b*, **116***c*, **116***d* where the variables corresponding to the x-position and y-position are generated based on the x and y coordinates of the point of each Interactive Visualization Input **116***a*, **116***b*, **116***c*, **116***d*, respectively, and the angle of rotation is generated based on a normal position of the Interactive Visualization Input **116** with the point oriented downwardly (e.g., as the Interactive Visualization Input **116** is shown in the Queue **118** in FIG. **4**). The Assessment Engine **102** may generate a representation for the first Interactive Visualization Input **116***a* of [**100**, **120**, **0**], a representation for the second Interactive Visualization Input **116***b* of [**100**, **120**, **90**], a representation for the third Interactive Visualization Input **116***c* of [**100**, **120**, **180**], and a representation for the fourth Interactive Visualization Input **116***d* of [**100**, **120**, **270**]. The Interactive Visualization Inputs **116** are labeled as the first Interactive Visualization Input **116***a*, the second Interactive Visualization Input **116**, the third Interactive Visualization Input **116***c*, and the fourth Interactive Visualization Input **116***d*. However, it will be appreciated that the Interactive Visualization Inputs **116***a*, **116***b*, **116***c*, **116***d* may be considered in any order. In some embodiments, the Assessment Engine **102** may be operable to generate each permutation and/or combination of orders of Interactive Visualization Inputs **116** for an answer such that the Assessment Engine **102** may generate fluency, originality, elaboration, and flexibility scores for the answers based on historical answers, as described below.

FIG. **9** shows another exemplary method for generating a representation of the sample answer for FIG. **8**. In the

exemplary method, the Assessment Engine **102** may be operable to automatically segment or divide the user manipulable space, grid, sub-space, or sub-grid into an array of zones, panes, or parts which are smaller than the user manipulable space, grid, sub-space, or sub-grid. The array may contain any number of zones, panes, or parts which may be any size that is smaller than the user manipulable space, grid, sub-space, or sub-grid and the Assessment Engine **102** may automatically segment or divide the user manipulable space, grid, sub-space, or sub-grid into any number of zones, panes, or parts such that the user manipulable space, grid, sub-space, or sub-grid has multiple zones, panes, or parts along the x-axis and multiple zones, panes, or parts along the y-axis. In the illustrated embodiment, the zones, panes, or parts are substantially square or rectangular. However, it will be appreciated that the zones, panes, or parts may have any suitable shape. For example, the zones, panes, or parts may be triangular or hexagonal. Also as shown in the illustrated embodiment, the sample answer is two-dimensional and the Assessment Engine **102** is operable to divide the user manipulable answer space into an array of panes having multiple columns along the x-axis and multiple columns along the y-axis. However, it will be appreciated that the Assessment Engine **102** may be operable to similarly divide or segment a three-dimensional user manipulable answer space into a plurality of smaller zones, panes, or parts that are three-dimensional in shape.

The Assessment Engine **102** may then be configured to automatically generate an identifying value or representation for each zone, pane, or part in the array corresponding to whether at least a portion of the zone, pane, or part contains at least a portion of an Interactive Visualization Input **116**. As shown in the magnified cross-section in FIG. **9**, the Assessment Engine **102** may analyze each of the zones, panes, or parts in the user manipulable space, grid, sub-space, or sub-grid and determine whether at least a portion of an Interactive Visualization Input **116** is contained in the zone, pane, or part. In some embodiments, the Assessment Engine **102** may be configured to generate a representation for each zone or pane that is binary depending on whether any portion of the zone or pane contains a portion of an Interactive Visualization Input **116**. For example, the Assessment Engine **102** may automatically generate a representation value of 0 for zones or panes without any portions of an Interactive Visualization Input **116** and generate a representation value of 1 for zones or panes containing at least a portion of an Interactive Visualization Input **116**. In other embodiments, the Assessment Engine **102** may be configured to generate a representation for each zone or pane corresponding to the amount of the zone or pane which contains a portion of an Interactive Visualization Input **116**. For example, the Assessment Engine **102** may generate a representation value of 100% for zones or panes that are entirely filed with Interactive Visualization Inputs **116**, a representation value of 50% for zones or panes that have Interactive Visualization Inputs **116** filling half of the zone or pane, and a representation value of 0% for zones or panes without any portion of an Interactive Visualization Input **116** contained therein. The Assessment Engine **102** may then automatically generate a representation of the user manipulable space, grid, sub-space, or sub-grid containing an answer to a creativity and/or intelligence test as a combination or matrix of the representations for each zone or pane in the array.

FIGS. **10**A and **10**B show an exemplary method for representing the generated representation of the sample answer of FIG. **8**. In the exemplary method for representing the generated representation of a sample answer, the Assessment Engine **102** may be configured to automatically generate a n-dimensional grid where n is the number of variables included in the generated representation for each of the Interactive Visualization Inputs **116** contained in the answer. As the sample answer of FIG. **8** may be represented with three variables (e.g., x-position, y-position, and angle of rotation), the Assessment Engine **102** may generate a 3-dimensional grid to represent the answer. As shown in FIG. **10**A, the Assessment Engine **102** may then be configured to generate a reference point in the n-dimensional grid for each Interactive Visualization Input **116** contained in an answer to a creativity and/or intelligence evaluation prompt using the n number of variables contained in the generated representation for the Interactive Visualization Input **116** as coordinates.

As shown in FIG. **10**B, the Assessment Engine **102** may be configured to automatically segment or divide the n-dimensional grid of FIG. **10**A into a number of n-dimensional areas, zones, or parts. In some embodiments, the Assessment Engine **102** may segment or divide the n-dimensional grid of FIG. **10**A into n-dimensional areas, zones, or parts of equal size. Each n-dimensional area, zone, or part may represent a unique range of coordinates in the n-dimensional grid. The Assessment Engine **102** may automatically generate a representation or score for each area or zone in the n-dimensional grid corresponding to whether the area or zone contains a generated representation of an Interactive Visualization Input **116**, such as shown in FIG. **10**A. In some embodiments, the Assessment Engine **102** may generate a score of 1 for each area or zone in the n-dimensional grid which contains a generated representation of an Interactive Visualization Input **116** and a score of 0 for each area or zone in the n-dimensional grid which does not contain a generated representation of an Interactive Visualization Input **116**. The Assessment Engine **102** may then automatically generate a mathematical representation of the answer to the creativity and/or intelligence prompt as a combination or matrix of the generated scores for each area or zone in the n-dimensional grid.

In the illustrated embodiment, the sample answer of FIG. **8** contains four Interactive Visualization Inputs **116** and there are four generated representations of Interactive Visualization Inputs **116** shown in FIGS. **10**A and **10**B. However, it will be appreciated that the answer and corresponding generated representations of Interactive Visualization Inputs **116** may have any number of Interactive Visualization Inputs **116** based on the answer formed or generated by the user.

In some embodiments, before the Assessment Engine **102** generates a mathematical representation of one or more answers provided by a user in response to one or more creativity and/or intelligence evaluation prompts, the one or more answers may be processed or preprocessed, such as to reduce the time and/or resources needed to generate the mathematical representations and/or to increase the accuracy of the mathematical representations. For example, the one or more answers may be processed or preprocessed by the Input Preprocessing Engine **601** as shown in FIG. **18**. The one or more answers may be processed or preprocessed in a variety of ways and to varying degrees. For example, one or more answers may be downscaled, upscaled, cleaned, cleansed, converted, integrated, transformed, reduced, enhanced, or otherwise configured or processed to reduce the time and/or resources needed to generate the mathematical representations and/or to increase the accuracy of the mathematical representations.

In some embodiments, the processing or preprocessing of the answers includes downscaling the answers to reduce the number of pixels or voxels in the answer and decrease the amount of time and/or resources needed to evaluate the answers and/or generate mathematical representations of the answers. Downscaling the answers results in fewer pixels or voxels needed to input into the Assessment Engine **102** to generate the mathematical representation. The answers may be downscaled a predetermined amount to reduce the time and/or resources needed to generate the mathematical representations, such as without reducing or decreasing the accuracy of the mathematical representations. As shown in FIG. **19**, the sample answer of FIG. **8** is shown according to four different levels of processing or preprocessing. In a first processed sample answer **701**, the sample answer of FIG. **8** is processed but not downscaled or reduced, resulting in no reduction in pixels in the processed answer. In a second processed sample answer **702**, the sample answer of FIG. **8** is downscaled according to a 1:4 ratio, resulting in 16 times fewer pixels than the sample answer of FIG. **8**. In a third processed sample answer **703**, the sample answer of FIG. **8** is downscaled according to a 1:5 ratio, resulting in 25 times fewer pixels than the sample answer of FIG. **8**. In a fourth processed sample answer **704**, the sample answer of FIG. **8** is downscaled according to a 1:8 ratio, resulting in 64 times fewer pixels than the sample answer of FIG. **8**. Three-dimensional answers generated by users may also be similarly downscaled. For example, a 1:4 downscale reduction would result in 64 times fewer voxels, a 1:5 downscale reduction would result in 125 times fewer voxels, and a 1:8 downscale reduction would result in 512 times fewer voxels.

FIG. **11** shows steps according to an exemplary method **400** for generating a creativity and/or intelligence level output of a user based on the answers provided in the User Interface **108** to prompts generated by the Assessment Engine **102** and corresponding to a creativity and/or intelligence level of the user. It will be appreciated that the illustrated method and associated steps may be performed in a different order, with illustrated steps omitted, with additional steps added, or with a combination of reordered, combined, omitted, or additional steps. The steps may be implemented in one or more computer readable instructions, such as by the Assessment Engine **102**.

At step **402**, a mathematical representation of each answer to the one or more creativity and/or intelligence evaluation prompts may be obtained. In some embodiments, the Assessment Engine **102** may automatically receive, obtain, or generate a mathematical representation of one or more answers to one or more prompts provided by a user in the User Interface **108** via an input of one of the Clients **114**. The Assessment Engine **102** may receive or obtain the mathematical representation of one or more answers to one or more prompts from the User Interface **108**, Storage **110**, or Network **112** or the Assessment Engine **102** may obtain the one or more answers to the one or more prompts from the User Interface **108**, Storage **110**, or Network **112** and be operable to generate the mathematical representation of one or more answers to the one or more prompts.

At step **404**, duplicate and/or substantially similar answers to one or more creativity and/or intelligence evaluation prompts may be removed. In some embodiments, the Assessment Engine **102** may be operable to automatically remove duplicate and/or substantially similar answers provided by the user in the User Interface **108** to each prompt generated by the Assessment Engine **102** or generated by the Assessment Engine **102** based on inputs and/or uploads provided by the user. The Assessment Engine **102** may be operable to compare the mathematical representations of each answer to determine whether any of the answers are the same or substantially similar to one or more other answers to the same prompt. If the Assessment Engine **102** determines that one or more of the answers is the same or substantially similar to one or more other answers, the Assessment Engine **102** may be operable to ignore, remove, or delete the duplicate or substantially similar answer. For example, the Assessment Engine **102** may be operable to ignore, remove, or delete answers that are slight variations of other answers to the same prompt, such as answers which are only rotations of other answers to the same prompt, answers which are only scaled variations of other answers to the same prompt, or any other answers which are only slight variations from other answers to the same prompt.

In some embodiments, the Assessment Engine **102** may be operable to automatically compare and contrast mathematical representations of answers as described in FIGS. **9**, **10**A, and/or **10**B to automatically determine whether two or more answers are the same or substantially similar. The Assessment Engine **102** may be operable to automatically compare the areas or zones of the n-dimensional grids representing the Interactive Visualization Inputs **116** of the answers to determine whether two or more answers are the same or substantially similar. For example, the Assessment Engine **102** may be operable to determine that two answers are the same or substantially similar if the areas or zones of the n-dimensional grid representing the Interactive Visualization Inputs **116** of a first answer are the same as the areas or zones of the n-dimensional grid representing the Interactive Visualization Inputs **116** of a second answer are the same or are the same but shifted one area or zone, such as shifted one area or zone over based on the x-direction, y-direction, or angle coordinates of the Interactive Visualization Inputs **116**. If the Assessment Engine **102** determines that two or more mathematical representations of answers are the same or substantially similar, the Assessment Engine **102** may be operable to automatically ignore, remove, or delete the duplicate or near duplicate answers.

FIG. **12** shows a set of four sample answers to a prompt (using a two-dimensional petal-shaped Interactive Visualization Input **116**, draw as many flowers as possible). The Assessment Engine **102** may be operable to determine that the top-left, top-right, and bottom-left answers are non-duplicative answers to the prompt. However, the Assessment Engine **102** may be operable to determine that the bottom-right answer is duplicative of the top-right answer as they are both four-petal flower designs emanating radially outward from a single origin and that the bottom-right answer is only a rotation of the top-left answer. For example, as described in FIGS. **10**A and **10**B, the Assessment Engine **102** may be operable to determine that the areas or zones of the n-dimensional grid representing the Interactive Visualization Inputs **116** of the top-left answer are the same as the areas or zones of the n-dimensional grid representing the Interactive Visualization Inputs **116** of the bottom-right answer only shifted along the axis corresponding to the angle of rotation of the Interactive Visualization Inputs **116**. Accordingly, the Assessment Engine may be operable to ignore, remove, or delete the bottom-right answer from the collection of mathematical representations of answers to the prompt.

Referring back to FIG. **11**, at step **406**, the answers to the creativity and/or intelligence evaluation prompts may be assessed to determine valid answers to the creativity and/or intelligence evaluation prompts. In some embodiments, the Assessment Engine **102** may be operable to automatically

determine valid answers to the prompt. The Assessment Engine **102** may be operable to determine, from the mathematical representations of answers, whether the arrangement of manipulated Interactive Visualization Inputs **116** in the user manipulable space, grid, sub-space, or sub-grid of each answer corresponds to a valid answer to the prompt. For example, the Assessment Engine **102** may be operable to determine if the arrangement of manipulated Interactive Visualization Inputs **116** in the user manipulable space, grid, sub-space, or sub-grid of each answer creates a shape, image, or design which is a suitable answer to the prompt, creates a shape, image, or design which is not a suitable answer to the prompt, or is a random arrangement which does not create a shape, image, or design. The Assessment Engine **102** may be operable to ignore, remove, or delete the answers that are not valid answers or responses to the prompt. The Assessment Engine **102** may be operable to implement any suitable method for determining whether the answers generated in the User Interface **108** represent valid answers to the prompt generated by the Assessment Engine **102**. For example, the Assessment Engine **102** may implement a neural network trained from historical data, a comparison to stored data or a database, such as stored in the Storage **110**, containing valid answers to the prompt.

At step **408**, a fluency score for the answers provided by the user may be generated corresponding to the number of unique answers to each prompt. In some embodiments, the Assessment Engine **102** may be operable to automatically generate a numerical value or point score according to the fluency of the answers provided by the user in the User Interface **108** or input and/or uploaded to the User Interface **108**, Assessment Engine **102**, and/or Client **114** to each prompt. For example, the Assessment Engine **102** may compare each of the of the answers to a prompt and ignore, remove, or delete the answers which are duplicates of or substantially similar to one or more other answer and the answers which are not valid responses to the prompt, and count the non-duplicative, valid answers. In certain embodiments, the Assessment Engine **102** may be operable to determine or count the number of user manipulable spaces, grids, sub-spaces, or sub-grids which contain valid answers. In other embodiments, the Assessment Engine **102** may be operable to determine or count the total number of valid, unique answers on one or more user manipulable spaces, grids, sub-spaces, or sub-grids. The Assessment Engine **102** may automatically apply one or more calculation methods for determining a numerical point value to assign to the answers to the prompt provided by the user corresponding to the fluency of the answers. For example, the Assessment Engine **102** may be operable to generate or otherwise assign a numerical value or point score equivalent to the number of unique, valid answers provided by the user to the prompt, a numerical value or point score that is weighted according to an average number of answers provided to the prompt (which could be stored in or generated from historical data stored in the Storage **110**), or a numerical value or point score that based on the number of unique, valid answers provided by the user to the prompt and weighted according to the number of unique answers provided by the user not contained in a historical data set (which could be stored in the Storage **110**). In some embodiments, the Assessment Engine **102** generates the fluency score for the answers provided by the user as a count of the valid, non-duplicative answers provided by the user. The Assessment Engine **102** may also be operable to generate one or more fluency scores based on a combination of one or more calculation methods, in parallel and/or in series. For example, the Assessment Engine **102** may concurrently perform two or more calculation methods and determine the highest score, weight an overall score based on the multiple calculations, and/or generate multiple fluency scores according to the different calculation methods.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate a fluency score for the answers provided by the user as a percentile rank compared to other users with similar ages and/or educational levels. For example, the Assessment Engine **102** may generate a fluency point value for the answers provided by the user as a count of the valid, non-duplicative answers provided by the user and then compare or evaluate the generated fluency point value against fluency point values of users with similar ages and/or educational levels contained in a historical data set (e.g., stored in the Storage **110**). The Assessment Engine **102** may then generate a fluency score for the answers provided by the user as a percentile rank of the generated fluency point value for the user compared to the fluency point values of users with similar ages and/or educational levels contained in the historical data set.

At step **410**, an originality score for the answers provided by the user may be generated corresponding to how novel, unique, or rare a given answer is in relation to other answers generated by other users. In some embodiments, the Assessment Engine **102** may be operable to automatically generate a numerical value or point score according to the originality of the answers provided by the user in the User Interface **108** to each prompt or generated by the Assessment Engine **102** based on inputs and/or uploads provided by the user. In certain embodiments, the Assessment Engine **102** may compare each of the answers provided by the user to historical answers provided by other users to the same prompt or prompts, such as historical answers stored in the Storage **110**. In certain embodiments, the Assessment Engine **102** may be operable to implement a neural network, deep learning algorithm, or other suitable AI method to automatically determine the originality of each answer provided by the user in relation to historical answers provided by other users. The Assessment Engine **102** may then be operable to automatically generate a numerical score or point value for each of the answers provided by the user based on the originality of the answers provided by the user in relation to the historical answers provided by other users. In some embodiments, the Assessment Engine **102** may be operable to generate an originality score which is inversely proportional to the frequency in which a particular answer appears in responses provided by users. In other embodiments, the Assessment Engine **102** may be operable to generate an originality score according to how different a particular answer is in relation to an average historical answer to the prompt. For example, the Assessment Engine **102** may measure or calculate the difference between the overall mathematical representation of a particular answer and the average mathematical representation of historical answers provided to the prompt or the Assessment Engine **102** may measure or calculate the difference between the mathematical representation of each Interactive Visualization Inputs **116** in the answer and an average Interactive Visualization Input **116** according to historical data, such as historical data stored in the Storage **110**. The Assessment Engine **102** may also be operable to automatically generate one or more originality scores based on a combination of one or more calculation methods, in parallel and/or in series. For example, the Assessment Engine **102** may concurrently perform two or more calculation methods and determine the highest score, weight an overall score based on the multiple

calculations, and/or generate multiple originality scores according to the different calculation methods.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate a two-dimensional chart or projection representing each historical answer to a creativity and/or intelligence evaluation prompt such that answers provided by a user may be compared to the historical answers to determine originality scores for the answers provided by the user. For example, the Assessment Engine **102** may be operable to generate each n-dimensional representation of the Interactive Visualization Inputs **116** of each historical answer as a two-dimensional data point and chart or project each two-dimensional data point on the historical data chart or projection. FIG. **13**A shows a sample two-dimensional historical data chart or projection where each point or dot represents a unique historical answer to a creativity and/or intelligence evaluation prompt. The n-dimensional mathematical representations or projections of the historical answers may be generated and/or projected in two-dimensions through any suitable process or algorithm, such as by projections, dimensional distributions, cross-sections, principal component analysis (PCA), t-distributed stochastic neighbor embedding (t-SNE), uniform manifold approximation and projection (UMAP), nonlinear dimensionality reduction, or other suitable method for dimensionality reduction of data. The Assessment Engine **102** may also be operable to generate a two-dimensional representation or projection of each answer provided by the user and chart or project the two-dimensional representation on the historical data chart or projection. The Assessment Engine **102** may generate the two-dimensional representation or projection of each answer provided by the user based on the n-dimensional mathematical representations of the Interactive Visualization Inputs **116** of the answers provided by the user in the same manner as the historical answers.

The Assessment Engine **102** may be further operable to automatically generate an originality point score for each of the answers provided by the user based on the proximity of the two-dimensional representations of the answers provided by the user in the historical data chart or projection to historical answers contained in the historical data chart or projection. In the historical data chart or projection, high density areas represent common answers that are very similar as the historical answer representations are very close to many other answer representations, medium density areas represent less common answers as the historical answer representations are not as close to many other answer representations, and low density areas represent rare or unique answers as the historical answer representations are spaced farther apart from clusters of answer representations. In some embodiments, the Assessment Engine **102** may be operable to automatically generate an originality point score for each provided answer according to the density of the historical answer representations or projections around the representation or projection of the user answer in the historical data chart or projection, such as whether the representation of the user answer is in a high density area, a medium density area, or a low density area. For example, the Assessment Engine **102** may be operable to generate an originality point score of 0 for answers in high density areas on the historical data chart or projection, an originality point score of 1 for answers in medium density areas on the historical data chart or projection, and an originality point score of 2 for answers in low density areas on the historical data chart or projection. However, it will be appreciated by those of skill in the art that the Assessment Engine **102** may generate originality point scores for the answers based on more than three categories of density, such as four or more, and may generate originality point scores other than 0, 1, and 2, such as between 0 and 1, between 1 and 2, and greater than 2. In other embodiments, the Assessment Engine **102** may be operable to generate an originality point score for each provided answer as inversely proportional to the density of the location on the historical data chart or projection. For example, if the density of a region in the historical data chart or projection surrounding the representation or projection of a provided answer is higher than a predetermined threshold, the Assessment Engine **102** may automatically generate an originality point score of 0 and if the density of the region is lower than the predetermined threshold, the Assessment Engine **102** may generate an originality point score that is the inverse of the density of historical answer representations around the provided answer representation or projection. The Assessment Engine **102** may then be operable to automatically generate an overall originality point score for the answers provided by the user as a sum of the originality point scores for each answer provided by the user.

FIGS. **13**B and **13**C each show two-dimensional representations of sample answers provided by users charted or projected in the historical data chart or projection of FIG. **13**A with the answers in FIG. **13**C having a higher originality score than the answers in FIG. **13**B. In FIGS. **13**B and **13**C, the two-dimensional representations of answers provided by the users are shown with stars. FIG. **13**B shows an answer set with three unique answers A, B, and C. In FIG. **13**B, all three answers A, B, and C are contained in an area in the historical data chart or projection with high density. FIG. **13**C shows an answer set with six unique answers D, E, F, G, H, and I. In FIG. **13**C, answers D, F, and G are in areas in the historical data chart or projection with high density, answer E is in an area in the historical data chart or projection with medium density, and answer H and I are in areas in the historical data chart or projection with low density. In the embodiment where the Assessment Engine **102** generates an originality point score of 0 for answers in high density areas, an originality point score of 1 for answers in medium density areas, and an originality point score of 2 for answers in low density areas, the answer set shown in FIG. **13**B would receive an overall originality point score of 0 (e.g., 3*0+0*1+0*2) and the answer set shown in FIG. **13**C would receive an overall originality point score of 5 (e.g., 3*0+1*1+2*2).

In the illustrated embodiment of FIGS. **13**A-**13**C, a single two-dimensional chart or projection is generated to represent the n-dimensional historical and user answers to a creativity and/or intelligence evaluation prompt. Such a two-dimensional chart or projection may represent a single two-dimensional view, projection, or perspective of the n-dimensional representations of each historical answer and each answer provided by the user. However, it will be appreciated by one of skill in the art that the Assessment Engine **102** may generate more than one two-dimensional representation of the answers to evaluate one or more answers provided by the user and generate an originality score for the answers provided by the user. For example, the Assessment Engine **102** may generate two or more different two-dimensional charts or projections representing the n-dimensional historical and user answers such that each two-dimensional chart or projection is a different view, projection, or perspective of the n-dimensional data representing the historical answers and the answers provided by the user. The Assessment Engine **102** may be further configured to generate an originality score for the answers provided by the user based on the multiple two-dimensional charts or projections. For

example, the Assessment Engine **102** may be configured to generate an originality point score as described above for each answer for each two-dimensional representation and generate an overall originality point score for each answer that is an average, weighted average, sum, or other combination of the generated originality point scores for each two-dimensional view, projection, or perspective of the answers. In other embodiments, the Assessment Engine **102** may be operable to compare the n-dimensional representations of the answers provided by a user without generating two-dimensional representations for each answer to generate the originality point score.

FIGS. **14**A and **14**B each show a set of four sample answers to prompt (using a petal-shaped Interactive Visualization Input **116**, draw as many flowers as possible). The Assessment Engine **102** may be operable to automatically determine that the answers in FIG. **14**B have a higher originality score than the answers provided in FIG. **14**A. For example, the Assessment Engine **102** may compare the answers provided in FIGS. **14**A and **14**B to historical answers stored in the Storage **110** and determine that the answers in FIG. **14**A are more common answers as they are radial designs emanating from a single point and that the answers in FIG. **14**B are valid answers that are less common. Accordingly, the Assessment Engine **102** may generate a higher originality numerical value or point score for the answers in FIG. **14**B than the answers in FIG. **14**A. While the answers provided in FIG. **14**B are shown as having a higher originality score than the answers provided in FIG. **14**A, it will be appreciated that the originality scores may change due to the composition of historical answers. For example, over time, answers may be provided by other users such that the answers provided in FIG. **14**A have the same originality score as the answers provided in FIG. **14**B or such that the answers provided in FIG. **14**A have a higher originality score than the answers provided in FIG. **14**B.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate an originality score for the answers provided by the user as a percentile rank compared to users with similar ages and/or educational levels. For example, the Assessment Engine **102** may generate an originality point value for the answers provided by the user as a sum of the point scores of each two-dimensional representation of the provided answer based on its proximity to historical answers in the historical data chart or projection and then compare or evaluate the generated originality point value against originality point values of users with similar ages and/or educational levels contained in a historical data set (e.g., stored in the Storage **110**). The Assessment Engine **102** may then automatically generate an originality score for the answers provided by the user as a percentile rank of the generated originality point value for the user compared to the originality point values of users with similar ages and/or educational levels contained in the historical data set.

Referring back to FIG. **11**, at step **412**, an elaboration score for the answers provided by the user may be generated corresponding to the complexity of Interactive Visualization Inputs **116** arranged in each of the answers to the prompts. In some embodiments, the Assessment Engine **102** may be operable to automatically generate a numerical value or point score according to the elaboration of the answers provided by the user in the User Interface **108** to each prompt based on the number and/or complexity of Interactive Visualization Inputs **116** arranged in each of the user manipulable spaces, grids, sub-spaces, or sub-grids corresponding to each of the answers provided by the user. The Assessment Engine **102** may also be configured to automatically generate a numerical value or point score according to the elaboration of the answers generated by the Assessment Engine **102** based on inputs and/or uploads provided by the user. In certain embodiments, the Assessment Engine **102** may be operable to automatically calculate the number of Interactive Visualization Inputs **116**, the number of types of Interactive Visualization Inputs **116**, and/or the variation of Interactive Visualization Inputs **116** contained in each of the user manipulable spaces, grids, sub-spaces, or sub-grids corresponding to each of the answers provided by the user. In certain embodiments, the Assessment Engine **102** may be operable to automatically analyze each of the mathematical representations of answers and ignore, remove, or delete superfluous or duplicative Interactive Visualization Inputs **116** in each answer. For example, the Assessment Engine **102** may analyze each of the answers and ignore, remove, or delete the representations corresponding to Interactive Visualization Inputs **116** that are completely overlapped by other Interactive Visualization Inputs **116**.

The Assessment Engine **102** may be operable to apply one or more calculation methods for generating the numerical point value to assign to the answers provided by the user based on the prompt. For example, the Assessment Engine **102** may be operable to automatically generate a numerical score or point value equal to the number of Interactive Visualization Inputs **116** contained in the answer, a numerical score or point value equal to the number of unique Interactive Visualization Inputs **116** or types of Interactive Visualization Inputs **116** provided in the answer, or a numerical score or point value that is weighted according to an average number of Interactive Visualization Inputs **116** provided to the prompt (which could be stored in or generated from historical data stored in the Storage **110**).

In some embodiments, the Assessment Engine **102** automatically generates the elaboration point score as a count of the Interactive Visualization Inputs **116** arranged in each of the user manipulable spaces, grids, sub-spaces, or sub-grids. In other embodiments, the Assessment Engine **102** automatically generates the elaboration point score as a count of the Interactive Visualization Inputs **116** arranged in each of the user manipulable spaces, grids, sub-spaces, or sub-grids plus the time a user spent creating the designs, such as the time spent manipulating each petal, multiplied by a scaling factor or coefficient. In still further embodiments, the Assessment Engine **102** automatically generates the elaboration point score as a count of the Interactive Visualization Inputs **116** arranged in each of the user manipulable spaces, grids, sub-spaces, or sub-grids multiplied by a scaling factor if the Assessment Engine **102** determines that the intricacy of the answer is above a predetermined threshold. For example, if the Assessment Engine **102** determines that the intricacy of the answer is above a specific threshold, the Assessment Engine **102** may generate the elaboration score by multiplying the count of Interactive Visualization Inputs **116** by a given number, such as 2. The Assessment Engine **102** may automatically determine the intricacy of the answer based on the record of the process by which the user formed the answer and the purposeful amount of time that the user spent positioning, scaling, rotating, or otherwise manipulating each Interactive Visualization Input **116**. The Assessment Engine **102** may automatically calculate the intricacy based on the amount of time the user actually spent placing or otherwise manipulating Interactive Visualization Inputs **116** to create each answer to the creativity and/or intelligence evaluation prompt. As such, the Assessment Engine **102** would ignore the time the user spent positioning,

scaling, rotating, or otherwise manipulating an Interactive Visualization Input **116** that did not result in the ultimate configuration of the Interactive Visualization Input **116** or time that the user spent taking the creativity and/or intelligence evaluation without manipulating any Interactive Visualization Input **116**. For example, the Assessment Engine **102** may ignore the time that the user spent moving an Interactive Visualization Input **116** without placing the Interactive Visualization Input **116** in the user manipulable space, grid, sub-space, or sub-grid.

The Assessment Engine **102** may also be operable to automatically generate one or more elaboration scores based on a combination of one or more calculation methods, in parallel and/or in series. For example, the Assessment Engine **102** may concurrently perform two or more calculation methods and determine the highest score, weight an overall score based on the multiple calculations, and/or generate multiple elaboration scores according to the different calculation methods.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate an elaboration score for the answers provided by the user as a percentile rank compared to other users with similar ages and/or educational levels. For example, the Assessment Engine **102** may generate an overall elaboration point score for the answers provided by the user as a count of Interactive Visualization Inputs **116** contained in all of the answers provided by the user and then compare or evaluate the generated overall elaboration point score against overall elaboration point scores of users with similar ages and/or educational levels contained in a historical data set (e.g., stored in the Storage **110**). The Assessment Engine **102** may then automatically generate an elaboration score for the answers provided by the user a percentile rank of the generated overall elaboration point score compared to the overall elaboration point score of users with similar ages and/or educational levels contained in the historical data set.

FIG. **15** shows a set of six sample answers to a prompt (using a petal-shaped Interactive Visualization Input **116**, draw as many flowers as possible). In some embodiments, the Assessment Engine **102** may be operable to generate a numerical value or point score based on the elaboration of each provided answer based on the number of Interactive Visualization Inputs **116** contained in each answer. For example, the Assessment Engine **102** may be operable to count the number of Interactive Visualization Inputs **116** in each answer to generate the following point scores based on the number of Interactive Visualization Inputs **116** in each answer: 3 for the top-left answer, 4 for the top-middle answer, 3 for the top-right answer, 24 for the bottom-left answer, 18 for the bottom-middle answer, and 24 for the bottom-right answer.

Referring back to FIG. **11**, at step **414**, a flexibility score for the answers provided by the user may be generated corresponding to the variation in arrangement and/or manipulation of Interactive Visualization Inputs **116** in the answers to each prompt. In some embodiments, the Assessment Engine **102** may be operable to automatically generate a numerical value or point score according to the flexibility of the answers provided by the user in the User Interface **108** in each of the user manipulable spaces, grids, sub-spaces, or sub-grids or generated by the Assessment Engine **102** based on answers input and/or uploaded by the user to the User Interface **108**, Assessment Engine **102**, and/or Client **114** corresponding to each of the answers provided by the user to the particular prompt. In certain embodiments, the Assessment Engine **102** may be operable to compare or evaluate each answer contained in one of the user manipulable spaces, grids, sub-spaces, or sub-grids against the other answers provided in the other user manipulable spaces, grids, sub-spaces, or sub-grids to evaluate how similar or different each particular answer is from the other answers provided by the user. The Assessment Engine **102** may be operable to automatically compare and/or contrast the answers to each prompt according to one or more methods to determine the similarities and/or differences. For example, FIGS. **16**A and **16**B each show four sample answers to a prompt (using a petal-shaped Interactive Visualization Input **116**, draw as many flowers as possible). The Assessment Engine **102** may be operable to automatically determine that the answers in FIG. **16**B have a higher flexibility score than the answers provided in FIG. **16**A as the answers in FIG. **16**A are all radial flowers that emanate from a single, center point whereas the answers in FIG. **16**B are flowers with different designs and/or structures. The Assessment Engine **102** may be operable to apply any suitable one or more calculation methods for generating the numerical value or point score according to the flexibility of the answers provided by the user. In certain embodiments, the Assessment Engine **102** may implement a neural network trained from historical data, a comparison to stored data or a database, such as stored in the Storage **110**, historical answers to the prompt, or other deep learning algorithms known to persons skilled in the art to determine the flexibility of the answers provided by the user. For example, the Assessment Engine **102** may be operable to generate a numerical score or point value to the answers equal to the number of unique designs contained in the answers provided by the user, a numerical score or point value that is weighted according to the average number of design or answer types provided to the prompt (which could be stored in or generated from historical data stored in the Storage **110**), or a numerical score or point value according to the number of manipulated Interactive Visualization Inputs **116** not contained in the other answers provided by the user. The Assessment Engine **102** may also be operable to automatically generate one or more flexibility scores based on a combination of one or more calculation methods, in parallel and/or in series. For example, the Assessment Engine **102** may concurrently perform two or more calculation methods and determine the highest score, weight an overall score based on the multiple calculations, and/or generate multiple flexibility scores according to the different calculation methods.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate an overall flexibility point score for the answers provided by a user based on the n-dimensional mathematical representation of each answer generated by the Assessment Engine **102**. The Assessment Engine **102** may automatically generate two-dimensional representations of each n-dimensional mathematical representation of each answer as described above, such as described in FIGS. **10**A-**10**B and **13**A-**13**C. The Assessment Engine **102** may then be operable to automatically generate an overall flexibility point score for the provided answers as a count of unique clusters of two-dimensional representations for the provided answers. For example, referring back to FIGS. **13**B and **13**C, the Assessment Engine **102** may generate an overall flexibility point score of 1 for the answers provided in FIG. **13**B as answers A, B, and C are all contained in a single cluster and the Assessment Engine **102** may generate an overall flexibility point score of 4 for the

answers provided in FIG. **13**C as answers D, E, and F are in a cluster and answers G, H, and I are each in unique areas in the chart or projection.

In the illustrated embodiment of FIGS. **13**A-**13**C, a single two-dimensional chart or projection is generated to represent the n-dimensional historical and user answers to a creativity and/or intelligence evaluation prompt. Such a two-dimensional chart or projection may represent a single two-dimensional view, projection, or perspective of the n-dimensional representations of each historical answer and each answer provided by the user. However, it will be appreciated by one of skill in the art that the Assessment Engine **102** may generate more than one two-dimensional representation of the answers to evaluate one or more answers provided by the user and generate a flexibility score for the answers provided by the user. For example, the Assessment Engine **102** may generate two or more different two-dimensional charts or projections representing the n-dimensional historical and user answers such that each two-dimensional chart or projection is a different view, projection, or perspective of the n-dimensional data representing the historical answers and the answers provided by the user. The Assessment Engine **102** may be further configured to generate a flexibility score for the answers provided by the user based on the multiple two-dimensional charts or projections. For example, the Assessment Engine **102** may be configured to generate a flexibility point score as described above for each answer for each two-dimensional representation and generate an overall flexibility point score for each answer that is an average, weighted average, sum, or other combination of the generated flexibility point scores for each two-dimensional view, projection, or perspective of the answers. In other embodiments, the Assessment Engine **102** may be operable to compare the n-dimensional representations of the answers provided by a user without generating two-dimensional representations for each answer to generate the flexibility point score.

In some embodiments, the Assessment Engine **102** may be operable to automatically generate a flexibility score for the answers provided by the user as a percentile rank compared to other users with similar ages and/or educational levels. For example, the Assessment Engine **102** may generate a flexibility point value for the answers provided by the user as a count of unique answer clusters provided by the user when the answers are represented in two-dimensional form in a data chart or projection and then compare or evaluate the generated flexibility point value against flexibility point values of other uses with similar ages and/or educational levels contained in a historical data set (e.g., stored in the Storage **110**). The Assessment Engine **102** may then automatically generate a flexibility score for the answers provided by the user as a percentile ranks of the generated flexibility point value for the user compared to the flexibility point values of users with similar ages and/or educational levels contained in the historical data set.

At step **416**, a creativity and/or intelligence evaluation value or point score may be generated based on the answers provided by the user to the creativity and/or intelligence evaluation prompts. In some embodiments, the Assessment Engine **102** may be operable to automatically generate an overall numerical value or point score for the creativity and/or intelligence evaluation based on the answers provided by the user in the User Interface **108** to the one or more prompts or generated by the Assessment Engine **102** based on inputs and/or uploads provided by the user. The Assessment Engine **102** may be operable to automatically implement one or more methods for calculating and generating the overall numerical value or point score for the creativity and/or intelligence evaluation. In certain embodiments, the Assessment Engine **102** may automatically add or combine the generated numerical values or point scores from each of steps **408** through **414** to generate the overall numerical value or point score for the creativity and/or intelligence evaluation. In other embodiments, the Assessment Engine **102** may generate the overall numerical value or point score by weighting one or more of the generated numerical values or point scores from steps **408** through **414**, such as the originality, elaboration, and/or flexibility scores generated in the preceding steps. The Assessment Engine **102** may also automatically generate the overall numerical value or point score based on multiple values or point scores generated in steps **408** through **414**. The Assessment Engine **102** may also automatically generate the overall numerical value or point score based on any suitable factors, such as the user's age, educational level, reading level, computer proficiency level, or any other suitable factor, such as, but not limited to, weighting a numerical value or point score according to the age and/or educational grade or level of the user. The Assessment Engine **102** may also be operable to automatically generate one or more creativity and/or intelligence evaluation values or point scores based on a combination of one or more calculation methods, in parallel and/or in series. For example, the Assessment Engine **102** may concurrently perform two or more calculation methods and determine the highest score, weight an overall score based on the multiple calculations, and/or generate multiple creativity and/or intelligence evaluation scores according to the different calculation methods.

The Assessment Engine **102** may generate the creativity and/or intelligence point score as a sum, weighted sum, average, or weighted average of one or more of the fluency score, originality score, elaboration score, and flexibility score. In some embodiments, the Assessment Engine **102** may automatically generate the creativity and/or intelligence point score as an average of the originality score and the highest two scores of the fluency, elaboration, and flexibility scores. For example, in an embodiment where the fluency, originality, elaboration, and flexibility scores are determined as rankings or percentile values compared to similar users, the Assessment Engine **102** may generate the following scores for a user: fluency score of 87%, originality score of 93%, elaboration score of 51%, and flexibility score of 90%. The Assessment Engine **102** would then calculate a creativity and/or intelligence point score as 90% as the average of 93% (the originality score), 90% (the flexibility score, the highest non-originality score), and 87% (the fluency score, the second-highest non-originality score). However, it will be appreciated that the Assessment Engine **102** may generate the creativity and/or intelligence point score according to other formulas. For example, the Assessment Engine **102** may generate the creativity and/or intelligence point score as an average of the originality score and the highest single other score, an average of the highest two scores, or an average of the highest three scores, or an average of all four scores.

At step **418**, a creativity and/or intelligence evaluation level output may be generated corresponding to a creativity and/or intelligence level of the user. In some embodiments, the Assessment Engine **102** may be operable to automatically generate the creativity and/or intelligence evaluation level output corresponding to the creativity and/or intelligence level of the user based on the overall numerical value or point score for the creativity and/or intelligence evaluation generated in step **416**. The Assessment Engine **102** may

automatically calculate and generate the creativity and/or intelligence evaluation level based on the overall numerical value or point score for the creativity and/or intelligence evaluation generated in step **416** according to one or more calculation methods. The Assessment Engine **102** may be operable to implement a neural network trained from historical data, a comparison to stored data or a database, such as stored in the Storage **110**, or other deep learning algorithms known to persons skill in the art to automatically generate the creativity and/or intelligence evaluation level output corresponding to the creativity and/or intelligence evaluation generated in step **416**. For example, the Assessment Engine **102** may compare the overall numerical value or point score to historical numerical values or point scores, such as scores stored in the Storage **110**, corresponding to known creativity and/or intelligence levels to determine a creativity and/or intelligence level output for the user. In other embodiments, the Assessment Engine **102** may be operable to calculate the creativity and/or intelligence level output of the user based on the one or more creativity and/or intelligence evaluation scores generated in step **416**. For example, the Assessment Engine **102** may be operable to apply a suitable weight or scale to the creativity and/or intelligence evaluation scores to generate the creativity and/or intelligence level output. In some embodiments, the Assessment Engine **102** may generate the creativity and/or intelligence evaluation level output as a percentile rank of the creativity and/or intelligence point score of the user compared to the creativity and/or intelligence point scores of other similar users, such as other users with similar ages and/or educational levels.

In certain embodiments, the Assessment Engine **102** may be operable to automatically implement more than one calculation method for generating the creativity and/or intelligence evaluation level output. For example, the Assessment Engine **102** may be operable to implement more than one method for generating one or more of the fluency score, originality score, elaboration score, flexibility score, creativity score, and creativity evaluation score. In further embodiments, the Assessment Engine **102** may be operable to implement one or more of the calculation methods in parallel.

In some embodiments, the Assessment Engine **102** may be operable to update or dynamically adjust the one or more calculation methods for generating one or more of the fluency score, originality score, elaboration score, flexibility score, creativity score, creativity evaluation score, and creativity evaluation level output based on one or more inputs, such as historical user test data. In certain embodiments, the Assessment Engine **102** may be operable to automatically update the one or more calculation methods in near time or near-real time. For example, the Assessment Engine **102** may be operable to implement a neural network with a node hierarchy and node parameters that may be altered or adjusted according to additional answers provided by users. In certain embodiments, the Assessment Engine **102** may be operable to alter the calculation or weighting methods for generating one or more of the fluency score, originality score, elaboration score, flexibility score, creativity score, creativity evaluation score, and creativity evaluation level output based on additional answers provided by users. For example, the Assessment Engine **102** may store additional user responses in the Storage **110** which may be used to adjust the algorithm or methodology by which the Assessment Engine **102** generates an originality score, such as by using the additional responses to update the frequency determination of a particular answer or the weighting to assign a particular score.

FIG. **17** shows steps according to an exemplary method **500** for enhancing the creativity and/or intelligence of a user. It will be appreciated that the illustrated method and associated steps may be performed in a different order, with illustrated steps omitted, with additional steps added, or with a combination of reordered, combined, omitted, or additional steps. The steps may be implemented in one or more computer readable instructions, such as by the Assessment Engine **102**.

At step **502**, a user creativity and/or intelligence level of a user may be received or obtained. The creativity and/or intelligence level may be the creativity and/or intelligence evaluation level output corresponding to the creativity and/or intelligence level of a user generated in step **418**. In some embodiments, the Assessment Engine **102** may be operable to automatically receive, obtain, or generate a creativity and/or intelligence level of a user. The Assessment Engine **102** may receive or obtain the creativity and/or intelligence level of the user from the User Interface **108**, Storage **110**, or Network **112** or the Assessment Engine **102** may be operable to generate the creativity and/or intelligence level of the user, such as shown in FIGS. **3**, **5**, and **11**.

At step **504**, a user profile may be generated for the user based, in part, on the user creativity and/or intelligence level of the user. The user profile may contain additional personal information about the user including, but not limited to, the age, primary or native language, educational level, interest areas, expression styles, and/or learning styles of the user. In some embodiments, the Assessment Engine **102** may be operable to generate the user profile for the user. In certain embodiments, the Assessment Engine **102** may be operable to automatically generate the user profile from data input by the user in the User Interface **108** via the input of one of the Clients **114**. For example, the user may input his or her personal information though the User Interface **108** such as by selecting options from drop downs, typing in the information, selecting check-boxes, or any other suitable manner. In other embodiments, the Assessment Engine **102** may be operable to generate an assessment to obtain personal information of the user such as by evaluating the interest areas, expression styles, learning styles, or any other suitable factor of the user.

At step **506**, a user learning group may be generated for the user. In some embodiments, the user may be linked to an administrative user, such as a teacher, depending on the generated user profile. In certain embodiments, the user may also be linked to one or more other users having similar user profiles. For example, the user learning group may link users with similar creativity and/or intelligence levels, learning styles, expression styles, interest areas, educational levels, or any other suitable factors. However, in other embodiments, the user learning group may not contain other users and the user learning group may contain only the user and the administrative user. In some embodiments, the Assessment Engine **102** may be operable to automatically generate the user learning group. In some embodiments, the Assessment Engine **102** may be operable to generate the user learning group based on historical data, such as historical data stored in the Storage **110**.

At step **508**, an interactive assignment may be generated which may be unique to the user learning group. The interactive assignment may be a task or assignment designed or intended to enhance the creativity and/or intelligence level of the users of the user learning group. In certain

embodiments, the Assessment Engine **102** may be operable to automatically generate the interactive assignment, such as based on the user profiles of the users in the user learning group. In other embodiments, the interactive assignment may be generated by the administrative user through the User Interface **108**. For example, the Assessment Engine **102** may generate a unique interactive assignment or may select from one of a number of stored or historical interactive assignments, such as an interactive assignment stored in the Storage **110**. The interactive assignment may ask the user learning group to answer one or more questions or complete one or more tasks which may enhance the creativity and/or intelligence of the users in the user learning group by answering the questions or completing the tasks. In still further embodiments, the interactive assignment may be generated by the Assessment Engine **102** and may be altered or edited by the administrative user through the User Interface **108**.

In some embodiments, the Assessment Engine **102** may automatically generate the interactive assignment based on one or more of the fluency score, originality score, elaboration score, and flexibility score of a user and/or the user learning group. The Assessment Engine **102** may generate the interactive assignment to target one or more creativity and/or intelligence areas (e.g., fluency, originality, elaboration, and flexibility) that the user and/or user learning group scored lowly on in the creativity and/or intelligence evaluation. For example, the Assessment Engine **102** may generate an interactive assignment which tasks the user and/or user learning group to increase the total number of designs in response to prompts for users with low fluency scores, to increase the uniqueness of designs in response to prompts for users with low originality scores, to increase the complexity of designs in response to prompts for users with low elaboration scores, and increase the variation of designs in response to prompts for users with low flexibility scores.

At step **510**, a user workspace may be generated for the interactive assignment for the user learning group to complete and resubmit the interactive assignment. The user workspace may be a space in which the users of the learning group may work on the interactive assignment and which facilitates communication and collaboration in a digital space over a network. In certain embodiments, the Assessment Engine **102** may be operable to automatically generate a user interactive space in the User Interface **108** in which the users in the user learning group may each work, either alone or in collaboration, to complete the interactive assignment. In some embodiments, the Assessment Engine **102** may be operable to generate a workspace interface in the User Interface **108** which allows the users of the user learning group to communicate to each other via the inputs of the Clients **114**, such as via chat, call, video call, or other communication method. The users of the learning group may interact and/or communicate together via the Network **112**, such as using the inputs of the Clients **114** in data communication with the Network **112**.

At step **512**, the completed interactive assignment may be received from one or more of the users in the user learning group. In some embodiments, the completed interactive assignment may be submitted by one or more of the users in the user learning group through the User Interface **108**. In some embodiments, the Assessment Engine **102** is operable to automatically receive the completed interactive assignment such as from the User Interface **108**, the Network **112**, or one of the Clients **114**.

At step **514**, the completed interactive assignment may be verified. In some embodiments, the Assessment Engine **102** may be operable to verify that the received interactive assignment is complete. For example, the Assessment Engine **102** may be operable to automatically assess the received interactive assignment to determine that the received interactive assignment is complete, such as by assessing whether each section or question of the interactive assignment has been answered or completed and may be operable to confirm a digital signature generated on the completed interactive assignment, such as a time stamp. The Assessment Engine **102** may also be operable to automatically verify that the completed interactive assignment was not plagiarized or otherwise completed through cheating. For example, the Assessment Engine **102** may be operable to compare the completed interactive assignment against historical completed interactive assignments, such as completed interactive assignments stored in the Storage **110**, to verify that the received completed interactive assignment is substantially unique and was not copied. In other embodiments, the completed interactive assignment may be verified by another user, such as the administrative user of the user learning group.

At step **516**, the completed interactive assignment may be assessed or evaluated. In some embodiments, the Assessment Engine **102** may be operable to automatically assess or evaluate the completed interactive assignment. For example, the Assessment Engine **102** may be operable to read and interpret the completed interactive assignment to evaluate the completed interactive assignment, such as by comparing the completed interactive assignment to a predetermined answer key or set. In other embodiments, the completed interactive assignment may be assessed or evaluated by another user, such as the administrative user of the user learning group. For example, the administrative user may apply subjective standards for grading, weighting, or otherwise evaluating the completed interactive assignment.

In some embodiments, feedback may be generated and shared with the users of the user learning group. For example, the assessment or evaluation of the completed interactive assignment may be shared with the user learning group, such as through the User Interface **108** or via the Network **112**. The assessment or evaluation may be generated and displayed in the User Interface **108** for the users of the user learning groups to view, such as via the display of the Client **114**. In certain embodiments, one or more users of the user learning group may respond to the assessment or evaluation of the completed interactive assignment by editing or altering the completed interactive assignment in the User Interface **108** and resubmit the altered interactive assignment for further assessment or evaluation.

At step **518**, a secure presentation environment may be generated to present or display the competed interactive assignment. The secure presentation environment may be automatically generated by the Assessment Engine **102** in the User Interface **108** such that the completed interactive assignment may be viewed by users via the display of one or more Clients **114** connected to the Network **112**. One of the users, such as the administrative user, may select a display preference such that the completed interactive assignment may be displayed via the User Interface **108** to only specified users, such as users in the user learning group, the district, region, state, country, or other suitable group.

In some embodiments, the System **100** or Assessment Engine **102** may be operable to automatically generate reports or audits related to the creativity and/or intelligence evaluation and/or the creativity and/or intelligence enhancement of one or more users or user learning groups. For example, the System **100** or Assessment Engine **102** may be

operable to generate reports confirming the completion of creativity and/or intelligence evaluation steps by a user, the receipt and/or completion of interactive assignments by one or more users or user learning groups, the verification of one or more completed interactive assignments, the assessment of one or more completed interactive assignments, the generation of one or more secure presentation environments, and/or the user access to one or more of the secure presentation environments.

While the embodiments discussed herein have been related to the systems and methods discussed above, these embodiments are intendent to be exemplary and are not intended to limit the applicability of these embodiments to only those discussed set forth herein. While the present invention has been illustrated by the description of embodiments thereof, and while the embodiments have been described in some detail, it is not the intention of the applicant to restrict or in any way limit the scope of the appended claims to such detail. Additional advantages and modifications will readily appear to those skilled in the art. Therefore, the invention in its broader aspects is not limited to the specific details, representative apparatus and methods, and illustrative examples shown and described. Accordingly, departures may be made from such details without departing from the spirit or scope of the applicant's general inventive concept.

The invention claimed is:

1. A method for evaluating a creativity level of a user, the method comprising the steps:

generating a prompt;

generating at least one interactive visualization input based on the prompt;

receiving data indicative of a user's modification of the at least one interactive visualization input;

generating a mathematical representation of the data with an assessment engine comprising a processor and a memory;

generating a creativity evaluation score from the data; and

generating a creativity evaluation level output based on the creativity evaluation score;

wherein the step of generating the mathematical representation of the user input comprises determining a position and an orientation of each interactive visualization input in the data.

2. The method of claim **1**, further including the step of determining whether the data is a valid answer to the prompt.

3. The method of claim **1**, wherein the step of generating the creativity evaluation score comprises generating a fluency score based on the data.

4. The method of claim **1**, wherein the step of generating the creativity evaluation score comprises generating an originality score based on the data.

5. The method of claim **1**, wherein the step of generating the creativity evaluation score comprises generating an elaboration score based on the data.

6. The method of claim **1**, wherein the step of generating the creativity evaluation score comprises generating a flexibility score based on the data.

7. The method of claim **1**, wherein the step of generating the mathematical representation of the data comprises determining a scale of each interactive visualization input in the data.

8. The method of claim **1**, wherein each interactive visualization input is a two-dimensional shape.

9. A system for testing a creativity level of a user:

an assessment engine including a processor;

a user interface;

a storage;

a client; and

a network connecting the assessment engine, user interface, storage, and client;

wherein the assessment engine is operable through the user interface to generate a creativity evaluation prompt, generate at least one interactive visualization prompt, and generate a mathematical representation of an answer to the creativity evaluation prompt;

further wherein the assessment engine evaluates the mathematical representation of the answer, and generates a creativity level output; and

wherein the mathematical representation of the answer to the creativity evaluation prompt comprises a mathematical representation of a position and an orientation of each interactive visualization element in the answer.

10. The system for testing a creativity level of a user according to claim **9**, wherein the assessment engine is further operable to determine whether the answer is valid.

11. The system for testing a creativity level of a user according to claim **9**, wherein the evaluation of the mathematical representation of the answer includes a fluency score.

12. The system for testing a creativity level of a user according to claim **9**, wherein the evaluation of the mathematical representation of the answer includes an elaboration score.

13. The system for testing a creativity level of a user according to claim **9**, wherein the evaluation of the mathematical representation of the answer includes an originality score.

14. A method for evaluating a creativity level of a user, the method comprising the steps:

providing an assessment engine having a processor and a memory, wherein the memory contains instructions that, when executed by the processor, cause the processor to perform acts comprising:

generating a prompt;

generating at least one interactive visualization input based on the prompt;

receiving data indicative of a user's modification of the at least one interactive visualization input;

generating a mathematical representation of the data;

generating a creativity evaluation score from the data; and

generating a creativity evaluation level output based on the creativity evaluation score;

wherein the step of generating the mathematical representation of data comprises determining a scale of each interactive visualization input in the data.

15. The method of claim **14**, further including the step of determining whether the data is a valid answer to the prompt.

16. The method of claim **14**, wherein the step of generating the creativity evaluation score comprises generating a fluency score based on the data.

17. The method of claim **14**, wherein the step of generating the creativity evaluation score comprises generating an originality score based on the data.

18. The method of claim **14**, wherein the step of generating the creativity evaluation score comprises generating an elaboration score based on the data.

19. The method of claim **14**, wherein the step of generating the creativity evaluation score comprises generating a flexibility score based on the data.

20. The method of claim **14**, wherein each interactive visualization input is a two-dimensional shape.

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