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(54) **ARTIFICIAL INTELLIGENCE ASSISTED HYBRID ENTERPRISE/CANDIDATE EMPLOYMENT ASSISTANCE PLATFORM**

(71) Applicant: **Intry, LLC**, Dripping Springs, TX (US)

(72) Inventors: **Jennifer Sethre**, Austin, TX (US); **Aquiles Mata**, Austin, TX (US); **Aaron Salley**, New York, NY (US)

(73) Assignee: **Intry, LLC**, Dripping Springs, TX (US)

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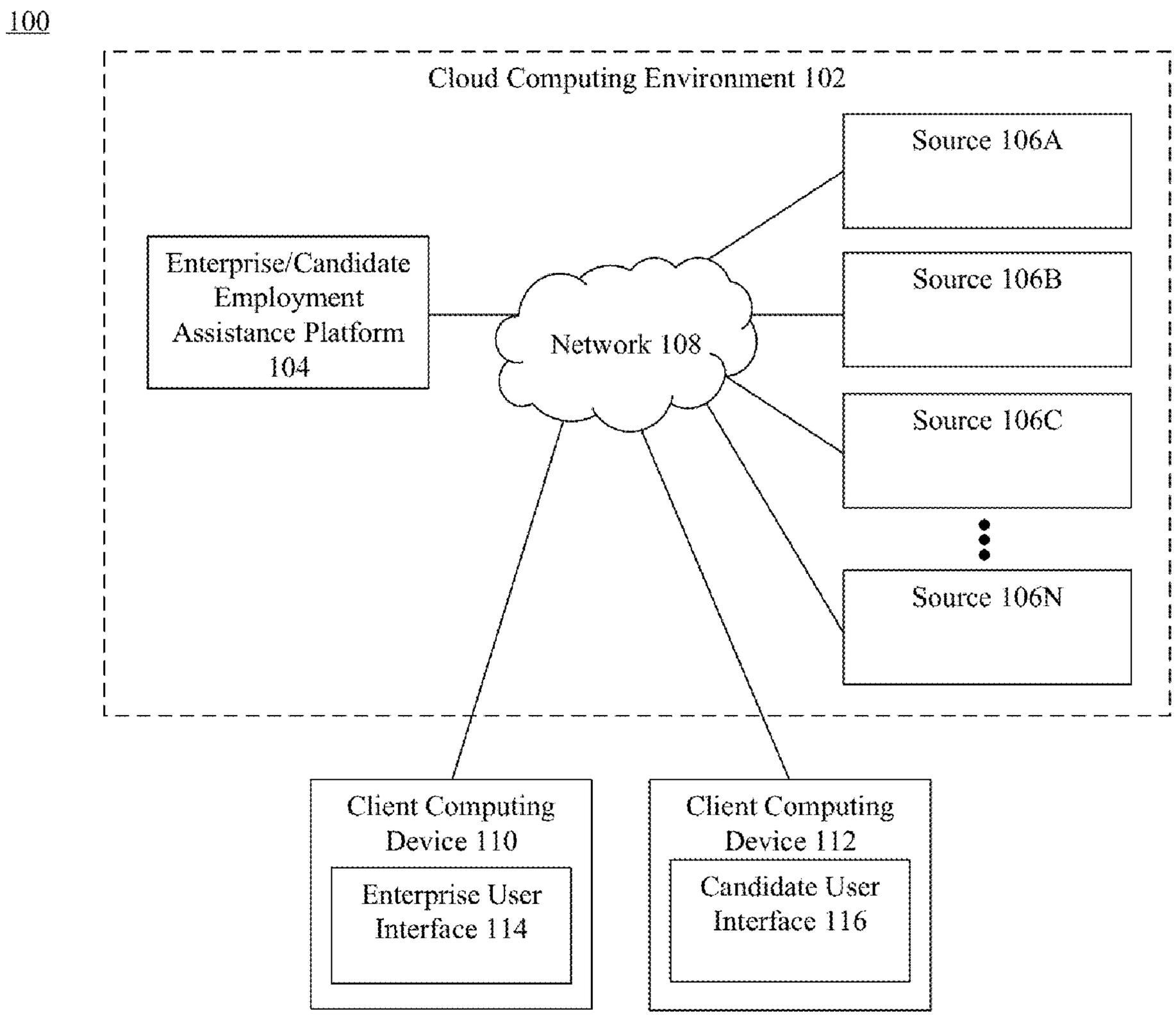
CPC ***G06Q 10/1053*** (2013.01); ***G06N 5/02*** (2013.01); ***G06N 20/00*** (2019.01)

(57) **ABSTRACT**

A platform for providing employment assistance services to enterprises and candidates is disclosed. For example, the platform trains, based on personal attributes of employees of multiple enterprise and work culture attributes associated with each employer of the multiple enterprises, a machine learning model that defines associations between the personal attributes and the work culture attributes. Further, for example, the platform generates a resume for a candidate based upon information from the user profile. The platform can eliminate bias when managing such resume by indexing the personal attributes of all user profiles to identify hidden variables, where the hidden variables are data that has been indexed as receiving biased treatment, editing the resume to remove the hidden variables, and returning the resume to the candidate.



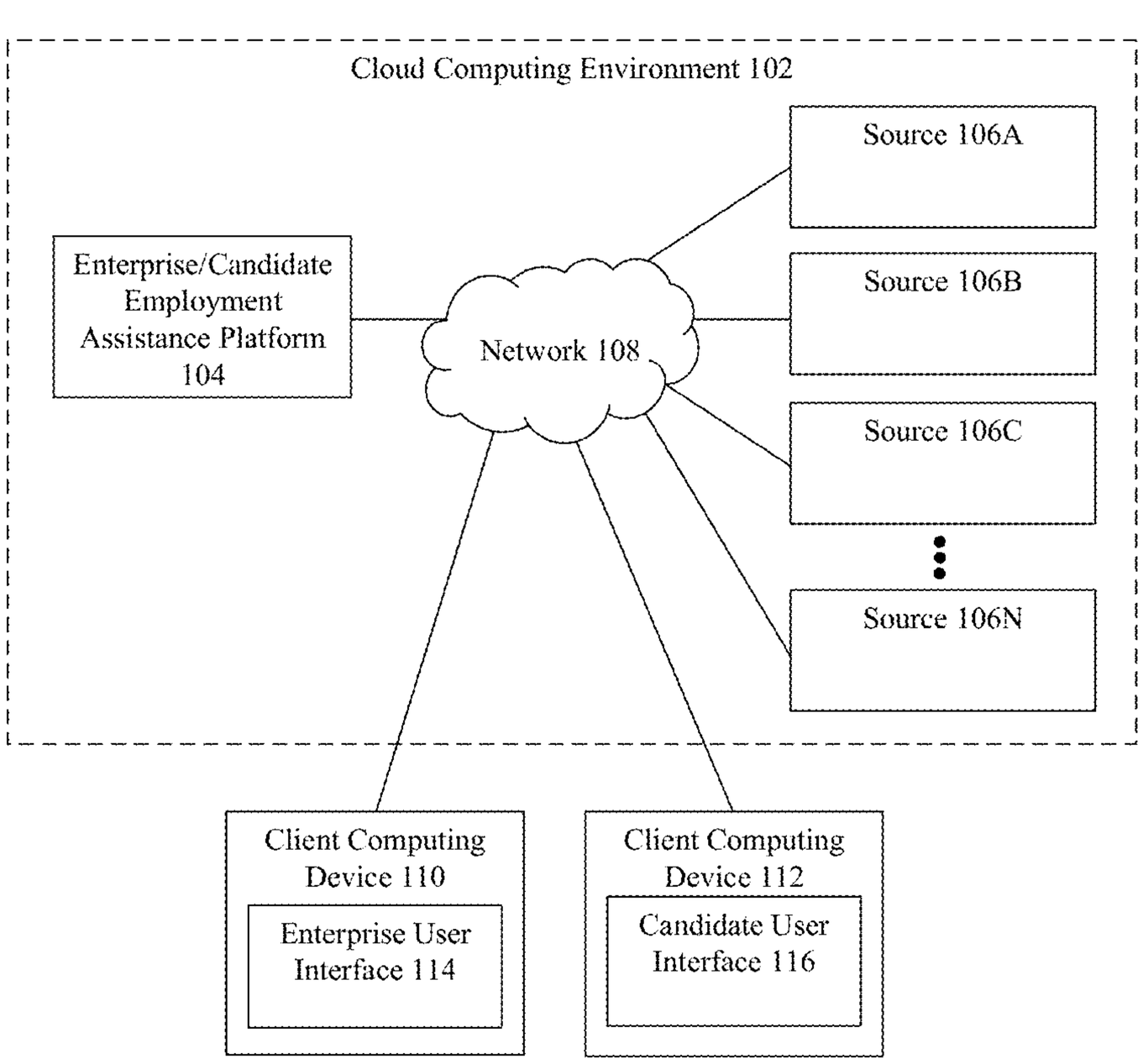

100
Cloud Computing Environment 102
Source 106A
Source 106B
Source 106C
Source 106N
Enterprise/Candidate Employment Assistance Platform 104
Network 108
Client Computing Device 110
Enterprise User Interface 114
Client Computing Device 112
Candidate User Interface 116

FIG. 1

200

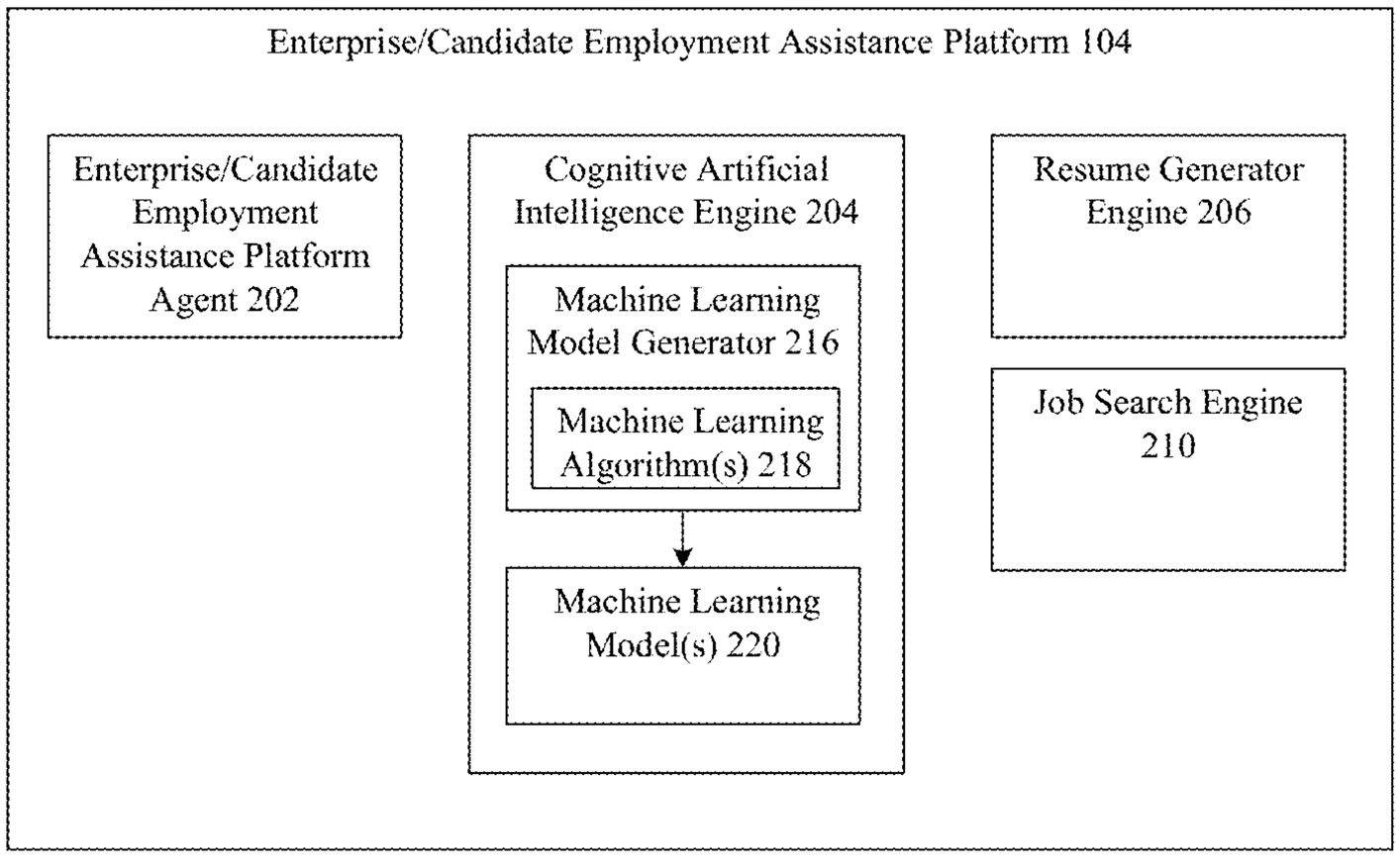

Enterprise/Candidate Employment Assistance Platform 104
Enterprise/Candidate Employment Assistance Platform Agent 202
Cognitive Artificial Intelligence Engine 204
Machine Learning Model Generator 216
Machine Learning Algorithm(s) 218
Machine Learning Model(s) 220
Resume Generator Engine 206
Job Search Engine 210

FIG. 2

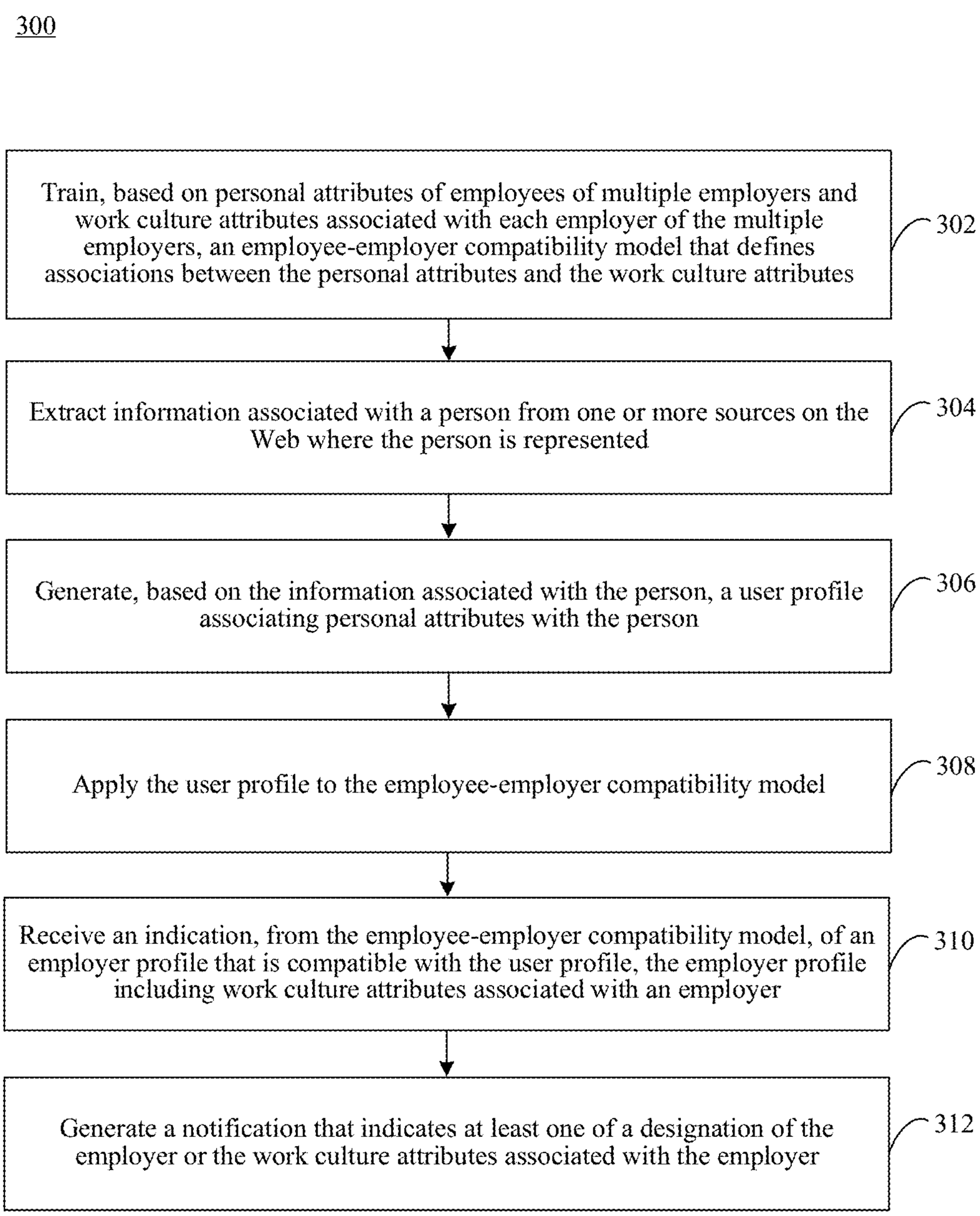

300
Train, based on personal attributes of employees of multiple employers and work culture attributes associated with each employer of the multiple employers, an employee-employer compatibility model that defines associations between the personal attributes and the work culture attributes
302
Extract information associated with a person from one or more sources on the Web where the person is represented
304
Generate, based on the information associated with the person, a user profile associating personal attributes with the person
306
Apply the user profile to the employee-employer compatibility model
308
Receive an indication, from the employee-employer compatibility model, of an employer profile that is compatible with the user profile, the employer profile including work culture attributes associated with an employer
310
Generate a notification that indicates at least one of a designation of the employer or the work culture attributes associated with the employer
312

FIG. 3

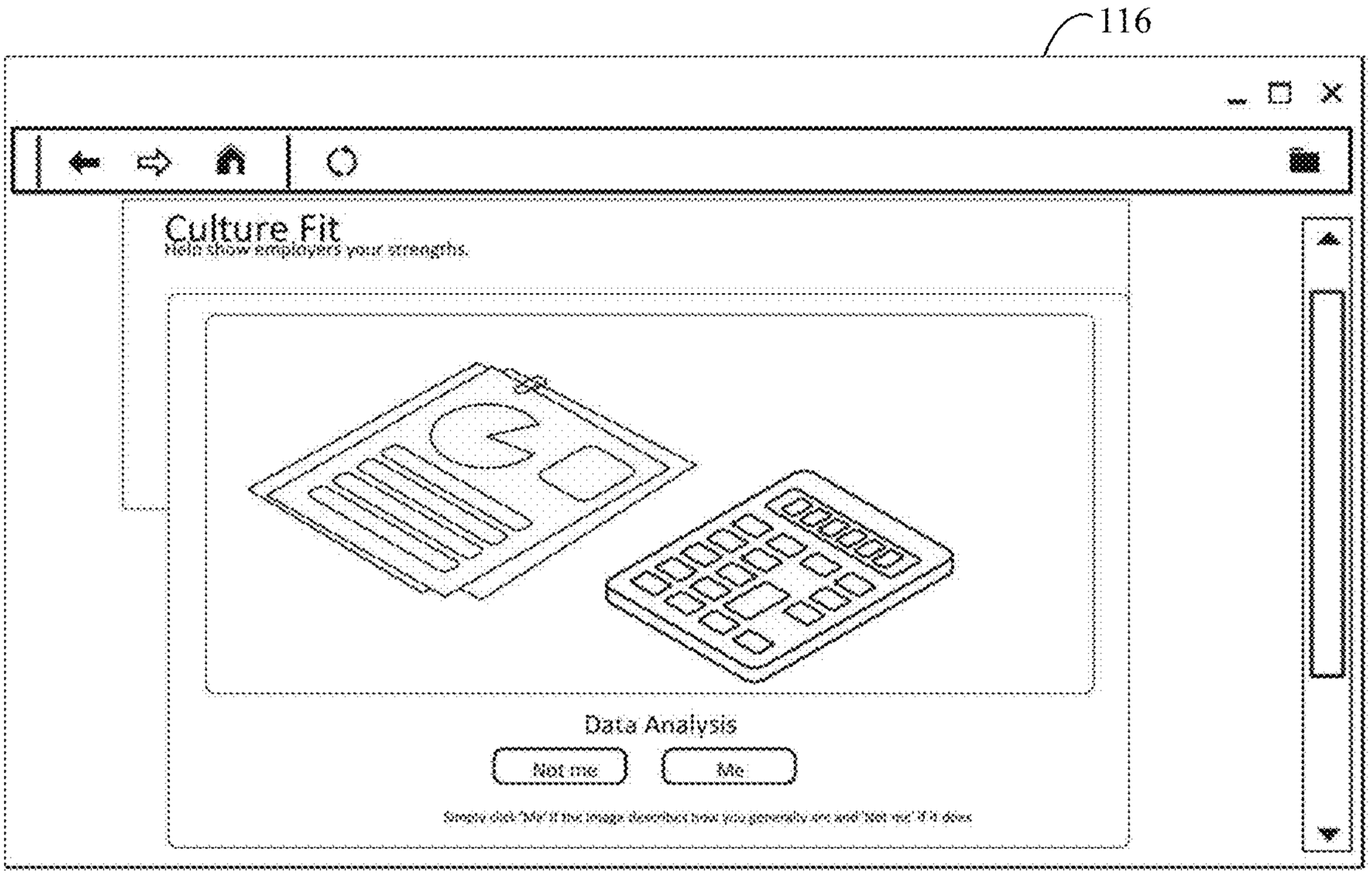

116
Culture Fit
Help show employers your strengths.
Data Analysis
Not me
Me
Simply click 'Me' if the image describes how you generally are and 'Not me' if it does

FIG. 4A

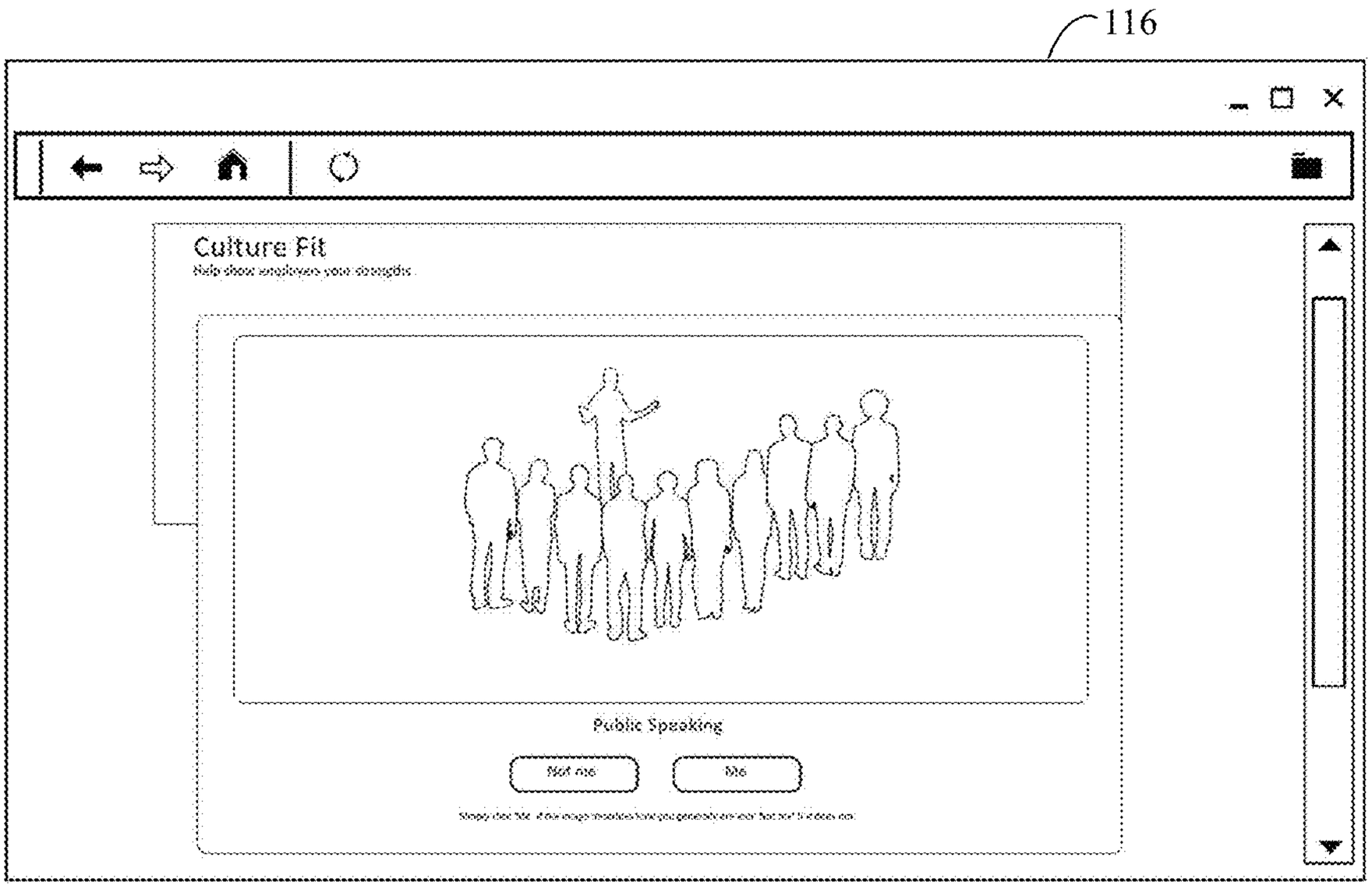

116
Culture Fit
Help show employers your strengths
Public Speaking
Not me
Me

FIG. 4B

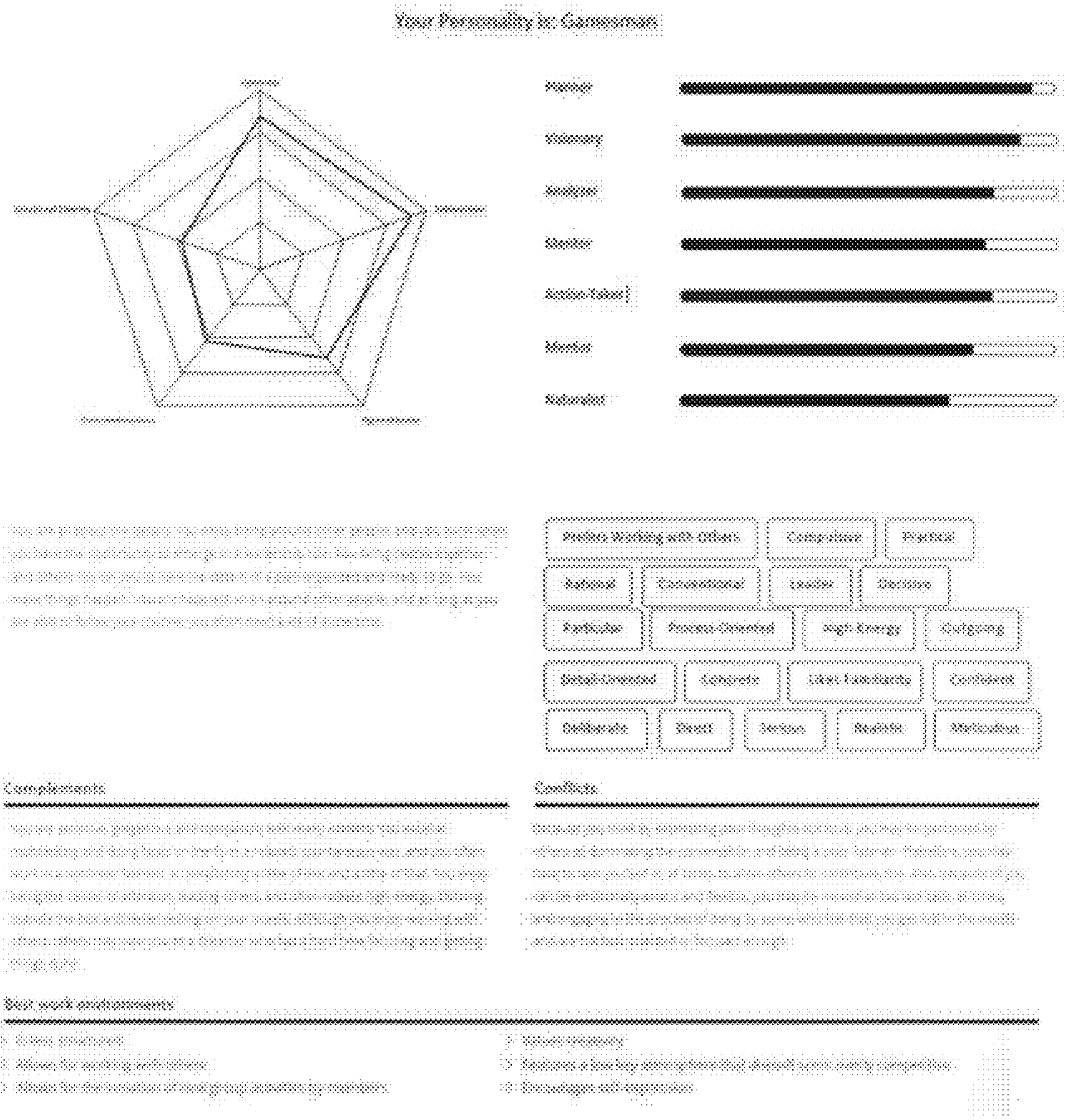


FIG. 5

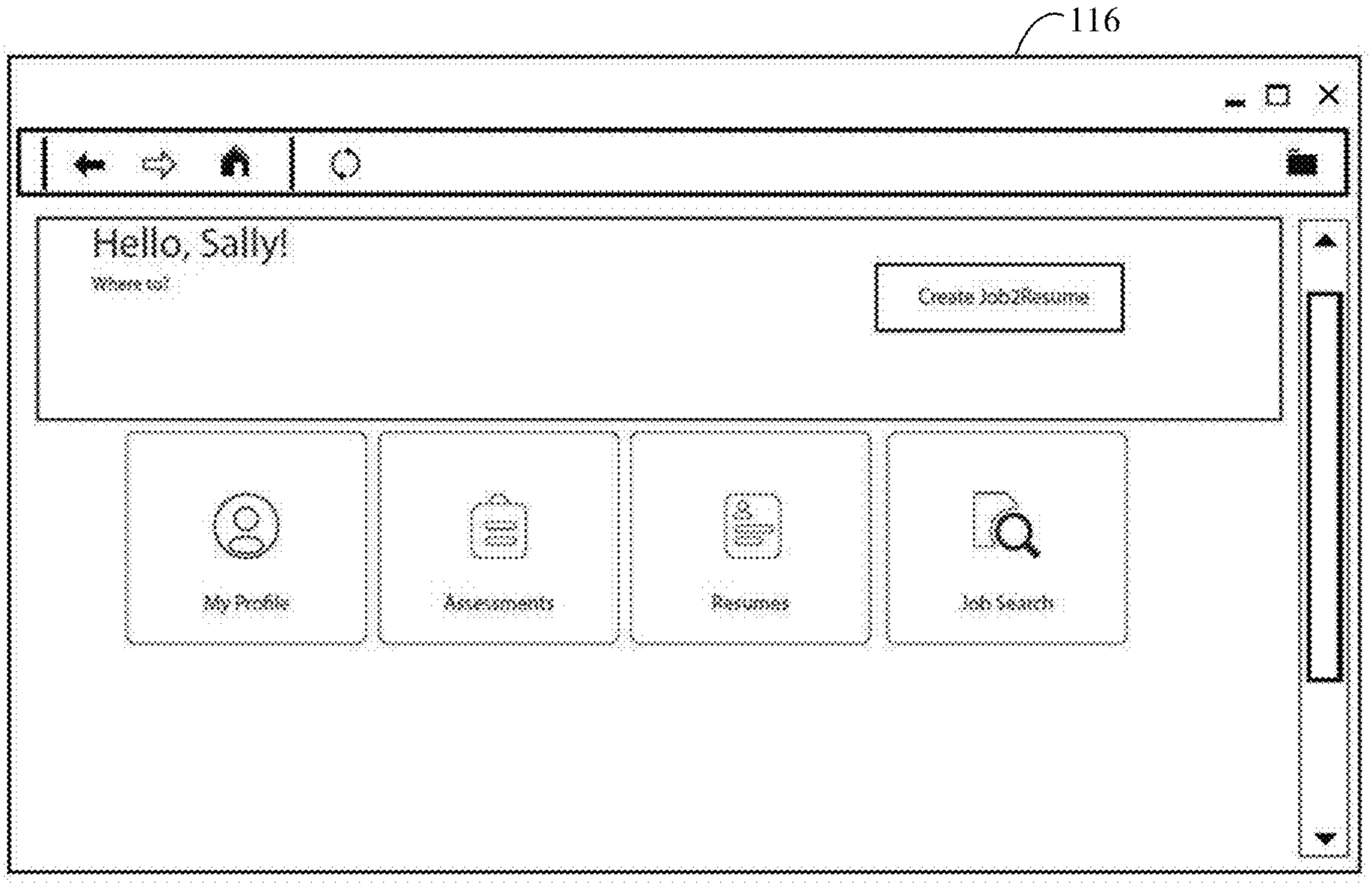

116
Hello, Sally!
Create Job2Resume
My Profile
Assessments
Resumes
Job Search

FIG. 6

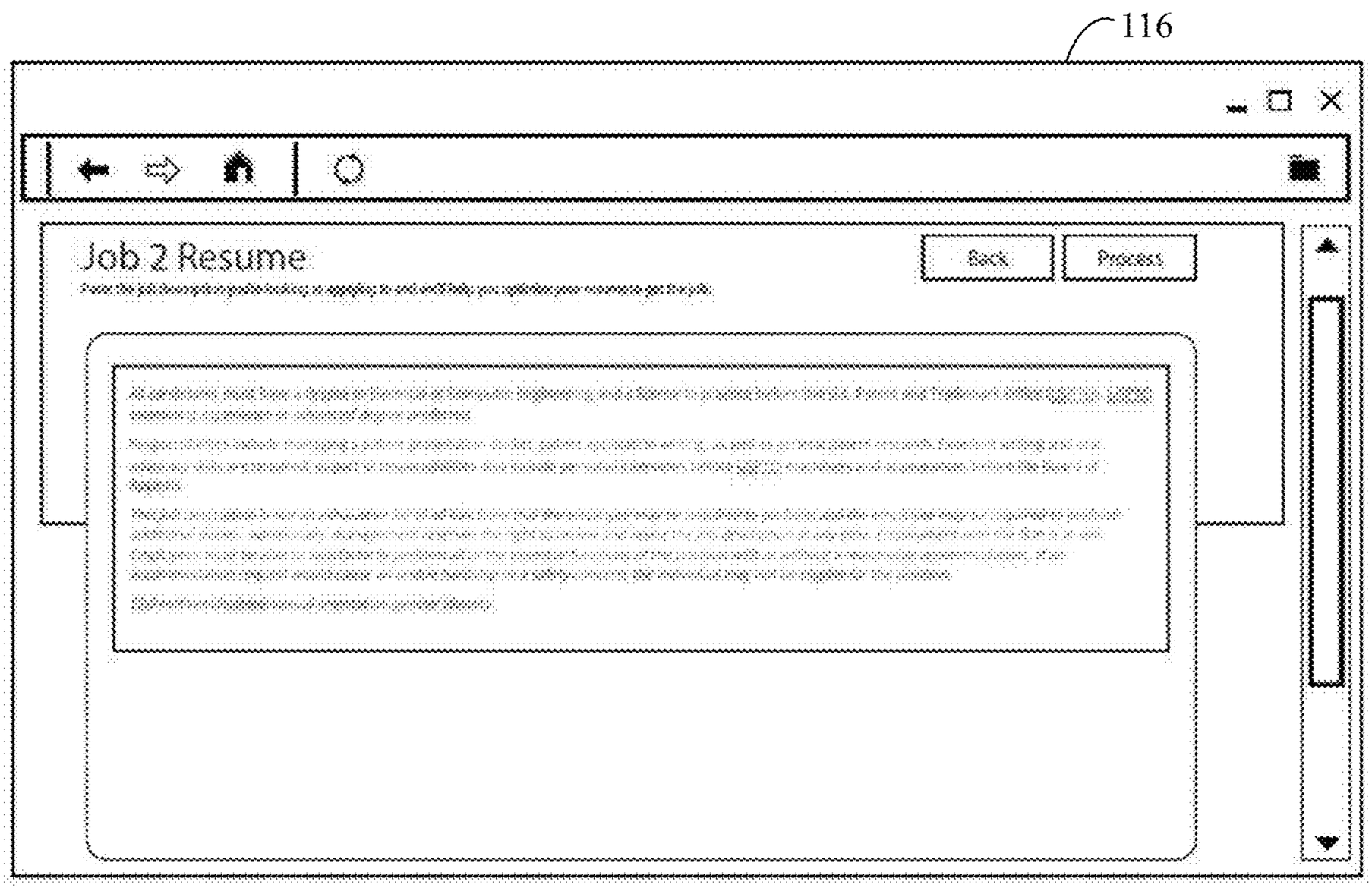

116
Job 2 Resume
Back
Process

FIG. 7

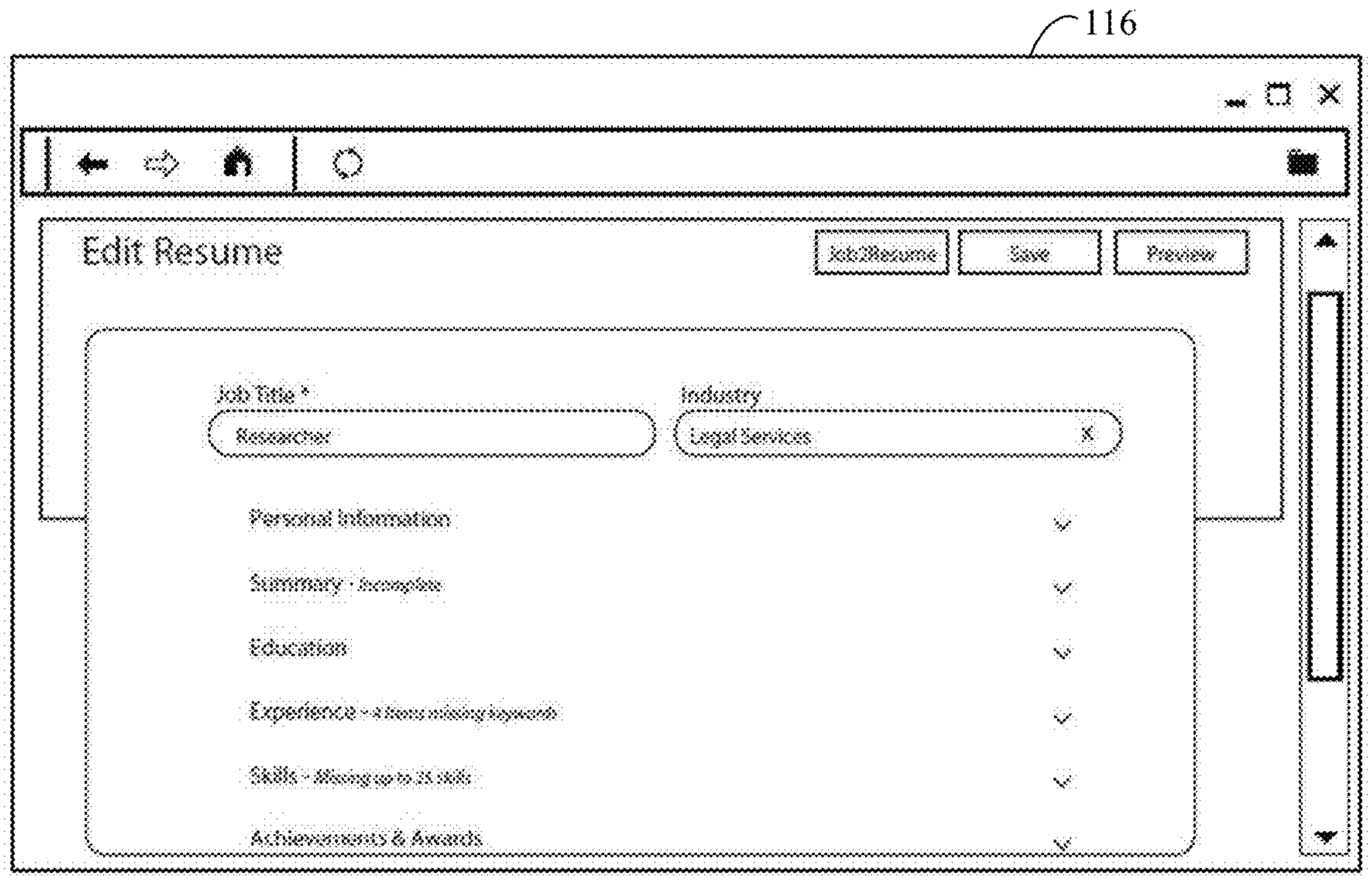

116
Edit Resume
Job Title *
Researcher
Industry
Legal Services
Personal Information
Education
Achievements & Awards

FIG. 8

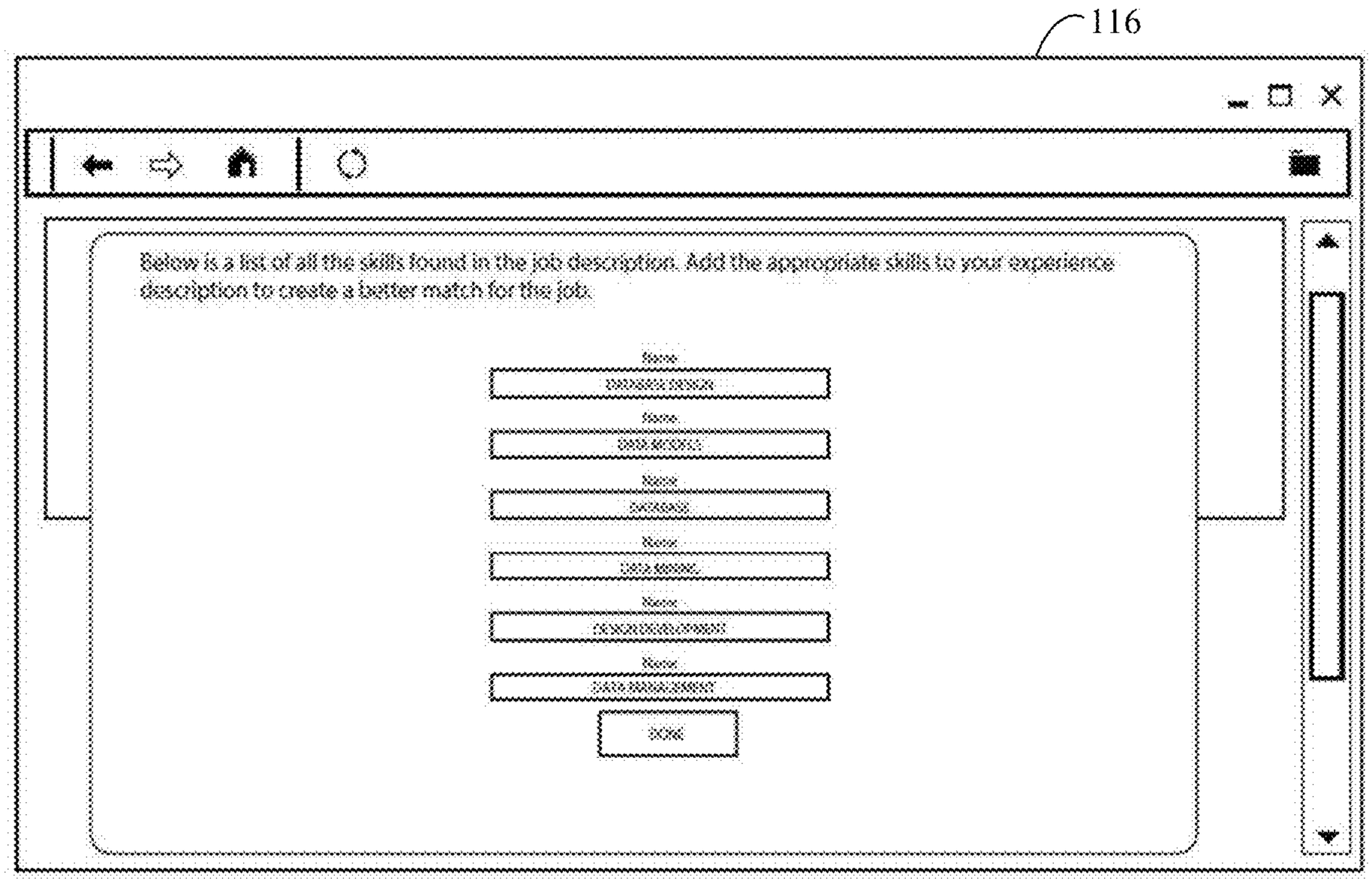

116
Below is a list of all the skills found in the job description. Add the appropriate skills to your experience description to create a better match for the job.
Done

FIG. 9

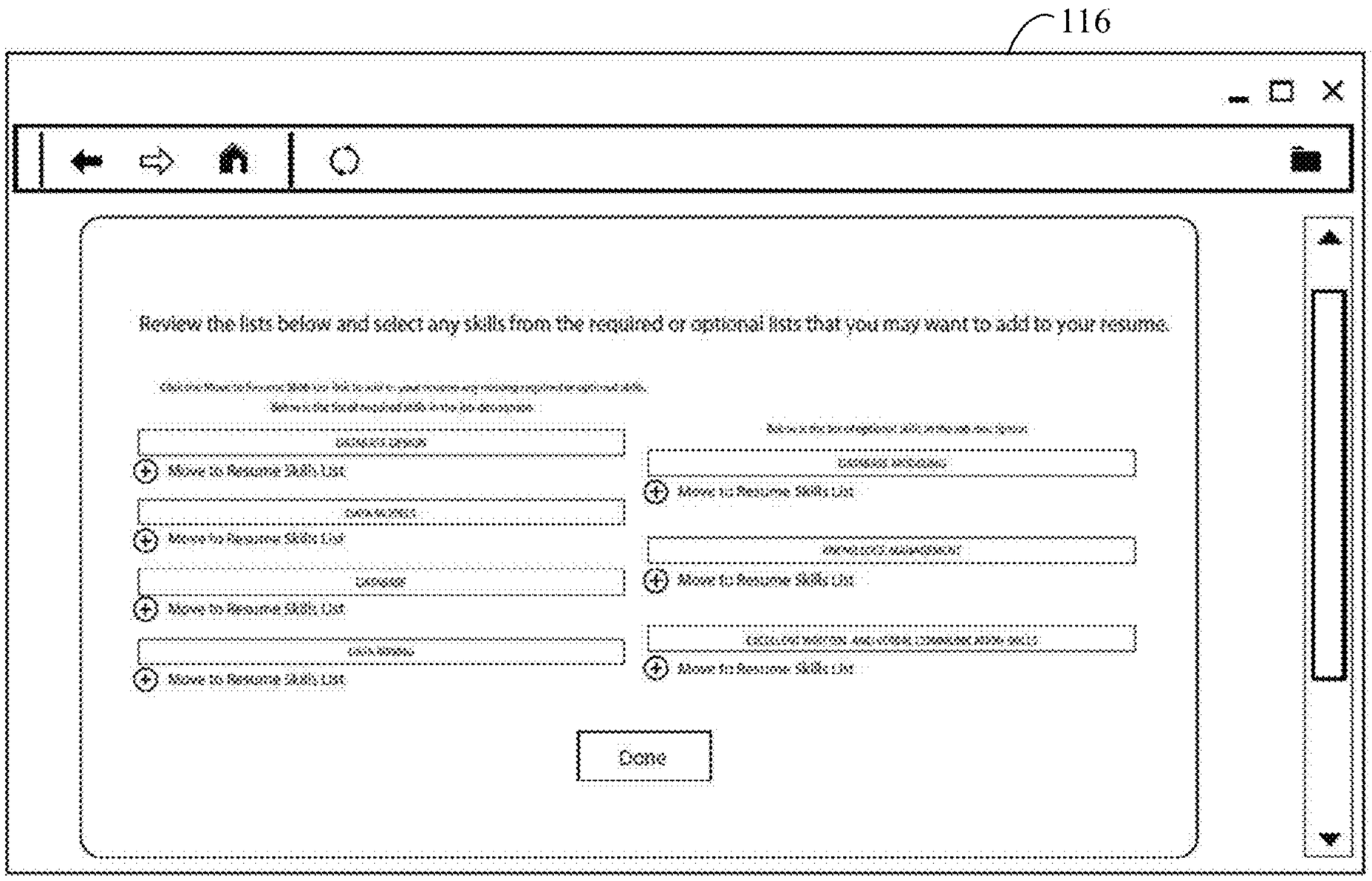

116
Review the lists below and select any skills from the required or optional lists that you may want to add to your resume.
Move to Resume Skills List
Move to Resume Skills List
Move to Resume Skills List
Move to Resume Skills List
Move to Resume Skills List
Move to Resume Skills List
Move to Resume Skills List
Done

FIG. 10

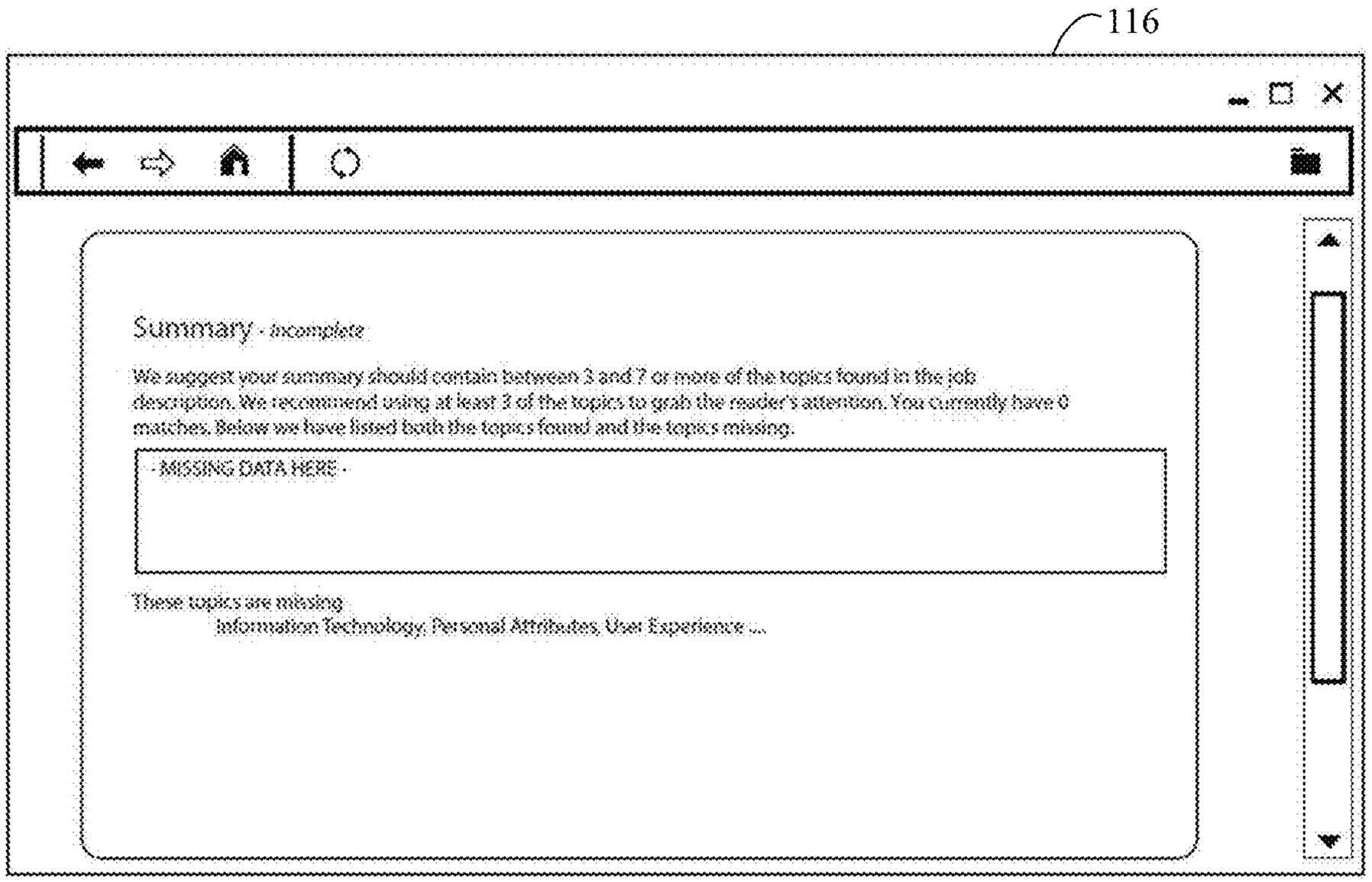

116
Summary - Incomplete
We suggest your summary should contain between 3 and 7 or more of the topics found in the job description. We recommend using at least 3 of the topics to grab the reader's attention. You currently have 0 matches. Below we have listed both the topics found and the topics missing.
- MISSING DATA HERE -
These topics are missing
Information Technology, Personal Attributes, User Experience ...

FIG. 11

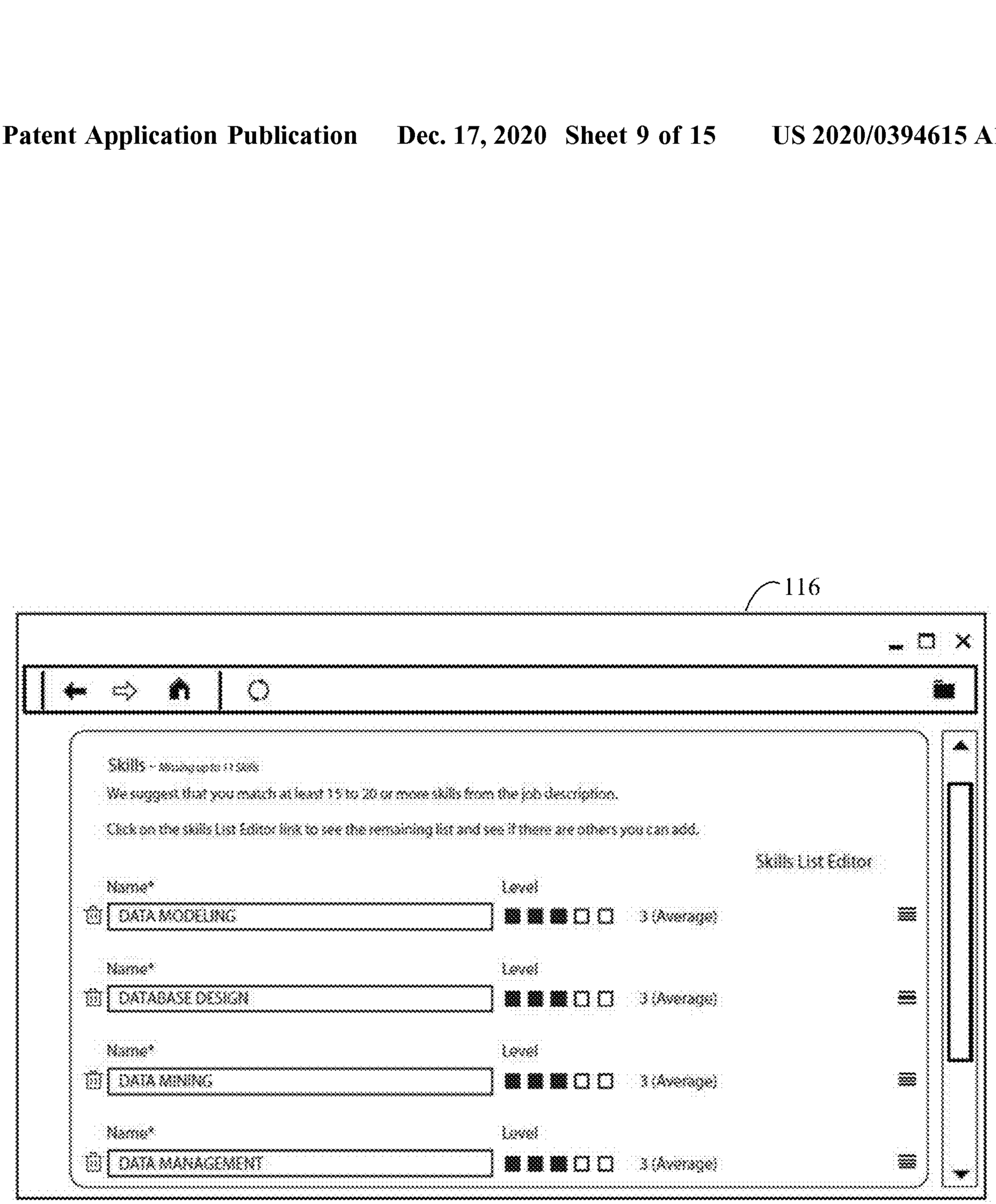

116
Skills - suggested skills
We suggest that you match at least 15 to 20 or more skills from the job description.
Click on the skills List Editor link to see the remaining list and see if there are others you can add.
Skills List Editor
Name*
Level
DATA MODELING
3 (Average)
Name*
Level
DATABASE DESIGN
3 (Average)
Name*
Level
DATA MINING
3 (Average)
Name*
Level
DATA MANAGEMENT
3 (Average)

FIG. 12

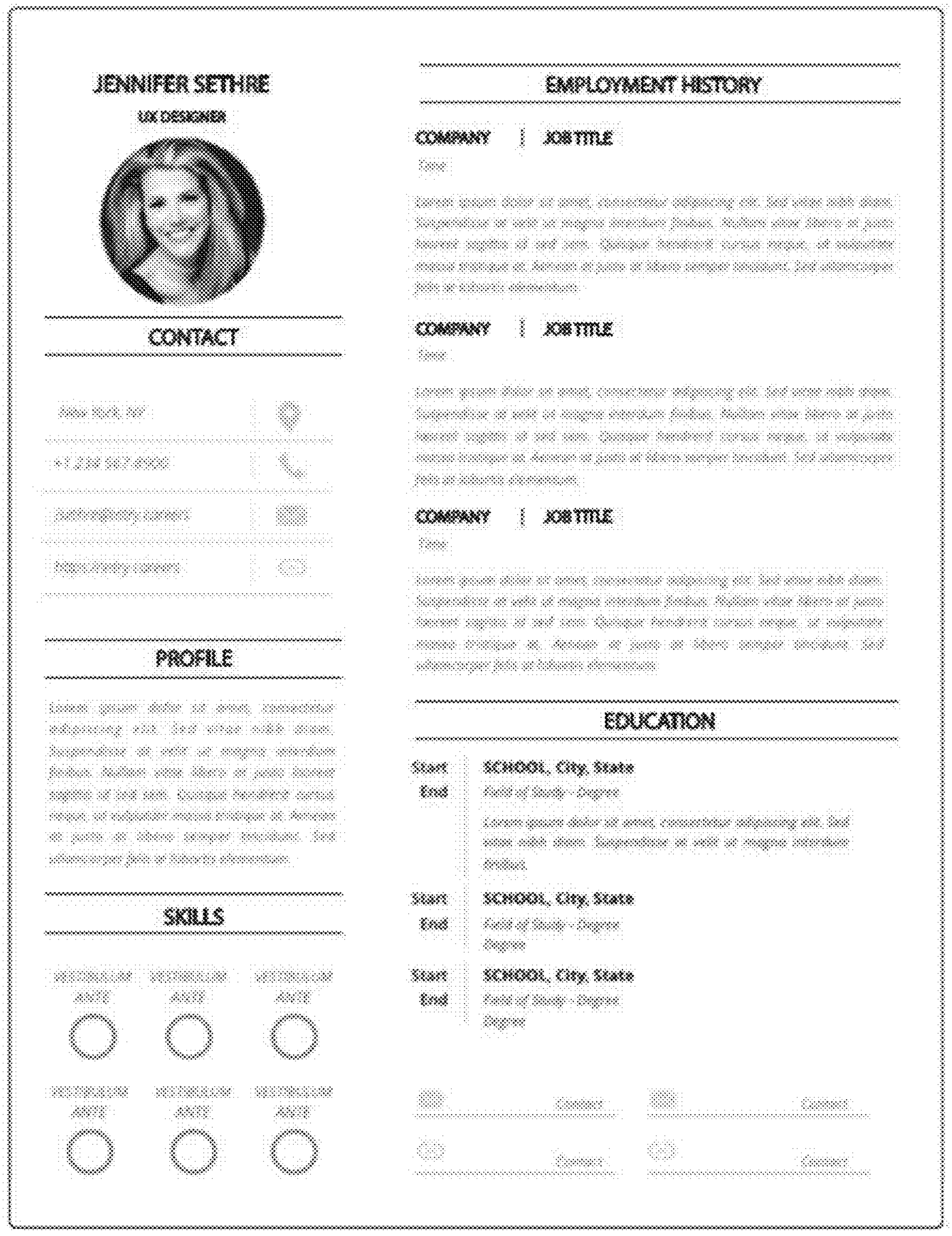

JENNIFER SETHRE
UX DESIGNER
CONTACT
PROFILE
SKILLS
EMPLOYMENT HISTORY
COMPANY | JOB TITLE
COMPANY | JOB TITLE
COMPANY | JOB TITLE
EDUCATION
Start
End
SCHOOL, City, State
Start
End
SCHOOL, City, State
Start
End
SCHOOL, City, State

FIG. 13A

File Edit Format View Help

Jennifer Sethre
-MISSING DATA HERE--
Contact
jennifer.sethre@email.com
512.333.333
Austin, TX
Summary
Attended the University of Texas and attained a Bachelor's Degree in Computer Science; Proficiency in serveral modern programming languages such as Java, C++, C#; More than Minimum 10 years professional experience in software development.
Skills
Data Modeling
Database Design
Data Mining
Data Management
Experience
Software Company 1
May 2016 - Present
Designing, build, and deploy software to support customer channels * Helping define engineering best practices and providing technical mentorship to other members of the engineering team
Software Company 2
May 2014 - May 2016
Designed and built software for virtual assitant enabled devices, mobile clients and server systems * Solved difficult problems with elegant and practical code

FIG. 13B

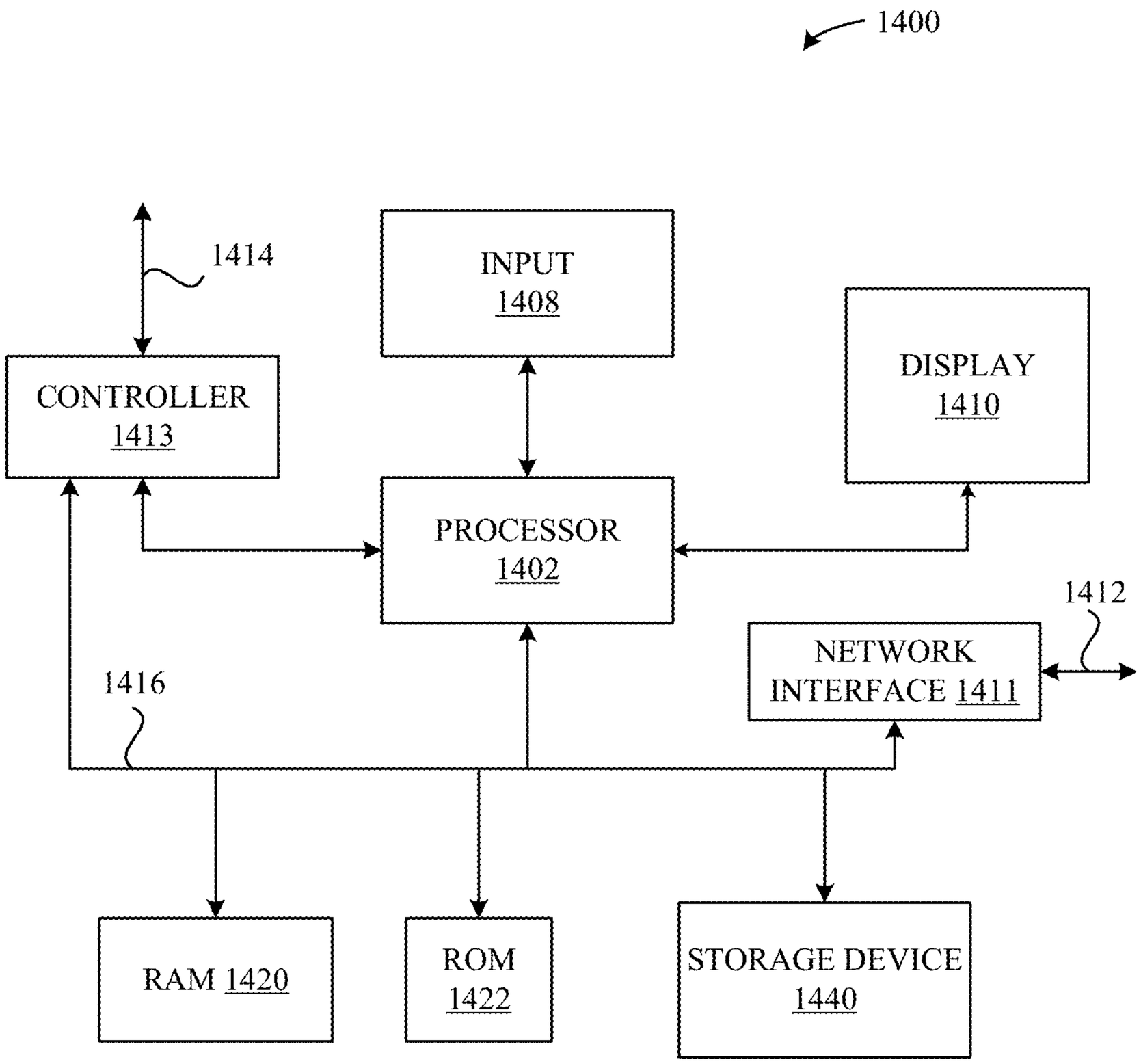

1400
1414
INPUT
1408
CONTROLLER
1413
DISPLAY
1410
PROCESSOR
1402
1412
NETWORK
INTERFACE 1411
1416
RAM 1420
ROM
1422
STORAGE DEVICE
1440

FIG. 14

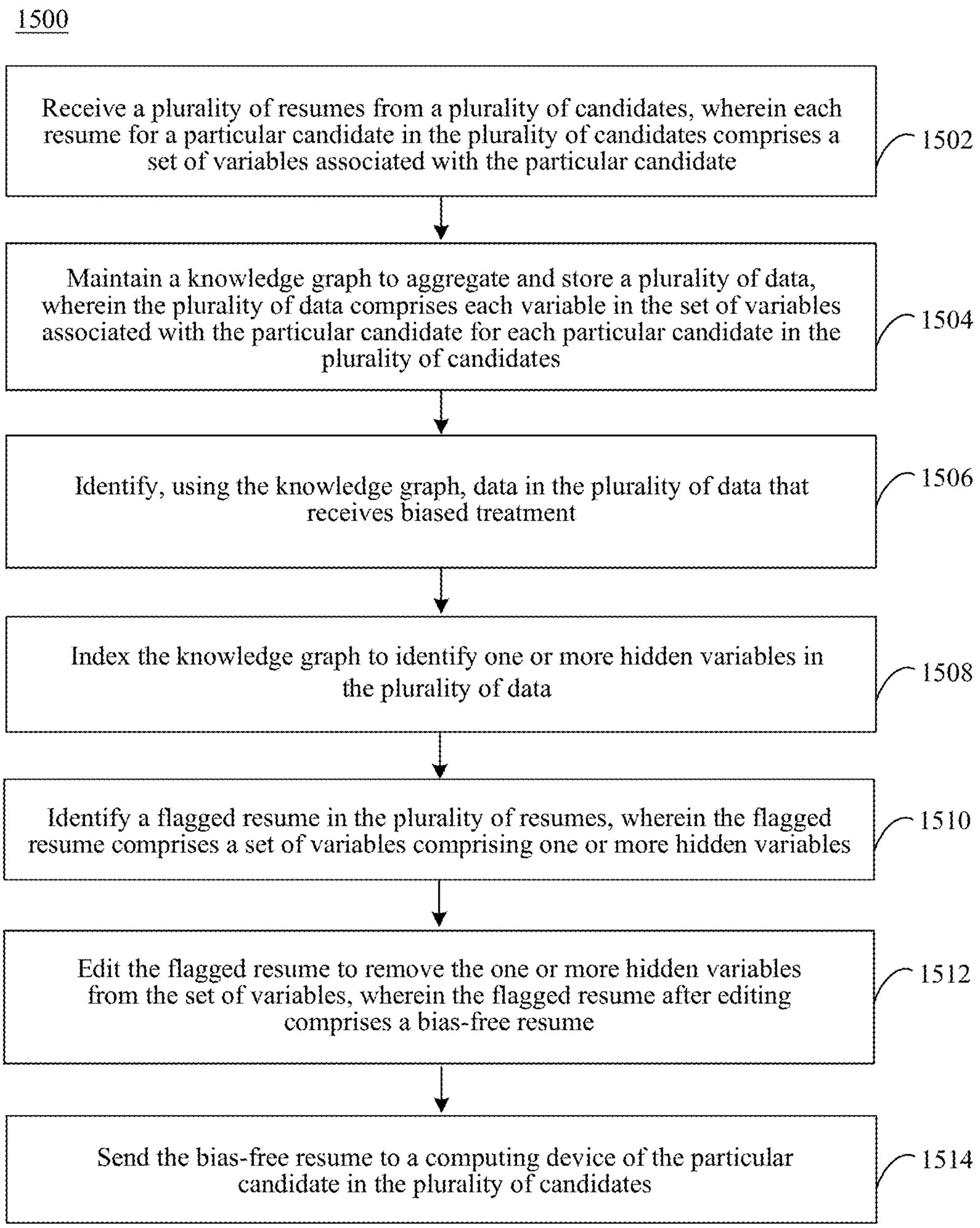

1500
Receive a plurality of resumes from a plurality of candidates, wherein each resume for a particular candidate in the plurality of candidates comprises a set of variables associated with the particular candidate
1502
Maintain a knowledge graph to aggregate and store a plurality of data, wherein the plurality of data comprises each variable in the set of variables associated with the particular candidate for each particular candidate in the plurality of candidates
1504
Identify, using the knowledge graph, data in the plurality of data that receives biased treatment
1506
Index the knowledge graph to identify one or more hidden variables in the plurality of data
1508
Identify a flagged resume in the plurality of resumes, wherein the flagged resume comprises a set of variables comprising one or more hidden variables
1510
Edit the flagged resume to remove the one or more hidden variables from the set of variables, wherein the flagged resume after editing comprises a bias-free resume
1512
Send the bias-free resume to a computing device of the particular candidate in the plurality of candidates
1514

FIG. 15

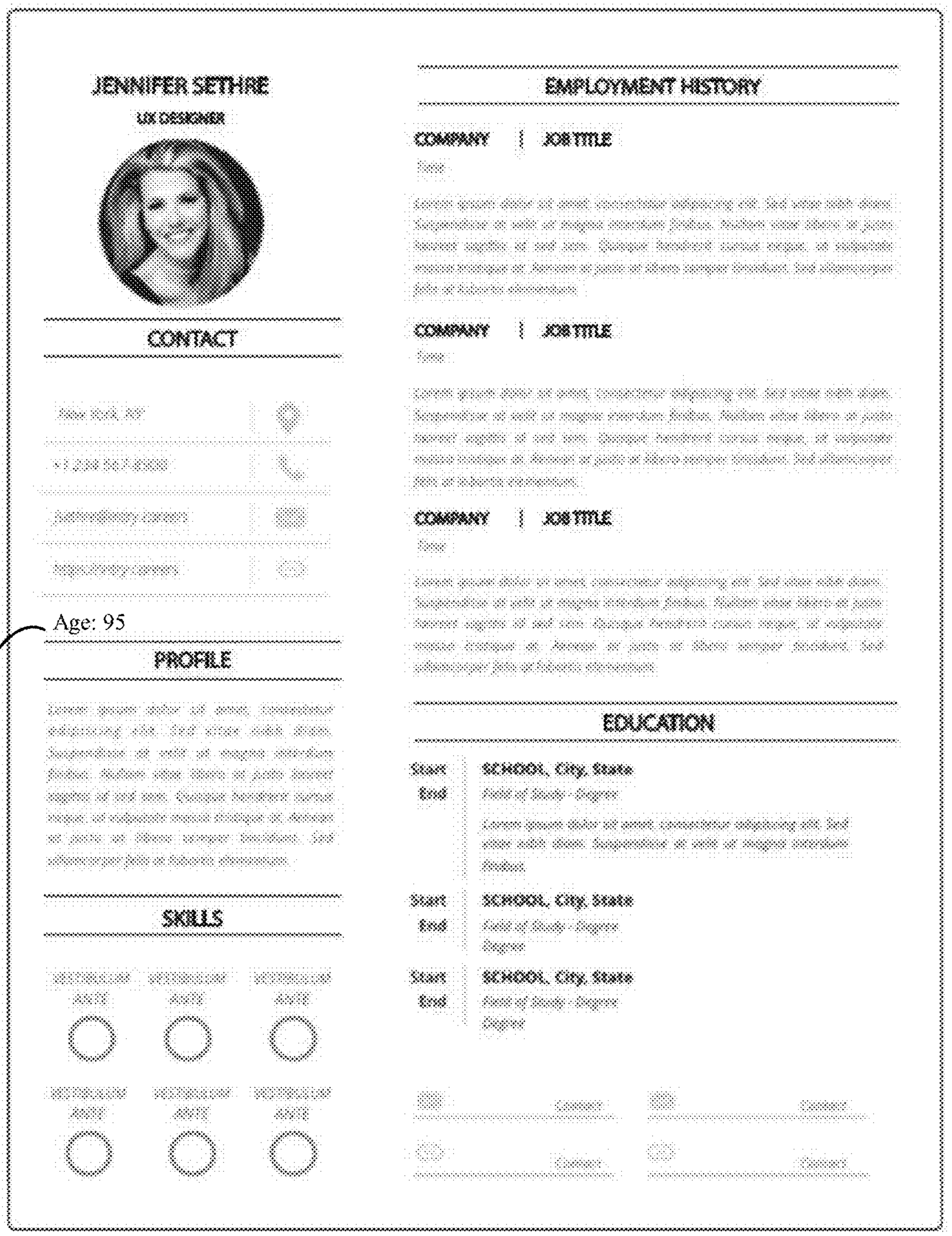

JENNIFER SETHRE
UX DESIGNER
CONTACT
Age: 95
PROFILE
SKILLS
EMPLOYMENT HISTORY
COMPANY | JOB TITLE
COMPANY | JOB TITLE
COMPANY | JOB TITLE
EDUCATION
Start
End
SCHOOL, City, State
Start
End
SCHOOL, City, State
Start
End
SCHOOL, City, State
1601

FIG. 16A

1602

File Edit Format View Help

Jennifer Sethre
-MISSING DATA HERE--
Contact
jennifer.sethre@email.com
512.333.333
Age: 95 (Biased Variable)
Summary
Attended the University of Texas and attained a Bachelor's Degree in Computer Science; Proficiency in serveral modern programming languages such as Java, C++, C#; More than Minimum 10 years professional experience in software development.
Skills
Data Modeling
Database Design
Data Mining
Data Management
Experience
Software Company 1
May 2018 - Present
Designing, build, and deploy software to support customer channels * Helping define engineering best practices and providing technical mentorship to other members of the engineering team
Software Company 2
May 2014 - May 2016
Designed and built software for virtual assitant enabled devices, mobile clients and server systems * Solved difficult problems with elegant and practical code

FIG. 16B

ARTIFICIAL INTELLIGENCE ASSISTED HYBRID ENTERPRISE/CANDIDATE EMPLOYMENT ASSISTANCE PLATFORM

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part of U.S. patent application Ser. No. 16/902,152, filed on Jun. 15, 2020, and titled "Artificial Intelligence Assisted Hybrid Enterprise/Candidate Employment Assistance Platform", which claims priority to and the benefit of U.S. Provisional Application Patent Ser. No. 62/861,232, filed Jun. 13, 2019, titled "Artificial Intelligence Assisted Hybrid Resume Generation System," the entire disclosure of these patent applications are hereby incorporated by reference in their entirety for all purposes.

BACKGROUND

[0002] Historically, resumes and curriculum vitae (CVs), henceforth referred to as documents, were created manually on machines, with software, or, more recently, using online tools. While the evolution of technology has aided in making the process less labor-intensive for the end user, it has not made the process more intelligent. Further, even the best crafted documents have not enhanced the success rate of a candidate getting through ubiquitous applicant tracking systems (ATS) that attempt to read and parse the information contained within the document. This has produced a sentiment that the workforce is under qualified for the jobs available.

[0003] The perceived solution in the industry to the problems inherent in ATS failures resulting from the submission of documents produced by the current means of creation has been to alter, refine, and manipulate job order requirement definitions. This solution, however, does not increase the success of identifying candidates based on inherent skills possessed, and may actually increase failures by being too restrictive. Additionally, the average end user is unaware of underlying technical processes that allow an ATS to function in the first place. Since job order manipulation did not address all points of failure in the candidate identification process, this method has not reduced the claim that applicants are not skilled for the jobs solicited.

SUMMARY

[0004] Representative embodiments set forth herein disclose various techniques for enabling a system and method for eliminating bias when managing resumes on a computing device.

[0005] In one embodiment, a method, comprises: training, based on personal attributes of employees of multiple employers and work culture attributes associated with each employer of the multiple employers, an employee-employer compatibility model that defines associations between the personal attributes and the work culture attributes; extracting information associated with a person from one or more sources on the Web where the person is represented; generating, based on the information associated with the person, a user profile associating personal attributes with the person; applying the user profile to the employee-employer compatibility model; receiving an indication, from the employee-employer compatibility model, of an employer profile that is compatible with the user profile, the employer profile including work culture attributes associated with an employer; and generating a notification that indicates at least one of a designation of the employer or the work culture attributes associated with the employer.

[0006] In another embodiment, a system, comprises: a model generator configured to train, based on personal attributes of employees of multiple employers and work culture attributes associated with each employer of the multiple employers, an employee-employer compatibility model that defines associations between the personal attributes and the work culture attributes; an agent of the system configured to extract information associated with an employer from one or more sources on the Web where the employer is represented; and cognitive artificial intelligence engine configured to: generate, based on the information associated with the employer, an employer profile including work culture attributes of the employer; apply the employer profile to the employee-employer compatibility model; and receive an indication, from the employee-employer compatibility model, of a user profile that is compatible with the employer profile, the user profile associating personal attributes with a person.

[0007] Still yet, in another embodiment, a computer-readable storage medium having program instructions recorded thereon that, when executed by at least one processing circuit of a computing device, perform a method, comprises: training, based on personal attributes of employees of multiple employers and work culture attributes associated with each employer of the multiple employers, an employee-employer compatibility model that defines associations between the personal attributes and the work culture attributes; extracting information associated with a person from one or more sources on the Web where the person is represented; generating, based on the information associated with the person, a user profile associating personal attributes with the person; applying the user profile to the employee-employer compatibility model; receiving an indication, from the employee-employer compatibility model, of an employer profile that is compatible with the user profile, the employer profile including work culture attributes associated with an employer; and generating a notification that indicates at least one of a designation of the employer or the work culture attributes associated with the employer.

[0008] Further, in another embodiment, a method, comprises: receiving a plurality of resumes from a plurality of candidates, wherein each resume for a particular candidate in the plurality of candidates comprises a set of variables associated with the particular candidate; maintaining a knowledge graph to aggregate and store a plurality of data, wherein the plurality of data comprises each variable in the set of variables associated with the particular candidate for each particular candidate in the plurality of candidates; identifying, using the knowledge graph, data in the plurality of data that receives biased treatment; indexing the knowledge graph to identify one or more hidden variables in the plurality of data, wherein the one or more hidden variables comprise one or more variables in the set of variables, and the one or more hidden variables comprise the data that has been identified as receiving biased treatment; identifying a flagged resume in the plurality of resumes, wherein the flagged resume comprises a set of variables comprising one or more hidden variables; responsive to identifying the flagged resume, editing the flagged resume to remove the one or more hidden variables from the set of variables,

wherein the flagged resume comprises a bias-free resume; responsive to editing the flagged resume, sending the bias-free resume to a computing device of the particular candidate in the plurality of candidates.

[0009] Lastly, in another embodiment, a system comprises: a computer-based interface capable of receiving a plurality of resumes from a plurality of candidates, wherein each resume in the plurality of resumes is electronically stored; a computer system with one or more processors having circuitry to execute instructions; a memory unit available to the one or more processors, wherein the memory unit is capable of storing the plurality of resumes created by the computer-based interface, and the memory unit is capable of having sequences of instructions stored therein, which when executed cause the one or more processors to aggregate and store a plurality of data, wherein the plurality of data comprises each variable in the set of variables associated with the particular candidate for each particular candidate in the plurality of candidates, transform the plurality of data into a knowledge graph, use the knowledge graph to identify the variables that receive biased treatment, isolate each resume in the plurality of resumes that contains the variables that receive biased treatment, and remove the variables that receive biased treatment from each resume in the plurality of resumes that are isolated, wherein each resume is a bias-free resume; a communication device capable of sending the bias-free resume to a remote computing device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] For a detailed description of example embodiments, reference will now be made to the accompanying drawings in which:

[0011] FIG. **1** shows a block diagram of an example of a cloud computing environment **102**, in accordance with various embodiments.

[0012] FIG. **2** shows a block diagram of an example of an enterprise/Candidate Employment Assistance Platform, in accordance with various embodiments.

[0013] FIG. **3** shows a method for generating a machine learning model and applying an input to the machine learning model, in accordance with various embodiments.

[0014] FIGS. **4**A and **4**B provide an example of questions that may be provided to a candidate through user interface in assessing a cultural fit of a candidate with an enterprise, in accordance with various embodiments.

[0015] FIG. **5** provides an example of a candidate profile generated in accordance with various embodiments.

[0016] FIG. **6** provides an exemplary embodiment of a user interface used to access services provided by enterprise/candidate employment assistance platform, in accordance with various embodiments.

[0017] FIG. **7** provides an exemplary embodiment of a user interface prompting a user to provide a job description or listing that the user is looking to apply to, in accordance with various embodiments.

[0018] FIGS. **8-12** provide examples of how the user may be encouraged, via a user interface, to update the resume, in accordance with various embodiments.

[0019] FIGS. **13**A and **13**B provide an exemplary embodiment of a hybrid resume generated, in accordance with various embodiments.

[0020] FIG. **14** illustrates a detailed view of a computing device that can represent the computing devices of FIG. **1** used to implement the various platforms and techniques described herein, according to some embodiments.

[0021] FIG. **15** shows a method for eliminating bias when managing resumes, in accordance with various embodiments.

[0022] FIGS. **16**A and **16**B provide an exemplary embodiment of a resume including variables that receive biased treatment, in accordance with various embodiments.

NOTATION AND NOMENCLATURE

[0023] Various terms are used to refer to particular system components. Different companies may refer to a component by different names—this document does not intend to distinguish between components that differ in name but not function. In the following discussion and in the claims, the terms "including" and "comprising" are used in an open-ended fashion, and thus should be interpreted to mean "including, but not limited to . . . " Also, the term "couple" or "couples" is intended to mean either an indirect or direct connection. Thus, if a first device couples to a second device, that connection may be through a direct connection or through an indirect connection via other devices and connections.

DETAILED DESCRIPTION

[0024] The following discussion is directed to various embodiments of the invention. Although one or more of these embodiments may be preferred, the embodiments disclosed should not be interpreted, or otherwise used, as limiting the scope of the disclosure, including the claims. In addition, one skilled in the art will understand that the following description has broad application, and the discussion of any embodiment is meant only to be exemplary of that embodiment, and not intended to intimate that the scope of the disclosure, including the claims, is limited to that embodiment.

[0025] Embodiments described herein bestow improvements to traditional tools used by enterprises for recruiting and candidates for job seeking. To help illustrate, FIG. **1** will now be described. FIG. **1** depicts a block diagram of an example system **100** for providing employment assistance services to enterprises and candidates, according to an embodiment. Enterprises as described herein refers to an organization or a business seeking or having employees. Candidate as described herein refers to a person who aspires to or is qualified for employment by an enterprise.

[0026] In FIG. **1**, system **100** comprises a cloud computing environment **102** and a plurality of computing devices, such as a client computing device **110** and a client computing device **112**. As shown in FIG. **1**, a cloud computing environment **102** includes an enterprise/candidate employment assistance platform **104** and sources **106**A, **106**B, **106**C . . . **106**N. In an embodiment, enterprise/candidate employment assistance platform **104** may be a cloud service/application running in one or more resources in cloud computing environment **102**. Sources **106**A, **106**B, **106**C . . . **106**N may include websites hosted on or cloud services/applications running in one or more resources in cloud computing environment **102**. For example, the one or more resources may be one or more servers and form a network-accessible server set that are each accessible by a network such as the Internet (e.g., in a "cloud-based" embodiment) to store, manage, and process data. Additionally, cloud computing

environment **102** may include any type and number of other resources including resources that facilitate communications with and between the servers (e.g., network switches, networks, etc.), storage by the servers (e.g., storage devices, etc.), resources that manage other resources (e.g., hypervisors that manage virtual machines to present a virtual operating platform for tenants of a multi-tenant cloud, etc.), and/or further types of resources. As such, enterprise/candidate employment assistance platform **104** may be implemented in various ways.

[0027] As portrayed in FIG. **1**, enterprise/candidate employment assistance platform **104** is communicatively coupled via a network **108** to sources **106**A, **106**B, **106**C . . . **106**N. Network **108** may comprise one or more networks such as local area networks (LANs), wide area networks (WANs), enterprise networks, the Internet, etc., and may include one or more of wired and/or wireless portions.

[0028] More specifically, enterprise/candidate employment assistance platform **104** is configured to access information associated with a candidate, an enterprise, employees of the enterprise, and/or current employment related data maintained by sources **106**A, **106**B, **106**C . . . **106**N. As an example, enterprise/candidate employment assistance platform **104** may access information associated with a candidate or enterprise via an application programming interface (API) social networking services, such as Facebook®, Twitter®, Instagram®, LinkedIn®, Scrubber®, etc. Enterprise/candidate employment assistance platform **104** may also access employment related data maintained by different entities, such as unemployment agencies (e.g., U.S. Department of Labor, Texas Workforce Commission, etc.), temp agencies, trade schools and universities (e.g., U.S. Department of Education, State Boards, etc.) military entities (e.g., U.S. Department of Defense, United Services Automobile Association®, etc.), entities associated with the elderly (American Association of Retired Persons®), etc.

[0029] As further shown in FIG. **1**, enterprise/candidate employment assistance platform **104** is communicatively coupled via the network **108** to computing device **110** and computing device **112**. Computing device **110** and computing device **112** may include at least one network interface that enables communications over network **106**. Examples of such a network interface, wired or wireless, include an IEEE 802.11 wireless LAN (WLAN) wireless interface, a Worldwide Interoperability for Microwave Access (Wi-MAX) interface, an Ethernet interface, a Universal Serial Bus (USB) interface, a cellular network interface, a Bluetooth™ interface, a near field communication (NFC) interface, etc. Client computing devices **110** and **112** may be any type of stationary or mobile computing device, including a mobile computer or mobile computing device (e.g., a smart phone, a laptop computer, a notebook computer, a tablet computer such as an Apple iPad™, a netbook, etc.), a wearable computing device (e.g., a smart watch, a head-mounted device including smart glasses such as Google® Glass™, etc.), or a stationary computing device such as a desktop computer or PC (personal computer).

[0030] Enterprise/candidate employment assistance platform **104** is configured to provide employment assistance services to enterprises and candidates. For example, a user (such as a candidate or job seeker) of client computing device **112** may access employment assistance services provided by enterprise/candidate employment assistance platform **104** through a candidate-specific user interface, a user interface **116**, executing on client computing device **112**. As another example, a user (such as an HR representative of an enterprise) of client computing device **110** may access employment assistance services provided by enterprise/candidate employment assistance platform **104** through an enterprise-specific user interface, a user interface **114**, executing on client computing device **110**. For example, user interface **114** and user interface **116** may be represented as a web page displayed in a web browser executing on client computing device **110** and client computing device **112**, respectively. As another example, user interface **114** and user interface **116** may be an Internet-enabled application executing on client computing device **110** and client computing device **112**, respectively. Still other implementations of user interface **108** and provider interface **120** are possible.

[0031] To explore in further detail the employment assistance services provided by enterprise/candidate employment assistance platform **104**, FIG. **2** will now be described. Note that enterprise/candidate employment assistance platform **104** of FIG. **1** may be implemented in various ways to perform its functions. For instance, FIG. **2** is a block diagram for a system **200** that provides employment assistance services to enterprises and candidates, in accordance with an example embodiment. As shown in FIG. **2**, system **200** includes enterprise/candidate employment assistance platform **104**. As further shown in FIG. **2**, enterprise/candidate employment assistance platform **104** includes enterprise/candidate employment assistance platform agent **202** (hereinafter referred to as "agent **202**"), a cognitive artificial intelligence (AI) engine **204**, a resume generator engine **206**, and a job search engine **210**. In various embodiments, the several computing devices executing within enterprise/candidate employment assistance platform **104** are communicably coupled by way of a network/bus interface. Furthermore, the several components of enterprise/candidate employment assistance platform **104** may be communicably coupled by one or more inter-host communication protocols. In some embodiments, the several components of enterprise/candidate employment assistance platform **104** may execute on separate computing devices. Still yet, in some embodiments, the several components of enterprise/candidate employment assistance platform **104** may be implemented on the same computing device or partially on the same computing device, without departing from the scope of this disclosure. System **200** is described in further detail as follows.

[0032] The several computing devices work in conjunction to implement the several components of enterprise/candidate employment assistance platform **104**. Enterprise/candidate employment assistance platform **104** is not limited to implementing only these components, or in the manner described in FIG. **1** and FIG. **2**. That is, enterprise/candidate employment assistance platform **104** can be implemented, with different or additional components, without departing from the scope of this disclosure. The example enterprise/candidate employment assistance platform **104** illustrates one way to implement the methods and techniques described herein.

[0033] As further shown in FIG. **2**, cognitive AI engine **204** includes a machine learning (ML) model generator **216** and ML models **220**. ML model generator **216** is configured to generate ML models **220** to facilitate the employment assistance services provided by enterprise/candidate

employment assistance platform **104**. As shown in FIG. **2**, the ML models **220** are deployed in cognitive AI engine **204**.

[0034] In an embodiment, ML model generator **216** is configured to generate an employee-employer compatibility model used to match qualified candidates with enterprises, where the candidates are compatible with the company culture of the enterprise. For example, as depicted in FIG. **2**, model generator **204** includes a machine learning algorithm **218**. Machine learning algorithm **218** is provided personal attributes of employees of multiple employers and work culture attributes associated with each employer of the multiple employers as input, and is executed by model generator **216** to generate the employee-employer compatibility model. Personal attributes of employees may include characteristics or personality traits of an individual. Some examples of personal attributes include: loyalty, commitment, honesty, enthusiasm, reliability, positive self-esteem, sense of humor, motivation, adaptability, etc. Work culture attributes are directed to the character and personality of the enterprise. Some examples of work culture attributes include: fairness, environment of collaboration, encouragement of employee engagement, learning opportunities, good communication, opportunities for growth, etc.

[0035] For example, ML model generator **216** may provide personal attributes of employees and work culture attributes of enterprises to a ML algorithm of ML algorithms **218**. ML model generator **216** may also include a machine learning (ML) application that implements the ML algorithm to the employee-employer compatibility model. When the ML algorithm is implemented, it may find patterns personal attributes of employees and work culture attributes of enterprises to map the personal attributes to the work culture attributes, and output a model that matches qualified candidates with enterprises, where the candidates are compatible with the company culture of the enterprise. In some embodiments, the ML algorithm may find patterns personal attributes of employees and work culture attributes of enterprises to map the personal attributes to the work culture attributes, and output a model that matches an enterprise having certain attributes (e.g., company culture) to a candidate employees having matching personal attributes (e.g., desired culture), where the enterprise is compatible with the personal attributes of the employee. The employee-employer compatibility model may be generated using any suitable techniques, including supervised machine learning model generation algorithms such as supervised vector machines (SVM), linear regression, logistic regression, naïve Bayes, linear discriminant analysis, decision trees, k-nearest neighbor algorithm, neural networks, recurrent neural network, etc. In some embodiments, unsupervised learning algorithms may be used such as clustering or neural networks.

[0036] Note that the employee-employer compatibility model may be generated in various forms. In accordance with one embodiment, the employee-employer compatibility model may be generated according to a suitable machine-learning algorithm mentioned elsewhere herein or otherwise known. In an embodiment, ML model generator **216** may implement a gradient boosted tree algorithm or other decision tree algorithm to generate and/or train the employee-employer compatibility model in the form of a decision tree. The decision tree may be traversed with input data (personal attributes of a candidate, etc.) to identify one or more enterprises that the candidate is compatible with. Alternatively, ML model generator **216** may implement an artificial neural network learning algorithm to generate the employee-employer compatibility model as a neural network that is an interconnected group of artificial neurons. The neural network may be presented with personal attributes of the candidate to identify attributes of a work culture that the candidate is compatible with.

[0037] Cognitive AI engine **204** is further configured to receive data via agent **202** from sources **106**A, **106**B, **106**C . . . **106**N in FIG. **1**. For example, as described with reference to FIG. **1**, agent **202** may retrieve information associated with a candidate, an enterprise, and employees of the enterprise from various sources on the Web and provide the information to cognitive AI engine **204**. More specifically, agent **202** may extract information associated with a candidate, an enterprise, or an employee from sources (e.g., social networking services, personal websites, business/marketing websites, professional associations websites, informational or reference websites, etc.) on the Web where candidates, enterprises, or the employees are represented (e.g., via Web scraping software, APIs exposed by social networking services, etc.). In some embodiments, a user may use a computing device to interact with the agent **202** and upload the information associated with a candidate, an enterprise, and employees of the enterprise. In such a way, the user using the computing device may itself be a source.

[0038] Further, cognitive AI engine **204** may use natural language processing (NLP), data mining, and pattern recognition technologies to process analyze the retrieved information and generate a profile associated with an employee or candidate that associates personal attributes with the employee or candidate or generate a profile that associates work culture attributes with an enterprise. More specifically, cognitive AI engine **204** may use different AI technologies to understanding language, translate content between languages, recognize elements in images and speech, and perform sentiment analysis. For example, cognitive AI engine **204** may rely on NLP technologies for the recognition and translation of spoken language in content and for understanding of natural language in written content. As another example, cognitive AI engine **204** may use imaging extraction techniques, such as optical character recognition (OCR) and/or use a machine learning model trained to identify and extract information from images. OCR refers to electronic conversion of an image of printed text into machine-encoded text. As another example, pattern recognition and/or computer vision may also be used to process images. Computer vision may involve image understanding by processing symbolic information from image data using models constructed with the aid of geometry, physics, statistics, and/or learning theory. Pattern recognition may refer to electronic discovery of regularities in data through the use of computer algorithms and with the use of these regularities to take actions such as classifying the data into different categories and/or determining what the symbols represent in the image (e.g., words, sentences, names, numbers, identifiers, etc.). Cognitive AI engine **204** may also use NLU techniques to process unstructured data using text analytics to extract entities, relationships, keywords, semantic roles, and so forth. Furthermore, cognitive AI engine **204** may use sentiment analysis to identify, extract, and quantify subjective information from social media sources associated with a candidate, an employee, or an enterprise. Cognitive AI engine **204** may use the same technologies to synthesize data

from various information sources, while weighing context and conflicting evidence, in generating a profile.

[0039] Additionally, in FIG. **2**, agent **202** may be further configured to interact with client computing device **110** and client computing device **112** in FIG. **1** via user interface **114** and user interface **116**, respectively. For example, via agent **202**, may provide a candidate, via user interface **116**, with a series of questions generated to assess characteristics and preferences of a candidate. In some embodiments, the responses provided may also be used in generating a profile for a candidate. In some embodiments, information associated with the candidate provided to platform **104** by the candidate (e.g., in a resume) may also be used in generating a profile for the candidate. To help further illustrate, FIGS. **4**A and **4**B provide an example of questions that may be provided to a candidate through user interface **116**. As shown in FIGS. **4**A and **4**B, a candidate may be prompted to respond to a series of questions by indicating if an item (such as "Data Analysis", "Public Speaking", etc.) is 'Me' or 'Not me'. Further, FIG. **5** provides an example of a candidate profile generated by Cognitive AI engine **204**. For example, in FIG. **5**, the candidate profile conveys a list of attributes associated with the candidate (e.g., rational, practical, confident, prefers working with others, etc.), a personality type, strengths and weaknesses, and examples of ideal work environments for the candidate. In some embodiments, based on the responses provided and information retrieved from other sources on the Web where the candidate is represented, cognitive AI engine **204**, using different AI technologies (e.g., the employee-employer compatibility model) determine how attributes associated with the candidate may serve as a strength or a weakness in a professional setting (e.g., "Complements" and "Conflicts" sections in FIG. **5**) and recommend company culture characteristics that may be most compatible with the candidate ("Best work environments" section in FIG. **5**).

[0040] In some embodiments, cognitive AI engine **204** may extract additional information associated with an enterprise from one or more job listings published by the enterprise and generate an enterprise profile based on the additional information associated with the employer.

[0041] Moreover, cognitive AI engine **204** is configured to apply the candidate profile to the employee-employer compatibility model. More specifically, cognitive AI engine **204** provides the candidate profile to employee-employer compatibility model and cognitive AI engine **204** receives, from the employee-employer compatibility model, an indication that one or more employer profiles are compatible with the candidate profile. In some embodiments, the indication generated by the employee-employer compatibility model may specify a designation of the employer or the work culture attributes associated with the employer. Agent **202** is configured to provide the notification to client computing device **112**.

[0042] Cognitive AI engine **204** is configured to update the machine learning models **220**, such as the employee-employer compatibility model to account for one or more associations detected between a candidate profile and an enterprise profile. For example, cognitive AI engine **204** may maintain the employee-employer compatibility model by continuously retraining the employee-employer compatibility model based personal attributes of candidates and personal attributes of employees of enterprises. In some embodiments, cognitive AI engine **204** is configured to train the employee-employer compatibility model based on professional attributes of the person. Professional attributes may include work-related knowledge, skills, and abilities, education, and experience of a candidate.

[0043] Agent **202** is further configured to identify job listings of enterprises having work culture compatible with a candidate via job search engine **210** and generate a notification for the person including indications of the job listings.

[0044] In some embodiments, cognitive AI engine **204** is further configured to receive via agent **202** extracted information associated with an enterprise from one or more sources on the Web where the enterprise is represented and generate, based on the information associated with the enterprise, an enterprise profile including work culture attributes of the enterprise. Further, cognitive AI engine **204** may apply the employer profile to the employee-employer compatibility model and receive an indication, from the employee-employer compatibility model, of one or more candidate profiles that are culturally compatible with the enterprise profile. In some embodiments, cognitive AI engine **204** may receive a notification from employee-employer compatibility model that indicates at least one of information identifying the person or the personal attributes.

[0045] To explore this further, FIG. **3** will now be described. FIG. **3** shows a method **300** for generating a machine learning model that defines associations between the personal attributes of employees and the work culture attributes of enterprises and applying a candidate profile to the machine learning model. As shown in FIG. **3**, method **300** begins at step **302**. At step **302**, based on personal attributes of employees of multiple employers and work culture attributes associated with each employer of the multiple employers, an employee-employer compatibility model is trained. The employee-employer compatibility model defines associations between the personal attributes and the work culture attributes. For example, as described with reference to FIG. **1** and FIG. **2**, cognitive AI engine **204** may train employee-employer compatibility model on attributes associated with candidates, attributes associated with employees of enterprises, and attributes of company culture associated with enterprises.

[0046] At step **304**, information associated with a person is extracted from one or more sources on the Web where the person is represented. For example, and with continued reference to FIG. **1** and FIG. **2**, agent **202** may retrieve information associated with a candidate, an enterprise, and employees of the enterprise from various sources on the Web and provide the information to cognitive AI engine **204**.

[0047] At step **306**, based on the information associated with the person, a user profile is generated, the user profile associating personal attributes with the person. For example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI engine **204** may generate a profile for a candidate based on the information associated with the candidate that is extracted from one or more sources on the Web where the candidate is represented.

[0048] At step **308**, the user profile is applied to the employee-employer compatibility model. For example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI engine **204** may apply a candidate profile to the employee-employer compatibility model.

[0049] At step **310**, an indication is received, from the employee-employer compatibility model, where the indica-

tion is of an employer profile that is compatible with the user profile and where the employer profile including work culture attributes associated with an employer. For example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI engine **204** may receive from the employee-employer compatibility model an indication that an enterprise is compatible with the candidate profile.

[0050] At step **312**, a notification is generated, the notification indicates at least one of a designation of the employer or the work culture attributes associated with the employer. For example, and with continued reference to FIG. **1** and FIG. **2**, agent **202** generates a notification indicating a designation of the enterprise or the work culture attributes associated with the enterprise that the candidate is compatible with.

[0051] There are several technical benefits for matching candidates with an enterprise, where the candidate is compatible with the company culture of the enterprise. One such benefit of providing a list of job descriptions from enterprises that candidates culturally match is that it increases the probability the candidate will find a match that interests them without having to scroll through pages of results. Each scroll is a request to the network and by reducing the chance that the user will make that call for additional matches, computing resources are saved (e.g., processing, network, memory). Also, the user interface includes the most relevant culture matches, thereby providing an improved user interface that may increase the user's experience using the computing device and platform by not having to perform a lot of individual searches. In addition, computing resources are further saved by employing AI technologies to process large amounts of data to provide better matches for candidates and employers.

[0052] FIG. **6** provides an exemplary embodiment of user interface **116** in FIG. **1**. FIG. **6** shows how a candidate may interact with enterprise/candidate employment assistance platform **104** to access its one or more employment assistance services. For example, in FIG. **2**, a user may initiate generation of a resume by selecting the "Create Job2Resume™" button. In particular, resume generator engine **206** is configured to interact with cognitive AI engine **204** to use cognitive AI to generate a resume for a candidate.

[0053] To help further illustrate, in FIG. **7**, after selecting Create Job2Resume™ button, the user is prompted through user interface **116** to paste a job description or listing that the user is looking to apply to. Using the job description or listing, resume generator engine **206** is enabled to optimize a resume for applying to the position associated with the job description or listing. The user may then select the "Process" button to initiate generation of the resume.

[0054] Subsequently, resume generator engine **206** may provide a previously uploaded resume of the user and the job description or listing to cognitive AI engine **204**. Using the technologies previously described herein, cognitive AI engine **204** analyzes the job description or listing and compares the job description or listing with the resume of the user. After the comparison, cognitive AI engine **204** may find information included in the job description or listing that should be included in the resume. For example, cognitive AI engine **204** may parse the resume and find that the user failed to include in the resume a required skill listed in the job description or listing. Moreover, cognitive AI engine **204** may identify one or more items that should be included in the resume that are not explicitly stated in the job description or listing. For example, cognitive AI engine **204** may determine, based on analysis of resumes of other candidates, that a required skill listed in the job description is most often included with another skill in the resumes of other candidates.

[0055] Furthermore, based on the analysis of cognitive AI engine **204**, resume generator engine **206** may prompt the user to update the resume, via user interface **116**, to optimize the resume for the job description. For example, in FIG. **8**, the user is informed of the sections of the resume that should be updated. In FIG. **8**, "Summary" is indicated as incomplete, "Experience" is indicated as missing keywords, and "Skills" is indicated as missing skills. The keywords that are identified as missing may have been included the job description or listing and not included in the resume that was uploaded.

[0056] FIGS. **9-12** provide examples of how the user may be encouraged, via user interface **116**, to update the resume based on the analysis of cognitive AI engine **204**. For example, in FIG. **9**, the user is provided with a list of skills found in the job description and suggested to add one or more of the skills to the experience section of the resume. As another example, in FIG. **10**, the user is provided a list of optional skills and required skills that were not included in the resume that cognitive AI engine **204** determined are beneficial to the user to include in the resume. For ease in updating the resume, the user may click the "Move to Resume Skills List" to add to the skill to the resume. That is, the user may use one-click of an input peripheral to cause the resume to be updated with the recommended information (e.g., skill), without having to actually open the resume in a separate application, type in the recommended information, and close out the resume. Such reduced input from the input peripheral may save computing resources (e.g., processing, memory, network, etc.) by using the one-click feature, and therefore may also improve the user's experience generating a resume and using a computing device. Further, in FIG. **11**, the user is prompted to update the summary of the resume. The user is recommended to include in the summary topics mentioned in the job description but missing from the resume. Finally, in FIG. **12**, the user is recommended to include particular skills related to the job description and indicate a strength level associated with each skill.

[0057] One example technical benefit of many technical benefits of the Job2Resume™ embodiment described above is that a user may use one-click of an input peripheral to cause the resume to be updated with the recommended information (e.g., skill) without having to open the resume in a separate application, type in the recommended information, and close out the resume. Such reduced input from the input peripheral may save computing resources (e.g., processing, memory, network, etc.) by using the one-click feature, and therefore may also improve the user's experience generating a resume and using a computing device.

[0058] FIGS. **13**A and **13**B shows an exemplary embodiment of a resume generated by resume generator engine **206**. In some embodiments, resume generator engine **206** may generate a "hybrid resume". A hybrid resume, as referred to herein, is a document comprising two or more layers, where at least one layer is a visually designed resume including one or more graphics and format displays (this visually designed resume may be referred to as a "visible" layer) and at least one layer is a cleanly, parsable resume including unformatted plain text this cleanly, parsable resume including unfor-

matted plain text may be referred to as a "hidden" layer). FIG. **13**A provides an exemplary embodiment of a "visual resume" and FIG. **13**B provides an exemplary embodiment of "parsable resume". In some embodiments, the visual resume layer, shown in FIG. **13**A, is layered on top of the parsable resume layer, shown in FIG. **13**B, to form the hybrid resume. The content of the parsable resume is hidden behind the visual resume, allowing for the content of the parsable resume to be invisible to a human reader. In contrast, the content of the parsable resume is accessible to an applicant tracking systems (ATS).

[0059] The hybrid resume provides a means for a candidate to produce a document that is consumable by both a human and an ATS. Furthermore, as in the process described above, the hybrid resume may be generated utilizing AI technologies employed by cognitive AI engine **204** in FIG. **2** to provide guidance in the document creation process such that the hybrid resume ensures that the candidate is referencing skills and experience that is most relevant to the position being is applied for.

[0060] In some embodiments, a hybrid document is intelligently generated from a dataset that can be consumed by a human or a machine. Moreover, although a document can be generated using any dataset, hybrid resume may use a predefined user profile to select a subset of data that best fits the known criteria for the job the candidate is apply for. The dataset may contain at least enough information to identify the candidate and the skills and experience the candidate possesses. The dataset may also include at least the first and last name of the candidate, phone number, email address, education and employment histories, hard and soft skills, and objective statement.

[0061] In some embodiments, the generation of the hybrid resume may take into consideration the technical function of an ATS while creating the document. For example, although any source can be used for defining job criteria, the embodiments described herein use a job order to identify requisite skills that should be included in the document. Requisite skills are identified by cognitive AI engine **204** and, using an ontology library, are matched to identified skills in the candidate. The skills are then transpiled to match the keyword(s) the ATS is expecting to find in the document.

[0062] Although any number of file formats can be used, the embodiments described herein may use a rasterized image format of the resume created in the software user experience to be consumed by a human, layered on top of a live text format of the same resume being produced to be consumed by the ATS. In some embodiments, a block templating language may be used that replaces placeholders with information from the dataset. This abstraction of content from visual layout design allows the document design definition to be exchanged for another while sharing a dataset or subset thereof. Once the hybrid document is created, the underlying live text is easily parsable by the ATS for accurate and complete machine readability, while still being visually appealing for any human or process thereof that might evaluate the document.

[0063] One example technical benefit of many technical benefits afforded by the hybrid resume includes using a hidden layer of text to easily and efficiently change the appearance of a visible layer. Through changes to the text in the hidden layer, the format of the visible layer may be transformed. This provides a technical solution of dynamically generated hybrid resumes that are customizable in real-time. Further, the text in the hidden layer is machine-readable and efficiently processed by the ATS system.

[0064] FIG. **14** illustrates a detailed view of a computing device **1400** that can be used to implement the various components described herein, according to some embodiments. In particular, the detailed view illustrates various components that can be included in client computing devices **110** and **112** illustrated in FIG. **1**, as well as the several computing devices implementing enterprise/candidate employment assistance platform **104** illustrated in FIGS. **1** and **2**. As shown in FIG. **14**, computing device **1400** can include a processor **1402** that represents a microprocessor or controller for controlling the overall operation of computing device **1400**. Computing device **1400** can also include a user input device **1408** that allows a user of computing device **1400** to interact with computing device **1400**. For example, the user input device **1408** can take a variety of forms, such as a button, keypad, dial, touch screen, audio input interface, visual/image capture input interface, input in the form of sensor data, and so on. Still further, computing device **1400** can include a display **1410** that can be controlled by the processor **1402** to display information to the user. A data bus **1416** can facilitate data transfer between at least a storage device **1440**, processor **1402**, and a controller **1413**. Controller **1413** can be used to interface with and control different equipment through an equipment control bus **1414**. Computing device **1400** can also include a network/bus interface **1411** that couples to a data link **1412**. In the case of a wireless connection, network/bus interface **1411** can include a wireless transceiver.

[0065] As noted above, computing device **1400** also includes storage device **1440**, which can comprise a single disk or a collection of disks (e.g., hard drives), and includes a storage management module that manages one or more partitions within storage device **1440**. In some embodiments, storage device **1440** can include flash memory, semiconductor (solid-state) memory or the like. Computing device **1400** can also include a Random-Access Memory (RAM) **1420** and a Read-Only Memory (ROM) **1422**. ROM **1422** can store programs, utilities or processes to be executed in a non-volatile manner. RAM **1420** can provide volatile data storage, and stores instructions related to the operation of processes and applications executing on the computing device.

[0066] In some embodiments, the generation of the hybrid resume can involve a method for eliminating bias. In further embodiments, the method for eliminating bias can be applied when managing such resumes. For example, a computer system with both a computer-based interface and a memory unit can be used to aggregate and store resumes from each of the users, transform the data from such resumes into a knowledge graph, use the knowledge graph to identify variables that receive biased treatment, and isolate the resumes that contain such variables. From this, the computer system can then remove the variables that receive biased treatment from each of the resumes to create a bias-free resume. Moreover, in some embodiments, a communication device can be used to send the bias-free resume to a remote computer of the user whose resume was converted into the bias-free resume.

[0067] Biased treatment may refer to variables that cause the resume to be excluded from further consideration for a particular job posting. For example, example variables that may receive biased treatment may include age, race, gender,

hobbies, ethnicity, and the like. In some embodiments, artificial intelligence may be used to analyze which resumes are selected by a hiring system (e.g., applicant tracking system, website, application, etc.) and determine the common variables in the resumes that are selected. The artificial intelligence may also analyze resumes that are not selected by the hiring system to identify common variables in the resumes that are not selected. The artificial intelligence may include one or more machine learning models trained to remove or add the identified common variables to a resume of a particular candidate to increase the chances of the resume being selected by the hiring system for further consideration (e.g., an interview).

[0068] In some embodiments, the method for eliminating bias can utilize the knowledge graph to identify one or more variables within the stored data that have been indexed as receiving biased treatment (these variables may be referred to as "hidden variables"). In response to identifying the hidden variables, the resume containing such hidden variables can be flagged by the system for identification.

[0069] To explore this further, FIG. **15** will now be described. FIG. **15** shows a method **1500** for eliminating biased variables that can be present based on included attributes within a resume and managing said resume to exclude the biased variables whenever the user associated with the resume applies for a job listing. The method **1500** is performed by processing logic that may include hardware (circuitry, dedicated logic, etc.), software (such as is run on a general purpose computer system or a dedicated machine), or a combination of both. The method **1500** and/or each of their individual functions, routines, subroutines, or operations may be performed by one or more processors of a computing device (e.g., any component of FIG. **1**, processor **1402** of FIG. **14**). In certain implementations, the method **1500** may be performed by a single processing thread. Alternatively, the method **1500** may be performed by two or more processing threads, each thread implementing one or more individual functions, routines, subroutines, or operations of the methods.

[0070] For simplicity of explanation, the method **1500** is depicted and described as a series of operations. However, operations in accordance with this disclosure can occur in various orders and/or concurrently, and with other operations not presented and described herein. For example, the operations depicted in the method **1500** may occur in combination with any other operation of any other method disclosed herein. Furthermore, not all illustrated operations may be required to implement the method **1500** in accordance with the disclosed subject matter. In addition, those skilled in the art will understand and appreciate that the method **1500** could alternatively be represented as a series of interrelated states via a state diagram or events.

[0071] As shown in FIG. **15**, method **1500** beings at step **1502**. At step **1502**, a computing system receives resumes from all of the candidates using the system. The resumes that are received each include a set of variables that are associated with the candidate that provided the resume. Thus, the computing device receives sets of variables associated with each resume. The variables may include any suitable data that is included in a resume as described herein, such as age, education, experience, hobbies, activities, skills, gender, ethnicity, address, email address, etc.

[0072] At step **1504**, the set of variables is stored as data in a knowledge graph and the data is aggregated together. For example, as described with reference to FIG. **1** and FIG. **2**, cognitive AI engine **204** may compile attributes associated with candidates and attributes associated with employees of enterprises.

[0073] At step **1506**, based on the information associated with a job listing, the knowledge graph can be used to identify variables within the data that receive biased treatment. For example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI engine **204** may parse through the resumes of candidates accepted by similar job listings to identify variables that are subject to biased treatment. That is, the cognitive AI engine **204** may be trained using training dataset that includes variables of candidates' resumes that are common to candidates that are selected for further consideration for a job listing and variables of candidates' resumes that are common to candidates that are not selected for further consideration for the job listing. In other words, the inputs in the training dataset may be the common variables to candidates and the outputs may be mapped to a result of whether the candidates were considered for further consideration or not. Accordingly, once trained, the cognitive AI engine **204** may be capable of identifying which variables receive biased treatment (e.g., cause exclusion from further consideration), and which variables receive bias-free treatment (e.g., cause inclusion for further consideration). As such, the trained cognitive AI engine **204** may receive a new resume with new variables and detect which variables in the new variables may receive biased treatment and may be capable of removing such variables from the resume. In some embodiments, this training of the cognitive AI engine **204** may be performed using an indexed knowledge graph (e.g., training dataset).

[0074] At step **1508**, the knowledge graph may be indexed to identify any variables that have been shown to receive biased treatment. For example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI engine **204** may be primed to search for specific variables that, through indexing, are prone to receive biased treatment. Further, in a continued example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI engine **204** may mark each of variables that are likely to be subjected to biased treatment as "hidden variables."

[0075] At step **1510**, the resumes that include variables that have been shown to receive biased treatment may be identified. For example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI engine **204** may identify and isolate any resume applying to job listing that contains the previously identified hidden variables.

[0076] At step **1512**, a resume including variables that have been shown to receive biased treatment is edited, where the editing removes the variables that have been shown to receive biased treatment from one or more layers of the resume (e.g., hidden layer and/or visible layer). For example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI engine **204** may delete from the candidate's resume all hidden variables that received biased treatment to create a bias-free resume.

[0077] At step **1514**, the resume that no longer includes the variables that have been shown to receive biased treatment is transmitted, either to a computing device of the candidate or to a computing device of the user monitoring the job listing. For example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI **204** transmits the bias-free

resume to the computing device of the candidate for presentation on the computing device of the candidate.

[0078] In some embodiments, the method **1500** may include, prior to sending the bias-free resume, notifying, by an Artificial Intelligence Virtual Assistance (A.I.V.A.) running on the computing device of the particular candidate, the particular candidate of editing the flagged resume. The A.I.V.A. represents a cognitive agent implemented as a set of instructions executing within the cognitive AI engine **204** that implement a client-facing component of the AI engine **204**. The A.I.V.A. is an interface between the cognitive AI engine **204** and the computing device of the candidate (e.g., user). And in some embodiments, the A.I.V.A. includes a conversation orchestrator that determines pieces of communication that are presented to the user device (and the user). In some embodiments, when a user interacts with the cognitive AI engine **204**, the user interacts with the A.I.V.A.

[0079] Various user interfaces may be provided to computing devices communicating with the A.I.V.A. executing in the cognitive intelligence AI engine **204**. The user interfaces may be presented in a standalone application executing on the devices or in a web browser as website pages. In some embodiments, the A.I.V.A. may be installed on a device of the user (e.g., candidate, employer). In some embodiments, the A.I.V.A. may be running on the cognitive AI engine **204** and the user interfaces of the A.I.V.A. are provided for presentation on the computing devices of the user. In some embodiments, the devices of the candidate and/or employer may communicate with cognitive AI engine **204** in a client-server architecture. In some embodiments, the A.I.V.A. may be implemented as computer instructions as an application programming interface.

[0080] In some embodiments, the A.I.V.A. may include a computer-based virtual assistant application running on a computing device capable of receiving communications from a remote user interface and transmitting a response to the remote user interface. The A.I.V.A. may include a computer-based virtual assistant application capable of receiving communications from a remote user interface and transmitting a response to the remote user interface.

[0081] In some embodiments, the A.I.V.A. is capable of providing an notification including information pertaining to one or more job listings to a computing device of a user, where the information includes available job positions, interview tips, desired skills, or some combination thereof. The A.I.V.A. may present a graphic element on a user interface that enables interacting with a user of computing on which the user interface is presented. For example, the user interface may enable the user to interact with the A.I.V.A. via talk, text, or touch by asking questions and/or having a conversation. For example, the A.I.V.A. is configured to perform conversational analysis in a general setting. In some embodiments, the A.I.V.A. uses conversational analysis to identify the intent of the user (e.g., find data, ask a question, search for facts, find references, find job listings, find interview tips, find desired employer information) and a respective micro-theory in which the intent is logical. The A.I.V.A. utilizes a combination of linguistics, artificial intelligence, and decision trees to decode what a user is asking or stating. In some embodiments, the A.I.V.A. uses a knowledge graph representing an ontology of information pertaining to attributes candidates, attributes of employers, attributes of job listings, or some combination thereof. As described herein, the knowledge graph may represent artifacts and relationships between those artifacts, such that the knowledge graph includes actual knowledge and not merely data. For example, the knowledge graph may include hidden variables that are flagged as receiving biased treatment from a particular employer when those hidden variables are considered in a resume by the particular employer. Such knowledge may be used by the cognitive AI engine **204** to remove the hidden variables from the resume of a candidate. Further, the A.I.V.A. may communicate, via a graphical element, speaker, and/or user interface, that the hidden variables are being removed. The user may ask the A.I.V.A. "why are they being removed?" and the A.I.V.A. may respond with the fact that the hidden variables have been detected as receiving biased treatment for the particular job listing of the employer with which the candidate is seeking employment.

[0082] In some embodiments, the method **1500** may include, responsive to sending the bias-free resume to the computing device of the particular candidate, transmitting, to the computing device of the particular candidate, a notification of information pertaining to one or more job listings, wherein the information comprises available job positions, interview tips, desired skills, and combinations thereof, and the notification comes from an Artificial Intelligence Virtual Assistance (A.I.V.A.) running on a computing device of the particular candidate.

[0083] In some embodiments, the method **1500** may include, responsive to notifying the particular candidate of information pertaining to the one or more job listings, receiving an acceptance from the computing device of the particular candidate, wherein the acceptance corresponds to a particular job listing of the one or more job listings.

[0084] In some embodiments, the method **1500** may include, responsive to receiving the acceptance, generating a cover letter of the particular candidate, wherein the cover letter is in a predefined format, the predefined format comprises one or more spaces, and the one or more spaces comprise one or more variables from the set of variables associated with the particular candidate.

[0085] In some embodiments, the method **1500** may include, responsive to generating the cover letter, sending the cover letter of the particular candidate to a particular employer associated with the particular job listing.

[0086] In some embodiments, the method **1500** may include, responsive to receiving an acceptance, sending the bias-free resume of the particular candidate to a particular employer associated with the particular job listing.

[0087] In some embodiments, the method **1500** may include, responsive to sending the bias free-resume to the particular employer, providing the particular employer with information on the particular candidate, wherein the information on the particular candidate comprises a background check, unemployment verification, or a combination thereof.

[0088] In some embodiments, the method **1500** may include, responsive to sending the bias free-resume to the particular employer, providing the particular employer with a built-in benefit compliance management program, wherein the built-in benefit compliance management program comprises automating filling out compliance forms, automating sending out the compliance forms, auto-reporting forms, or combinations thereof.

[0089] As an example of the difference between a resume including biased variables and a resume that has bias eliminated per the method of FIG. **15**, FIGS. **16**A and **16**B will

now be described. FIG. **16**A is an exemplary depiction of a resume that is accessible to a human. In some embodiments, FIG. **16**A represents a visible layer, as described above. FIG. **16**A includes a biased variable **1601**. FIG. **16**B is an exemplary depiction of a resume that includes a hidden layer (machine readable text) that may be parsed by an ATS. In some embodiments, FIG. **16**B represents a parsable layer (or hidden layer), as described above. FIG. **16**B includes a biased variable **1602** (e.g., age). The biased variable **1602** may include any suitable variable, such as age, gender, ethnicity, hobby, activity, work experience, geographic location, etc. In some embodiments, FIGS. **16**A and **16**B represent the visible layer and the hidden layer that are received in a hybrid resume (e.g., generated by the cognitive AI engine **204**) associated with a particular candidate.

[0090] In some embodiments, when the candidate applies for a particular job listing, the resume may be managed through the method of FIG. **15**. For example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI **204** detects the biased variables **1601** and **1602** for the particular job listing. Moreover, in some embodiments, the biased variables may be removed. For example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI **204** removes biased variables **1601** and **1602** to generate the bias-free resume.

[0091] In some embodiments, the bias-free resume would reflect that of the hybrid resume depicted in FIGS. **13**A and **13**B. In some embodiments, the bias-free resume (or hybrid resume) shown in FIGS. **13**A and **13**B can be transmitted to the computing device of the candidate. For example, and with continued reference to FIG. **1** and FIG. **2**, cognitive AI **204** transmits the resume to the computing device of the candidate.

[0092] Further, in some embodiments, an Artificial Intelligence Virtual Assistant (A.I.V.A.) can be presented on the computing device for each user. In such embodiments, the A.I.V.A. is a computer-based virtual assistant application that receives communication from a remote user interface on the computing device of each user and transmits a response. For example, the A.I.V.A. can notify a candidate of editing a candidate's resume or information that pertains to the job listings to which the candidate is sending the resume of said candidate. Specifically, this information that pertains to the job listings can include available job positions, interview tips, desired skills, and combinations thereof. Further, in some embodiments, the A.I.V.A. may be used to recommend available job listings to the candidate and obtain an acceptance from the candidate, in which the candidate allows the computing system to send the resume to an employer. Additionally, in some embodiments, responsive to receiving the acceptance, the computing device can generate a cover letter that is in a predefined format. This predefined format includes in which data from the candidate's resume can be input. In this embodiment, the information regarding a candidate can be inserted into the generated cover letter, within the open text boxes, by the computing system. In additional embodiments, the cover letter and resume of the candidate may be sent to the employer by the computer system in response to the acceptance.

[0093] In some embodiments, the A.I.V.A. can be used by a user that is in the position of an employer that is managing the job listing. In this embodiment, the A, I.V.A. can provide the employer with information on the candidate including a background check, unemployment verification, or a combination thereof. One benefit of providing such information is that the employer would be able to ensure that the candidates were properly vetted and the candidate was in compliance with industry requirements. Specifically, in some embodiments, the A.I.V.A. can include a built-in compliance management program. The built-in compliance management program can include automating filling out compliance forms, automating sending out compliance forms, auto-reporting forms, or combinations thereof.

[0094] The various aspects, embodiments, implementations or features of the described embodiments can be used separately or in any combination. Various aspects of the described embodiments can be implemented by software, hardware or a combination of hardware and software. The described embodiments can also be embodied as computer readable code on a computer readable medium. The computer readable medium is any data storage device that can store data which can thereafter be read by a computer system. Examples of the computer readable medium include read-only memory, random-access memory, CD-ROMs, DVDs, magnetic tape, hard disk drives, solid-state drives, and optical data storage devices. The computer readable medium can also be distributed over network-coupled computer systems so that the computer readable code is stored and executed in a distributed fashion.

[0095] Consistent with the above disclosure, the examples of systems and methods enumerated in the following clauses are specifically contemplated and are intended as a non-limiting set of examples.

[0096] Clause 1. A method, comprising: training, based on personal attributes of employees of multiple employers and work culture attributes associated with each employer of the multiple employers, an employee-employer compatibility model that defines associations between the personal attributes and the work culture attributes; extracting information associated with a person from one or more sources on the Web where the person is represented; generating, based on the information associated with the person, a user profile associating personal attributes with the person; applying the user profile to the employee-employer compatibility model; receiving an indication, from the employee-employer compatibility model, of an employer profile that is compatible with the user profile, the employer profile including work culture attributes associated with an employer; and generating a notification that indicates at least one of a designation of the employer or the work culture attributes associated with the employer.

[0097] Clause 2. The method of any foregoing clause, further comprising: extracting information associated with the employer from the one or more sources on the Web where the employer is represented; and generating, based at least in part, on the information associated with the employer, the employer profile.

[0098] Clause 3. The method of any foregoing clause, further comprising updating the employee-employer compatibility model to account for one or more associations detected between the user profile and the employer profile.

[0099] Clause 4. The method of any foregoing clause, further comprising: extracting additional information associated with the person from at least one of a resume of the person or from a questionnaire completed by the person; and generating the user profile based on the additional information associated with the person.

[0100] Clause 5. The method of any foregoing clause, further comprising: training the employee-employer compatibility model based on professional attributes of the person.

[0101] Clause 6. The method of any foregoing clause, further comprising: receiving an indication from the employee-employer compatibility model that the user profile is compatible with a plurality of employer profiles, each employer profile of the plurality of employer profiles including work culture attributes corresponding to an employer.

[0102] Clause 7. The method of any foregoing clause, further comprising: identifying job listings of the employers associated with the identified employer profiles; and generating a notification for the person including indications of the job listings.

[0103] Clause 8. A system, comprising: a model generator configured to train, based on personal attributes of employees of multiple employers and work culture attributes associated with each employer of the multiple employers, an employee-employer compatibility model that defines associations between the personal attributes and the work culture attributes; an agent of the system configured to extract information associated with an employer from one or more sources on the Web where the employer is represented; and cognitive artificial intelligence engine configured to: generate, based on the information associated with the employer, an employer profile including work culture attributes of the employer; apply the employer profile to the employee-employer compatibility model; and receive an indication, from the employee-employer compatibility model, of a user profile that is compatible with the employer profile, the user profile associating personal attributes with a person.

[0104] Clause 9. The system of any foregoing clause, wherein the profile generator is further configured to: extract information associated with the person from the one or more sources on the Web where the person is represented; and generate, based on the information associated with the person, the user profile.

[0105] Clause 10. The system of any foregoing clause, wherein the model generator is further configured to update the employee-employer compatibility model to account for one or more associations detected between the user profile and the employer profile.

[0106] Clause 11. The system of any foregoing clause, wherein the cognitive AI engine is further configured to: receive an indication from the employee-employer compatibility model that the employer profile is compatible with a plurality of user profiles, each user profile of the plurality of user profiles associating personal attributes with a corresponding person.

[0107] Clause 12. The system of any foregoing clause, wherein the agent is further configured to generate a notification that indicates at least one of information identifying the person or the personal attributes.

[0108] Clause 13. The system of any foregoing clause, wherein the cognitive AI engine is further configured to: extract additional information associated with the employer from one or more job listings published by the employer; and generate the employer profile based on the additional information associated with the employer.

[0109] Clause 14. A computer-readable storage medium having program instructions recorded thereon that, when executed by at least one processing circuit of a computing device, perform a method, comprising: training, based on personal attributes of employees of multiple employers and work culture attributes associated with each employer of the multiple employers, an employee-employer compatibility model that defines associations between the personal attributes and the work culture attributes; extracting information associated with a person from one or more sources on the Web where the person is represented; generating, based on the information associated with the person, a user profile associating personal attributes with the person; applying the user profile to the employee-employer compatibility model; receiving an indication, from the employee-employer compatibility model, of an employer profile that is compatible with the user profile, the employer profile including work culture attributes associated with an employer; and generating a notification that indicates at least one of a designation of the employer or the work culture attributes associated with the employer.

[0110] Clause 15. The computer-readable storage medium of any foregoing clause, wherein the method further comprises: extracting information associated with the employer from the one or more sources on the Web where the employer is represented; and generating, based at least in part, on the information associated with the employer, the employer profile.

[0111] Clause 16. The computer-readable storage medium of claim any foregoing clause, wherein the method further comprises: updating the employee-employer compatibility model to account for one or more associations detected between the user profile and the employer profile.

[0112] Clause 17. The computer-readable storage medium of any foregoing clause, wherein the method further comprises: extracting additional information associated with the person from at least one of a resume of the person or from a questionnaire completed by the person; and generating the user profile based on the additional information associated with the person.

[0113] Clause 18. The computer-readable storage medium of any foregoing clause, wherein the method further comprises: training the employee-employer compatibility model based on professional attributes of the person.

[0114] Clause 19. The computer-readable storage medium of any foregoing clause, wherein the method further comprises: receiving an indication from the employee-employer compatibility model that the user profile is compatible with a plurality of employer profiles, each employer profile of the plurality of employer profiles including work culture attributes corresponding to an employer.

[0115] Clause 20. The computer-readable storage medium of any foregoing clause, wherein the method further comprises: identifying job listings of the employers associated with the identified employer profiles; and generating a notification for the person including indications of the job listings.

[0116] Clause 21. A method for eliminating bias when managing resumes, the method comprising receiving a plurality of resumes from a plurality of candidates, wherein each resume for a particular candidate in the plurality of candidates comprises a set of variables associated with the particular candidate; maintaining a knowledge graph to aggregate and store a plurality of data, wherein the plurality of data comprises each variable in the set of variables associated with the particular candidate for each particular candidate in the plurality of candidates; identifying, using the knowledge graph, data in the plurality of data that

receives biased treatment; indexing the knowledge graph to identify one or more hidden variables in the plurality of data, wherein the one or more hidden variables comprise one or more variables in the set of variables, and the one or more hidden variables comprise the data that has been indexed as receiving biased treatment; identifying a flagged resume in the plurality of resumes, wherein the flagged resume comprises a set of variables comprising one or more hidden variables; responsive to identifying the flagged resume, editing the flagged resume to remove the one or more hidden variables from the set of variables, wherein the flagged resume after editing comprises a bias-free resume; responsive to editing the flagged resume, sending the bias-free resume to the particular candidate in the plurality of candidates, wherein the particular candidate in the plurality of candidates comprises the particular candidate in the plurality of candidates from which the flagged resume was received.

[0117] Clause 22. The method of any foregoing clause, wherein the method further comprises: prior to sending the bias-free resume, notifying the particular candidate of editing the flagged resume, wherein the notification comes from an Artificial Intelligence Virtual Assistance (A.I.V.A.) on the computing device of the particular candidate

[0118] Clause 23. The method of claim **2**, wherein the A.I.V.A. comprises a computer-based virtual assistant application running on a computing device capable of receiving communications from a remote user interface and transmitting a response to the remote user interface.

[0119] Clause 24. The method of any foregoing clause, wherein the method further comprises: responsive to sending the bias-free resume to the particular candidate, notifying the particular candidate of information pertaining to one or more job listings, wherein the information comprises available job positions, interview tips, desired skills, and combinations thereof, and the notification comes from an Artificial Intelligence Virtual Assistance (A.I.V.A.) on a computing device of the particular candidate.

[0120] Clause 25. The method of any foregoing clause, wherein the A.I.V.A. comprises a computer-based virtual assistant application running on a computing device capable of receiving communications from a remote user interface and transmitting a response to the remote user interface.

[0121] Clause 26. The method of any foregoing clause, wherein the method further comprises: responsive to notifying the particular candidate of information pertaining to one or more job listings, receiving an acceptance from the computing device of the particular candidate, wherein the acceptance corresponds to a particular job listing of the one or more job listings.

[0122] Clause 27. The method of any foregoing clause, wherein the method further comprises: responsive to receiving an acceptance, generating a cover letter of the particular candidate, wherein the cover letter is in a predefined format, the predefined format comprises one or more spaces, and the one or more spaces comprise one or more variables from the set of variables associated with the particular candidate.

[0123] Clause 28. The method of any foregoing clause, wherein the method further comprises: responsive to generating the cover letter, sending the cover letter of the particular candidate to a particular employer associated with the particular job listing.

[0124] Clause 29. The method of any foregoing clause, wherein the method further comprises: responsive to receiving an acceptance, sending the bias-free resume of the particular candidate to a particular employer associated with the particular job listing.

[0125] Clause 30. The method of any foregoing clause, wherein the method further comprises: responsive to sending the bias free-resume to the particular employer, providing the particular employer with information on the particular candidate, wherein the information on the particular candidate comprises a background check, unemployment verification, or a combination thereof.

[0126] Clause 31. The method of any foregoing clause, wherein the method further comprises: responsive to sending the bias free-resume to the particular employer, providing the particular employer with a built-in benefit compliance management program, wherein the built-in benefit compliance management program comprises automating filling out compliance forms, automating sending out compliance forms, auto-reporting forms, or combinations thereof.

[0127] Clause 32. A system for eliminating bias when managing resumes, the system comprising a computer-based interface capable of receiving a plurality of resumes from a plurality of candidates, wherein each resume in the plurality of resumes is electronically stored; a computer system with one or more processors having circuitry to execute instructions; a memory unit available to the one or more processors, wherein the memory unit is capable of storing the plurality of resumes created by the computer-based interface, and the memory unit is capable of having sequences of instructions stored therein, which when executed cause the one or more processors to: aggregate and store a plurality of data, wherein the plurality of data comprises each variable in the set of variables associated with the particular candidate for each particular candidate in the plurality of candidates, transform the plurality of data into a knowledge graph, use the knowledge graph to identify the variables that receive biased treatment, isolate each resume in the plurality of resumes that contains the variables that receive biased treatment, and remove the variables that receive biased treatment from each resume in the plurality of resumes that are isolated, wherein each resume is a bias-free resume; a communication device capable of sending the bias-free resume to a remote computer.

[0128] Clause 33. A system for eliminating bias when managing resumes, the system comprising: a computer-based interface capable of receiving a plurality of resumes from a plurality of candidates, wherein each resume in the plurality of resumes is electronically stored; a computer system with one or more processors having circuitry to execute instructions; a memory unit available to the one or more processors, wherein the memory unit is capable of storing the plurality of resumes created by the computer-based interface, and the memory unit is capable of having sequences of instructions stored therein, which when executed cause the one or more processors to: aggregate and store a plurality of data, wherein the plurality of data comprises each variable in the set of variables associated with the particular candidate for each particular candidate in the plurality of candidates, transform the plurality of data into a knowledge graph, use the knowledge graph to identify the variables that receive biased treatment, isolate each resume in the plurality of resumes that contains the variables that receive biased treatment, and remove the variables that receive biased treatment from each resume in the plurality of

resumes that are isolated, wherein each resume is a bias-free resume; a communication device capable of sending the bias-free resume to a remote computing device.

[0129] Clause 44. The system of any foregoing clause, wherein, prior to sending the bias-free resume, the one or more processors are further to notify, by an Artificial Intelligence Virtual Assistance (A.I.V.A.), the particular candidate of editing the flagged resume.

[0130] Clause 45. The system of any foregoing clause, wherein the A.I.V.A. comprises a computer-based virtual assistant application running on a computing device capable of receiving communications from a remote user interface and transmitting a response to the remote user interface.

[0131] Clause 46. The system of any foregoing clause, wherein the one or more processors are further to: responsive to sending the bias-free resume to the computing device of the particular candidate, transmit, to the particular candidate, a notification of information pertaining to one or more job listings, wherein the information comprises available job positions, interview tips, desired skills, and combinations thereof, and the notification comes from an Artificial Intelligence Virtual Assistance (A.I.V.A.) running on a computing device of the particular candidate.

[0132] Clause 47. The system of any foregoing clause, wherein the A.I.V.A. comprises a computer-based virtual assistant application running on a computing device capable of receiving communications from a remote user interface and transmitting a response to the remote user interface.

[0133] Clause 48. The system of any foregoing clause, wherein the one or more processors are further to: responsive to notifying the particular candidate of information pertaining to the one or more job listings, receive an acceptance from a computing device of the particular candidate, wherein the acceptance corresponds to a particular job listing of the one or more job listings.

[0134] Clause 49. The system of any foregoing clause, wherein the processing device is further to: responsive to receiving the acceptance, generate a cover letter of the particular candidate, wherein: the cover letter is in a predefined format, the predefined format comprises one or more spaces, and the one or more spaces comprise one or more variables from the set of variables associated with the particular candidate.

[0135] Clause 50. The system of any foregoing clause, wherein the one or more processors are further to: responsive to generating the cover letter, send the cover letter of the particular candidate to a particular employer associated with the particular job listing.

[0136] Clause 51. A non-transitory, computer-readable medium storing instructions that, when executed, cause a processor to: receive a plurality of resumes from a plurality of candidates, wherein each resume in the plurality of resumes is electronically store; aggregate and store a plurality of data, wherein the plurality of data comprises each variable in a set of variables associated with a particular candidate for each particular candidate in the plurality of candidates; transform the plurality of data into a knowledge graph; use the knowledge graph to identify the variables that receive biased treatment; isolate each resume in the plurality of resumes that contains the variables that receive biased treatment; and remove the variables that receive biased treatment from each resume in the plurality of resumes that are isolated, wherein each resume is a bias-free resume.

[0137] The foregoing description, for purposes of explanation, used specific nomenclature to provide a thorough understanding of the described embodiments. However, it should be apparent to one skilled in the art that the specific details are not required in order to practice the described embodiments. Thus, the foregoing descriptions of specific embodiments are presented for purposes of illustration and description. They are not intended to be exhaustive or to limit the described embodiments to the precise forms disclosed. It should be apparent to one of ordinary skill in the art that many modifications and variations are possible in view of the above teachings.

[0138] The above discussion is meant to be illustrative of the principles and various embodiments of the present invention. Numerous variations and modifications will become apparent to those skilled in the art once the above disclosure is fully appreciated. It is intended that the following claims be interpreted to embrace all such variations and modifications.

What is claimed is:

1. A method for eliminating bias when managing resumes, the method comprising:

receiving a plurality of resumes from a plurality of candidates, wherein each resume for a particular candidate in the plurality of candidates comprises a set of variables associated with the particular candidate;

maintaining a knowledge graph to aggregate and store a plurality of data, wherein the plurality of data comprises each variable in the set of variables associated with the particular candidate for each particular candidate in the plurality of candidates;

identifying, using the knowledge graph, data in the plurality of data that receives biased treatment;

indexing the knowledge graph to identify one or more hidden variables in the plurality of data, wherein:

the one or more hidden variables comprise one or more variables in the set of variables, and

the one or more hidden variables comprise the data that has been identified as receiving biased treatment;

identifying a flagged resume in the plurality of resumes, wherein the flagged resume comprises a set of variables comprising the one or more hidden variables;

responsive to identifying the flagged resume, editing the flagged resume to remove the one or more hidden variables from the set of variables, wherein the flagged resume comprises a bias-free resume;

responsive to editing the flagged resume, sending the bias-free resume to a computing device of the particular candidate in the plurality of candidates.

2. The method of claim **1**, further comprising:

prior to sending the bias-free resume, notifying, by an Artificial Intelligence Virtual Assistance (A.I.V.A.) running on the computing device of the particular candidate, the particular candidate of editing the flagged resume.

3. The method of claim **2**, wherein the A.I.V.A. comprises a computer-based virtual assistant application running on the computing device capable of receiving communications from a remote user interface and transmitting a response to the remote user interface.

4. The method of claim **1**, further comprising:

responsive to sending the bias-free resume to the computing device of the particular candidate, transmitting,

to the computing device of the particular candidate, a notification of information pertaining to one or more job listings, wherein

the information comprises available job positions, interview tips, desired skills, and combinations thereof, and

the notification comes from an Artificial Intelligence Virtual Assistance (A.I.V.A.) running on a computing device of the particular candidate.

5. The method of claim **4**, wherein the A.I.V.A. comprises a computer-based virtual assistant application capable of receiving communications from a remote user interface and transmitting a response to the remote user interface.

6. The method of claim **4**, further comprising:

responsive to notifying the particular candidate of information pertaining to the one or more job listings, receiving an acceptance from the computing device of the particular candidate, wherein the acceptance corresponds to a particular job listing of the one or more job listings.

7. The method of claim **6**, further comprising:

responsive to receiving the acceptance, generating a cover letter of the particular candidate, wherein:

the cover letter is in a predefined format,

the predefined format comprises one or more spaces, and

the one or more spaces comprise one or more variables from the set of variables associated with the particular candidate.

8. The method of claim **7**, further comprising:

responsive to generating the cover letter, sending the cover letter of the particular candidate to a particular employer associated with the particular job listing.

9. The method of claim **6**, further comprising:

responsive to receiving an acceptance, sending the bias-free resume of the particular candidate to a particular employer associated with the particular job listing.

10. The method of claim **9**, further comprising:

responsive to sending the bias free-resume to the particular employer, providing the particular employer with information on the particular candidate, wherein the information on the particular candidate comprises a background check, unemployment verification, or a combination thereof.

11. The method of claim **9**, further comprising:

responsive to sending the bias free-resume to the particular employer, providing the particular employer with a built-in benefit compliance management program, wherein the built-in benefit compliance management program comprises automating filling out compliance forms, automating sending out the compliance forms, auto-reporting forms, or combinations thereof.

12. A system for eliminating bias when managing resumes, the system comprising:

a computer-based interface capable of receiving a plurality of resumes from a plurality of candidates, wherein each resume in the plurality of resumes is electronically stored;

a computer system with one or more processors having circuitry to execute instructions;

a memory unit available to the one or more processors, wherein:

the memory unit is capable of storing the plurality of resumes created by the computer-based interface, and

the memory unit is capable of having sequences of instructions stored therein, which when executed cause the one or more processors to:

aggregate and store a plurality of data, wherein the plurality of data comprises each variable in the set of variables associated with the particular candidate for each particular candidate in the plurality of candidates,

transform the plurality of data into a knowledge graph,

use the knowledge graph to identify the variables that receive biased treatment,

isolate each resume in the plurality of resumes that contains the variables that receive biased treatment, and

remove the variables that receive biased treatment from each resume in the plurality of resumes that are isolated, wherein each resume is a bias-free resume;

a communication device capable of sending the bias-free resume to a remote computing device.

13. The system of claim **12**, wherein, prior to sending the bias-free resume, the one or more processors are further to notify, by an Artificial Intelligence Virtual Assistance (A.I.V.A.), the particular candidate of editing the flagged resume.

14. The system of claim **13**, wherein the A.I.V.A. comprises a computer-based virtual assistant application running on a computing device capable of receiving communications from a remote user interface and transmitting a response to the remote user interface.

15. The system of claim **12**, wherein the one or more processors are further to:

responsive to sending the bias-free resume to the computing device of the particular candidate, transmit, to the particular candidate, a notification of information pertaining to one or more job listings, wherein

the information comprises available job positions, interview tips, desired skills, and combinations thereof, and

the notification comes from an Artificial Intelligence Virtual Assistance (A.I.V.A.) running on a computing device of the particular candidate.

16. The system of claim **15**, wherein the A.I.V.A. comprises a computer-based virtual assistant application running on a computing device capable of receiving communications from a remote user interface and transmitting a response to the remote user interface.

17. The system of claim **15**, wherein the one or more processors are further to:

responsive to notifying the particular candidate of information pertaining to the one or more job listings, receive an acceptance from a computing device of the particular candidate, wherein the acceptance corresponds to a particular job listing of the one or more job listings.

18. The system of claim **17**, wherein the processing device is further to:

responsive to receiving the acceptance, generate a cover letter of the particular candidate, wherein:

the cover letter is in a predefined format,

the predefined format comprises one or more spaces, and

the one or more spaces comprise one or more variables from the set of variables associated with the particular candidate.

19. The system of claim **18**, wherein the one or more processors are further to:

responsive to generating the cover letter, send the cover letter of the particular candidate to a particular employer associated with the particular job listing.

20. A non-transitory, computer-readable medium storing instructions that, when executed, cause a processor to:

receive a plurality of resumes from a plurality of candidates, wherein each resume in the plurality of resumes is electronically store;

aggregate and store a plurality of data, wherein the plurality of data comprises each variable in a set of variables associated with a particular candidate for each particular candidate in the plurality of candidates;

transform the plurality of data into a knowledge graph;

use the knowledge graph to identify the variables that receive biased treatment;

isolate each resume in the plurality of resumes that contains the variables that receive biased treatment; and

remove the variables that receive biased treatment from each resume in the plurality of resumes that are isolated, wherein each resume is a bias-free resume.

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