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(71) Applicant: **JIO PLATFORMS LIMITED** [IN/IN]; Office - 101, Saffron, Nr. Centre Point, Panchwati 5 Rasta, Ambawadi, Ahmedabad - 380006, Gujarat (IN).

(72) Inventors: **MURARKA, Ankit**; Office - 101, Saffron, Nr. Centre Point, Panchwati 5 Rasta, Ambawadi, Ahmedabad - 380006, Gujarat (IN). **AHMAD, Rizwan**; Office - 101, Saffron, Nr. Centre Point, Panchwati 5 Rasta, Ambawadi, Ahmedabad - 380006, Gujarat (IN). **GANVEER, Chandra**; Office - 101, Saffron, Nr. Centre Point, Panchwati 5 Rasta, Ambawadi, Ahmedabad - 380006, Gujarat (IN). **DE, Supriya Kaushik**; Office - 101, Saffron, Nr. Centre Point, Panchwati 5 Rasta, Ambawadi, Ahmedabad - 380006, Gujarat (IN). **GILL, Kapil**; Office - 101, Saffron, Nr. Centre Point, Panchwati 5 Rasta, Ambawadi, Ahmedabad - 380006, Gujarat (IN). **BHUSHAN, Shashank**; Office - 101, Saffron, Nr. Centre Point, Panchwati 5 Rasta, Ambawadi, Ahmedabad - 380006, Gujarat (IN). **BHATNAGAR, Aayush**; Office - 101, Saffron, Nr. Centre Point, Panchwati 5 Rasta, Ambawadi, Ahmedabad - 380006, Gujarat (IN). **MAGU, Sameer**; Office - 101, Saffron, Nr. Centre Point, Panchwati 5 Rasta, Ambawadi, Ahmedabad - 380006, Gujarat (IN). **JAIN, Arpit**; Office - 101, Saffron, Nr. Centre Point, Panchwati 5 Rasta, Ambawadi, Ahmedabad - 380006, Gujarat (IN). **GODARA, Rohtas**; Office - 101, Saffron, Nr. Centre Point, Panchwati 5 Rasta, Ambawadi, Ahmedabad - 380006, Gujarat (IN).

(74) Agent: **SAHNEY, Garima**; SAIKRISHNA & ASSOCIATES, ADVOCATES, B-140, Sector 51, Noida-201301, Uttar Pradesh (IN).

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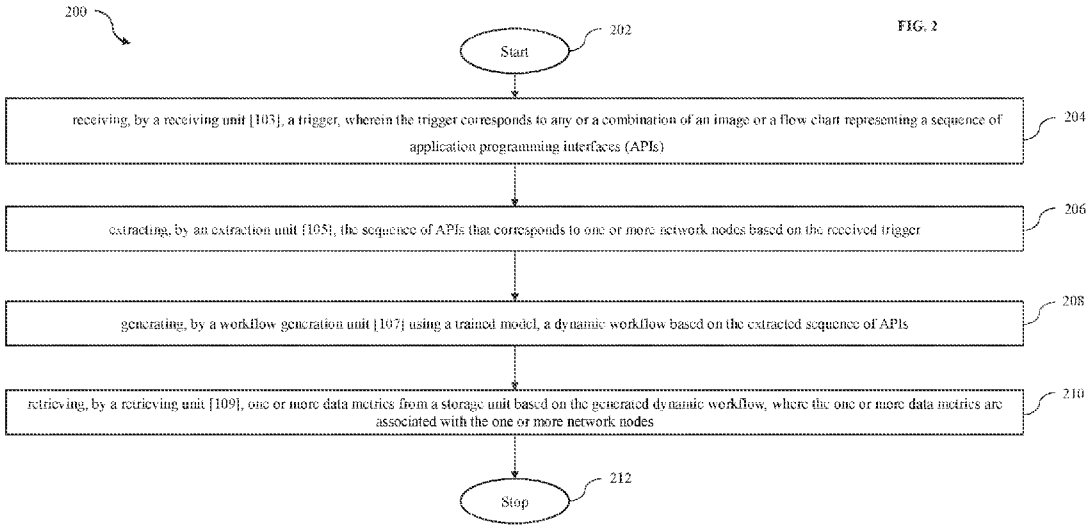


FIG. 2

(57) Abstract: The present disclosure relates to a method and a system method for dynamic workflow creation, said method encompasses receiving, by a receiving unit [103], a trigger, wherein the trigger corresponds to representing a sequence of application programming interfaces (APIs); extracting, by an extraction unit [105], the sequence of APIs that corresponds to one or more network nodes based on the received trigger; generating, by a workflow generation unit [107] using one or more trained models, a dynamic workflow based on the extracted sequence of APIs; and retrieving, by a retrieving unit [109], one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

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METHOD AND SYSTEM FOR DYNAMIC WORKFLOW CREATION

TECHNICAL FIELD

[0001] Embodiments of the present disclosure generally relate to fulfilment management services (FMS). More particularly, embodiments of the present disclosure relate to method and system for dynamic workflow creation.

BACKGROUND

[0002] The following description of the related art is intended to provide background information pertaining to the field of the disclosure. This section may include certain aspects of the art that may be related to various features of the present disclosure. However, it should be appreciated that this section is used only to enhance the understanding of the reader with respect to the present disclosure, and not as admissions of the prior art.

[0003] Wireless communication technology has rapidly evolved over the past few decades, with each generation bringing significant improvements and advancements. The first generation of wireless communication technology was based on analog technology and offered only voice services. However, with the advent of the second-generation (2G) technology, digital communication and data services became possible, and text messaging was introduced. 3G technology marked the introduction of high-speed internet access, mobile video calling, and location-based services. The fourth-generation (4G) technology revolutionized wireless communication with faster data speeds, better network coverage, and improved security. Currently, the fifth-generation (5G) technology is being deployed, promising even faster data speeds, low latency, and the ability to connect multiple devices simultaneously. With each generation, wireless communication technology has become more advanced, sophisticated, and capable of delivering more services to its users.

[0004] Generally, a fulfilment management services in network nodes encompass the coordination and optimization of tasks within a network environment. These fulfilment management services aim to streamline and automate the workflow process by ensuring efficient resource allocation, task scheduling, and intelligent routing. By leveraging software systems and algorithms, network nodes can dynamically adapt to changing requirements and priorities and enable seamless execution of complex workflows.

[0005] Traditional FMS workflows are often static and predefined, making them inflexible to changes in the network environment or business requirements. Designing workflows typically requires manual effort from developers or engineers to define the sequence of APIs, their parameters, and the associated logic. This process is time-consuming and prone to human error. Integrating new APIs or changing existing ones in a workflow can be challenging in traditional systems due to the static nature of the workflows. In conventional systems, retrieving relevant data metrics for different network nodes can be cumbersome and may require separate queries or manual data extraction. Managing the states of a workflow, such as request schema, attributes, endpoints, and mappings, can be complex and error-prone in traditional systems. The claimed invention facilitates automatic state creation and association, enhancing the accuracy and reliability of the workflow management process.

[0006] Thus, there exists an imperative need in the art to provide an efficient system and method for cleanup of network resources after handover procedure.

OBJECTS OF THE INVENTION

[0007] Some of the objects of the present disclosure, which at least one embodiment disclosed herein satisfies are listed herein below.

[0008] It is an object of the present disclosure to provide a method and system for dynamic workflow creation in the FMS.

[0009] It is another object of the present disclosure to provide a method and system for dynamic workflow creation in the FMS that automates the generation of workflows based on triggers such as images or flowcharts, reducing the need for manual intervention and increasing efficiency.

[0010] It is another object of the present disclosure to provide a method and system for dynamic workflow creation in the FMS that allows for the flexible adaptation of workflows to different sequences of APIs corresponding to various network nodes, enhancing the system's responsiveness to changing requirements.

[0011] It is another object of the present disclosure to provide a method and system for dynamic workflow creation in the FMS that simplifies the integration and modification of APIs in the workflow by extracting the sequence of APIs from a trigger and dynamically generating the workflow.

[0012] It is another object of the present disclosure to provide a method and system for dynamic workflow creation in the FMS that streamlines the retrieval of data metrics associated with different network nodes based on the generated dynamic workflow, improving data management efficiency.

[0013] It is another object of the present disclosure to provide a method and system for dynamic workflow creation in the FMS that facilitates the automatic creation and association of states in the workflow, such as request schema, attributes, endpoints, and mappings, enhancing the accuracy and reliability of the workflow management process.

SUMMARY

[0014] This section is provided to introduce certain aspects of the present disclosure in a simplified form that are further described below in the detailed description. This summary is not intended to identify the key features or the scope of the claimed subject matter.

[0015] An aspect of the present disclosure provides a method for dynamic workflow creation. The method comprises receiving, by a receiving unit, a trigger, wherein the trigger corresponds to representing a sequence of application programming interfaces (APIs). The method further comprises extracting, by an extraction unit, the sequence of APIs that corresponds to one or more network nodes based on the received trigger. The method further comprises generating, by a workflow generation unit using one or more trained models, a dynamic workflow based on the extracted sequence of APIs. Thereafter, the method comprises retrieving, by a retrieving unit, one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

[0016] In an aspect, the one or more data metrics correspond to information associated with at least one of the one or more network nodes, segregation of the API based on application, schema associated with a request, and one or more attributes associated with the schema associated with the request.

[0017] In an aspect, the sequence of APIs comprises a series of API signatures, each signature of the series of API signatures comprises at least one of parameters, data types, and return values that define a specific function associated with an API.

[0018] In an aspect, the one or more trained models are trained based on a dataset comprising a plurality of interfaces and corresponding API signatures.

[0019] In an aspect, the one or more trained models comprises at least one of a Convolutional Neural Network (CNN) (Bidirectional Encoder Representations from Transformers) BERT, and a Recurrent Neural Network (RNN) model, and Long Short-Term Memory (LSTM).

[0020] In an aspect, the trigger is received based on receipt of flowchart, image, voice, video from a user.

[0021] In an aspect, the method comprises creating a set of states comprising a request schema, a set of attributes, a plurality of end points, and a plurality of mappings.

[0022] In an aspect, the method comprises automatically associating the set of states.

[0023] In an aspect, the method comprises performing, by the workflow generation unit, at least one of image processing, video processing, and voice processing on the received trigger.

[0024] Another aspect of the present disclosure provides a system for dynamic workflow creation. The system comprises a receiving unit configured to receive a trigger, wherein the trigger corresponds to representing a sequence of application programming interfaces (APIs). The system comprises an extraction unit configured to extract the sequence of APIs that corresponds to one or more network nodes based on the received trigger. The system comprises a workflow generation unit configured to generate, using one or more trained models, a dynamic workflow based on the extracted sequence of APIs. The system comprises a retrieving unit configured to retrieve one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

[0025] An aspect of the present disclosure provides a user equipment comprising a processor. The processor is configured to transmit a trigger for dynamic workflow creation in a fulfilment

management system (FMS), wherein the trigger corresponds to at least one of a voice or a video representing a sequence of application programming interfaces (APIs) and wherein for dynamic workflow creation comprises: extracting the sequence of APIs that corresponds to one or more network nodes based on the received trigger; generating, using one or more trained models, a dynamic workflow based on the extracted sequence of APIs; and retrieving one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

[0026] Yet another aspect of the present disclosure provides a non-transitory computer-readable storage medium storing instruction for dynamic workflow creation the storage medium comprising executable code which, when executed by one or more units of a system, causes: a receiving unit configured to receive a trigger, wherein the trigger corresponds to representing a sequence of application programming interfaces (APIs); an extraction unit configured to extract the sequence of APIs that corresponds to one or more network nodes based on the received trigger; a workflow generation unit configured to generate, using one or more trained models, a dynamic workflow based on the extracted sequence of APIs; and a retrieving unit configured to retrieve one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

DESCRIPTION OF THE DRAWINGS

[0027] The accompanying drawings, which are incorporated herein, and constitute a part of this disclosure, illustrate exemplary embodiments of the disclosed methods and systems in which like reference numerals refer to the same parts throughout the different drawings. Components in the drawings are not necessarily to scale, emphasis instead being placed upon clearly illustrating the principles of the present disclosure. Also, the embodiments shown in the figures are not to be construed as limiting the disclosure, but the possible variants of the method and system according to the disclosure are illustrated herein to highlight the advantages of the disclosure. It will be appreciated by those skilled in the art that disclosure of such drawings includes disclosure of electrical components or circuitry commonly used to implement such components.

[0028] FIG. 1A illustrates an exemplary block diagram representation of 5th generation core (5GC) network architecture, in accordance with exemplary embodiment of the present disclosure.

[0029] FIG. 1B illustrates an exemplary block diagram of a system for dynamic creation of a workflow in a fulfilment management system (FMS), in accordance with exemplary embodiments of the present disclosure.

[0030] FIG. 2 illustrates an exemplary method flow diagram indicating for the dynamic creation of a workflow in a fulfilment management system (FMS), in accordance with exemplary embodiments of the present disclosure.

[0031] Figure 3A and 3B illustrates an exemplary workflow created by a fulfilment management service (FMS), in accordance with exemplary embodiments of the present disclosure.

[0032] FIG. 4 illustrates an exemplary block diagram of a computing device upon which an embodiment of the present disclosure may be implemented.

[0033] FIG. 5 illustrates an exemplary block diagram of a user equipment (UE) for dynamic creation of workflow in a fulfilment management system (FMS), in accordance with exemplary embodiments of the present disclosure.

[0034] The foregoing shall be more apparent from the following more detailed description of the disclosure.

DESCRIPTION

[0035] In the following description, for the purposes of explanation, various specific details are set forth in order to provide a thorough understanding of embodiments of the present disclosure. It will be apparent, however, that embodiments of the present disclosure may be practiced without these specific details. Several features described hereafter can each be used independently of one another or with any combination of other features. An individual feature may not address any of the problems discussed above or might address only some of the problems discussed above. Some of the problems discussed above might not be fully addressed by any of the features described herein. Example embodiments of the present disclosure are described below, as illustrated in various drawings in which like reference numerals refer to the same parts throughout the different drawings.

[0036] The ensuing description provides exemplary embodiments only, and is not intended to limit the scope, applicability, or configuration of the disclosure. Rather, the ensuing description of the exemplary embodiments will provide those skilled in the art with an enabling description for implementing an exemplary embodiment. It should be understood that various changes may be made in the function and arrangement of elements without departing from the spirit and scope of the disclosure as set forth.

[0037] It should be noted that the terms "mobile device", "user equipment", "user device", “communication device”, “device” and similar terms are used interchangeably for the purpose of describing the invention. These terms are not intended to limit the scope of the invention or imply any specific functionality or limitations on the described embodiments. The use of these terms is solely for convenience and clarity of description. The invention is not limited to any particular type of device or equipment, and it should be understood that other equivalent terms or variations thereof may be used interchangeably without departing from the scope of the invention as defined herein.

[0038] Specific details are given in the following description to provide a thorough understanding of the embodiments. However, it will be understood by one of ordinary skill in the art that the embodiments may be practiced without these specific details. For example, circuits, systems, networks, processes, and other components may be shown as components in block diagram form in order not to obscure the embodiments in unnecessary detail. In other instances, well-known circuits, processes, algorithms, structures, and techniques may be shown without unnecessary detail in order to avoid obscuring the embodiments.

[0039] Also, it is noted that individual embodiments may be described as a process which is depicted as a flowchart, a flow diagram, a data flow diagram, a structure diagram, or a block diagram. Although a flowchart may describe the operations as a sequential process, many of the operations can be performed in parallel or concurrently. In addition, the order of the operations may be re-arranged. A process is terminated when its operations are completed but could have additional steps not included in a figure.

[0040] The word “exemplary” and/or “demonstrative” is used herein to mean serving as an example, instance, or illustration. For the avoidance of doubt, the subject matter disclosed herein is not limited by such examples. In addition, any aspect or design described herein as “exemplary”

and/or "demonstrative" is not necessarily to be construed as preferred or advantageous over other aspects or designs, nor is it meant to preclude equivalent exemplary structures and techniques known to those of ordinary skill in the art. Furthermore, to the extent that the terms "includes," "has," "contains," and other similar words are used in either the detailed description or the claims, such terms are intended to be inclusive—in a manner similar to the term "comprising" as an open transition word—without precluding any additional or other elements.

[0041] As used herein, an "electronic device", or "portable electronic device", or "user device" or "communication device" or "user equipment" or "device" refers to any electrical, electronic, electromechanical, and computing device. The user device is capable of receiving and/or transmitting one or parameters, performing function/s, communicating with other user devices, and transmitting data to the other user devices. The user equipment may have a processor, a display, a memory, a battery, and an input-means such as a hard keypad and/or a soft keypad. The user equipment may be capable of operating on any radio access technology including but not limited to IP-enabled communication, Zig Bee, Bluetooth, Bluetooth Low Energy, Near Field Communication, Z-Wave, Wi-Fi, Wi-Fi direct, etc. For instance, the user equipment may include, but not limited to, a mobile phone, smartphone, virtual reality (VR) devices, augmented reality (AR) devices, laptop, a general-purpose computer, desktop, personal digital assistant, tablet computer, mainframe computer, or any other device as may be obvious to a person skilled in the art for implementation of the features of the present disclosure.

[0042] Further, the user device may also comprise a "processor" or "processing unit" includes processing unit, wherein processor refers to any logic circuitry for processing instructions. The processor may be a general-purpose processor, a special purpose processor, a conventional processor, a digital signal processor, a plurality of microprocessors, one or more microprocessors in association with a DSP core, a controller, a microcontroller, Application Specific Integrated Circuits, Field Programmable Gate Array circuits, any other type of integrated circuits, etc. The processor may perform signal coding data processing, input/output processing, and/or any other functionality that enables the working of the system according to the present disclosure. More specifically, the processor is a hardware processor.

[0043] As portable electronic devices and wireless technologies continue to improve and grow in popularity, the advancing wireless technologies for data transfer are also expected to evolve and replace the older generations of technologies. In the field of wireless data communications, the

dynamic advancement of various generations of cellular technology are also seen. The development, in this respect, has been incremental in the order of second generation (2G), third generation (3G), fourth generation (4G), and now fifth generation (5G), and more such generations are expected to continue in the forthcoming time.

[0044] Radio Access Technology (RAT) refers to the technology used by mobile devices/ user equipment (UE) to connect to a cellular network. It refers to the specific protocol and standards that govern the way devices communicate with base stations, which are responsible for providing the wireless connection. Further, each RAT has its own set of protocols and standards for communication, which define the frequency bands, modulation techniques, and other parameters used for transmitting and receiving data. Examples of RATs include GSM (Global System for Mobile Communications), CDMA (Code Division Multiple Access), UMTS (Universal Mobile Telecommunications System), LTE (Long-Term Evolution), and 5G. The choice of RAT depends on a variety of factors, including the network infrastructure, the available spectrum, and the mobile device's/device's capabilities. Mobile devices often support multiple RATs, allowing them to connect to different types of networks and provide optimal performance based on the available network resources.

[0045] A Fulfilment management system supports translation of any kind of incoming request from a northbound interface to plurality of outgoing predefined sequence of calls from application program interface (API) to southbound API. The fulfilment management system can take a single request containing superset of all attributes (of all the southbound APIs) and then execute the sequence of southbound API calls (workflow) and provides final response after completion of APIs. Fulfilment management system processes which are configured to run any process supports sequential, parallel, conditional and loop workflow pattern.

[0046] The fulfilment management system (FMS) is a robust and flexible solution for managing complex inter-system communications, translating requests into actionable tasks, and ensuring efficient execution of these tasks based on predefined workflows. The FMS orchestrates and manages requests and responses between different systems or interfaces. The key functions performed by the FMS may include:

[0047] Translation of Requests: The FMS accepts any incoming request from a northbound interface. This request can then be translated into multiple outgoing API calls to one or more southbound interfaces.

[0048] Superset of Attributes: The system can manage a single request that contains a superset of all attributes of all the southbound APIs. This enables it to understand and manage complex requests that might cover multiple aspects of the system's functions.

[0049] Sequential Execution of API Calls: After translating the incoming request, the FMS can execute a sequence of API calls to the southbound interfaces. The sequence and number of these calls (n) can vary based on the requirements of the incoming request.

[0050] Response Generation: The FMS provides milestone or final responses after the completion of the individual or all API calls. This ensures the northbound interface is kept informed of the progress and outcomes of its requests.

[0051] Workflow Pattern Support: The FMS is designed to support various workflow patterns. This includes sequential execution (one step after another), parallel execution (multiple steps at the same time), conditional execution (based on certain conditions), and loop execution (repeated steps). The choice of pattern depends on the specific needs of the process or request being managed.

[0052] An application programming interface (API) is a set of protocols, rules, and tools that specifies how software components should interact and communicate with each other. The APIs are used in all kinds of digital environments such as Web APIs, for example, HTTP APIs or REST APIs; Operating System APIs define how different software applications interact with the operating system. For example, if a software program needs to display a window on your screen, it uses an API provided by the operating system to do so. For example, if an application needs to retrieve some data from a database, it uses a database API to send a query to the database and receive the results. In the context of the Fulfilment Management System, APIs would be used to send requests between different systems or interfaces (northbound and southbound interfaces), allowing them to communicate and share data.

[0053] As discussed in the background section, Traditional FMS workflows are often static and predefined, making them inflexible to changes in the network environment or business

requirements. Designing workflows typically requires manual effort from developers or engineers to define the sequence of APIs, their parameters, and the associated logic. This process is time-consuming and prone to human error. Integrating new APIs or changing existing ones in a workflow can be challenging in traditional systems due to the static nature of the workflows. In conventional systems, retrieving relevant data metrics for different network nodes can be cumbersome and may require separate queries or manual data extraction. Managing the states of a workflow, such as request schema, attributes, endpoints, and mappings, can be complex and error-prone in traditional systems.

[0054] To overcome these and other inherent problems in the art, the present disclosure proposes a solution of a method and system for dynamic workflow creation in a fulfilment management system (FMS) that leverages a combination of triggers, such as images or flowcharts, and a trained model to automate and adapt workflows based on the needs of different network nodes. This approach addresses the rigidity of traditional workflows by allowing for dynamic adjustments to the workflow as the inputs change, thereby enhancing the system's flexibility and responsiveness to varying requirements. Furthermore, the proposed solution automates the process of designing workflows by extracting the sequence of APIs from the provided triggers and generating the workflow dynamically using the trained model. This reduces the reliance on manual efforts, thereby decreasing the likelihood of errors and increasing efficiency. The automation extends to the integration and modification of APIs, as updates to the trigger automatically result in corresponding changes in the generated dynamic workflow, simplifying the process of incorporating new APIs or altering existing ones. In addition, the solution streamlines the retrieval of relevant data metrics for different network nodes by automatically fetching this information based on the generated dynamic workflow. This eliminates the need for separate queries or manual data extraction, leading to a more efficient approach to data management. Finally, the proposed method and system facilitate the automatic creation and association of states within the workflow, such as request schema, attributes, endpoints, and mappings. This enhances the accuracy and reliability of the workflow management process, addressing the complexity and error-proneness associated with state management in traditional systems.

[0055] Hereinafter, exemplary embodiments of the present disclosure will be described with reference to the accompanying drawings.

[0056] FIG. 1A illustrates an exemplary block diagram representation of 5th generation core (5GC) network architecture [100], in accordance with exemplary embodiment of the present disclosure. As shown in FIG. 1, the 5GC network architecture [100] includes a user equipment (UE) [102], a radio access network (RAN) [104], a plurality if network functions or network entities such as, an access and mobility management function (AMF) [106], a Session Management Function (SMF) unit [108], a Service Communication Proxy (SCP) [110], an Authentication Server Function (AUSF) [112], a Network Slice Specific Authentication and Authorization Function (NSSAAF) [114], a Network Slice Selection Function (NSSF) [116], a Network Exposure Function (NEF) [118], a Network Repository Function (NRF) [120], a Policy Control Function (PCF) [122], a Unified Data Management (UDM) [124], an application function (AF) [126], a User Plane Function (UPF) [128], a data network (DN) [130], wherein all the components are assumed to be connected to each other in a manner as obvious to the person skilled in the art for implementing features of the present disclosure.

[0057] The User Equipment (UE) [102] interfaces with the network via the Radio Access Network (RAN) [104]; the Access and Mobility Management Function (AMF) [106] manages connectivity and mobility, while the Session Management Function (SMF) unit [108] administers session control; the service communication proxy (SCP) [110] routes and manages communication between network services, enhancing efficiency and security, and the Authentication Server Function (AUSF) [112] handles user authentication; the NSSAAF [114] for integrating the 5G core network with existing 4G LTE networks i.e., to enable Non-Standalone (NSA) 5G deployments, the Network Slice Selection Function (NSSF) [116], Network Exposure Function (NEF) [118], and Network Repository Function (NRF) [120] enable network customization, secure interfacing with external applications, and maintain network function registries respectively; the Policy Control Function (PCF) [122] develops operational policies, and the Unified Data Management (UDM) [124] manages subscriber data; the Application Function (AF) [126] enables application interaction, the User Plane Function (UPF) [128] processes and forwards user data, and the Data Network (DN) [130] connects to external internet resources; collectively, these components are designed to enhance mobile broadband, ensure low-latency communication, and support massive machine-type communication, solidifying the 5GC as the infrastructure for next-generation mobile networks.

[0058] Radio Access Network (RAN) [104] is the part of a mobile telecommunications system that connects user equipment (UE) [102] to the core network (CN) and provides access to different

types of networks (e.g., 5G network). It consists of radio base stations and the radio access technologies that enable wireless communication.

[0059] Access and Mobility Management Function (AMF) [106] (alternatively referred to as AMF unit [106]) is a 5G core network function responsible for managing access and mobility aspects, such as UE registration, connection, and reachability. It also manages mobility management procedures like handovers and paging.

[0060] Session Management Function (SMF) [108] is a 5G core network function responsible for managing session-related aspects, such as establishing, modifying, and releasing sessions. It coordinates with the User Plane Function (UPF) for data forwarding and manages IP address allocation and QoS enforcement.

[0061] Service Communication Proxy (SCP) [110] is a network function in the 5G core network that facilitates communication between other network functions by providing a secure and efficient messaging service. It acts as a mediator for service-based interfaces.

[0062] Authentication Server Function (AUSF) [112] is a network function in the 5G core responsible for authenticating UEs during registration and providing security services. It generates and verifies authentication vectors and tokens.

[0063] Network Slice Specific Authentication and Authorization Function (NSSAAF) [114] is a network function that provides authentication and authorization services specific to network slices. It ensures that UEs can access only the slices for which they are authorized.

[0064] Network Slice Selection Function (NSSF) [116] is a network function responsible for selecting the appropriate network slice for a UE based on factors such as subscription, requested services, and network policies.

[0065] Network Exposure Function (NEF) [118] is a network function that exposes capabilities and services of the 5G network to external applications, enabling integration with third-party services and applications.

[0066] Network Repository Function (NRF) [120] is a network function that acts as a central repository for information about available network functions and services. It facilitates the discovery and dynamic registration of network functions.

[0067] Policy Control Function (PCF) [122] is a network function responsible for policy control decisions, such as QoS, charging, and access control, based on subscriber information and network policies.

[0068] Unified Data Management (UDM) [124] is a network function that centralizes the management of subscriber data, including authentication, authorization, and subscription information.

[0069] Application Function (AF) [126] is a network function that represents external applications interfacing with the 5G core network to access network capabilities and services.

[0070] User Plane Function (UPF) [128] is a network function responsible for handling user data traffic, including packet routing, forwarding, and QoS enforcement.

[0071] Data Network (DN) [130] refers to a network that provides data services to user equipment (UE) in a telecommunications system. The data services may include but are not limited to Internet services, private data network related services.

[0072] FIG. 1B illustrates an exemplary block diagram of a system [101] for dynamic workflow creation in a fulfilment management system (FMS), in accordance with exemplary embodiments of the present disclosure. As shown in FIG. 1B, the system [101] includes a receiving unit [103], an extraction unit [105], a workflow generation unit [107], and a retrieving unit [109], wherein all the components are assumed to be connected to each other in a manner as obvious to the person skilled in the art for implementing features of the present disclosure. Also, in FIG. 1 only a few units are shown, however, the system [101] may comprise multiple such units or the system [101] may comprise any such numbers of said units, as required to implement the features of the present disclosure.

[0073] The system [101] for dynamic workflow creation in a fulfilment management system (FMS) is shown in FIG. 1B. The dynamic workflow refers to a flexible and adaptable sequence of

tasks or processes that can be automatically generated and modified in response to specific inputs or conditions. Unlike static workflows, which are predefined and unchangeable, dynamic workflows adjust and optimize based on real-time data, user inputs, or changing requirements. For example, in a fulfilment management system, a user might upload a flowchart depicting a series of steps for processing an order. The system analyses this input and dynamically generates a workflow that includes tasks such as inventory check, payment processing, packaging, and shipping. Also, API signatures change based on data metric information retrieved. For instance, if the earlier network node is busy (obtained from data metrics), then another instance of that network node is selected, resulting in changes in API signatures. This adaptability ensures that the workflow can reroute tasks to available nodes, maintaining efficiency and continuity. This dynamic effect allows the workflow to remain efficient and relevant to the current context, enhancing productivity and accuracy.

[0074] The system [101] comprises the receiving unit [103]. The receiving unit [103] is configured to receive a trigger, wherein the trigger corresponds to at least one of an image or a flow chart or a voice or a video representing a sequence of application programming interfaces (APIs). The trigger facilitates in initiating the dynamic workflow creation process within the system. The trigger can be an image, such as a diagram or photograph, or a flow chart that visually depicts the sequence of APIs involved in a particular workflow. The ability of the receiving unit [103] to accept triggers in these formats allows for a more intuitive and user-friendly way for users to input the desired sequence of APIs. Once the trigger is received, it is passed on to other components of the system for further processing, including the extraction of the API sequence, generation of the dynamic workflow, and retrieval of data metrics based on the generated workflow. This process facilitates the automation and customization of workflows in the fulfilment management system (FMS), addressing the limitations of traditional static workflows.

[0075] The system [101] comprises the extraction unit [105] communicatively coupled to the receiving unit [103]. The extraction unit [105] is configured to extract the sequence of APIs that corresponds to one or more network nodes based on the received trigger. Once the receiving unit [103] receives the trigger, which could be in the form of an image, a flow chart, a voice command, or a video representing a sequence of APIs, this information is forwarded to the extraction unit [105].

[0076] The extraction unit [105] then processes the trigger to identify and extract the specific sequence of APIs depicted in the trigger. The extraction involves using image processing or video processing techniques to identify the one or more network nodes and requests within the trigger input. For example, if a user uploads a flowchart, the extraction unit [105] analyses the visual elements of the flowchart to identify nodes such as inventory, PCF [122], and UDM [124], as well as specific requests like "Find free number." Examples of the one or more network nodes includes, but not limited only to PCF [122], SMF 108, UDM [124], and other network nodes of the network architecture as disclosed in FIG. 1A.

[0077] The extraction unit [105] processes the trigger to map the identified one or more nodes and requests to the sequence API calls. The sequence of API calls is then sequenced to create a dynamic workflow. For instance, in a flowchart illustrating network operations, the extraction unit [105] would recognize each visual element representing a node or a request, extract the corresponding API calls, and determine their sequence. For voice commands, NLP techniques transcribe the spoken words into text and analyse the text to identify the sequence of API calls and corresponding network nodes. Video inputs are processed by breaking down the video into frames and analysing each frame to identify key elements that represent API calls and their sequence.

[0078] The sequence defines the order and nature of the APIs that need to be executed for a particular process or task within the fulfilment management system (FMS). The extraction process facilitates in automating and customizing workflows in the FMS, allowing for greater flexibility and efficiency in workflow management. For example, a user uploads a video demonstrating a workflow with various API interactions between network nodes. The extraction unit [105] employs advanced video processing algorithms to analyse the video content, identifying frames that represent distinct API calls and the associated nodes. By recognizing patterns and sequences within the video, the extraction unit [105] determines the order and parameters of the API calls. The extracted sequence is then used to create a dynamic workflow, ensuring that the correct API calls are made to the appropriate network nodes in the specified order.

[0079] The system [101] comprises the workflow generation unit [107] communicatively coupled to the extraction unit [105]. The workflow generation unit [107] is configured to generate, using one or more trained models, a dynamic workflow based on the extracted sequence of APIs. Once the extraction unit [105] has identified and extracted the sequence of APIs from the received

trigger, this sequence is passed on to the workflow generation unit [107]. Here, a trained model is employed to transform the extracted sequence of APIs into a dynamic workflow.

[0080] The one or more trained models comprise at least one of a Convolutional Neural Network (CNN) for image processing, a Transformer-based model such as BERT (Bidirectional Encoder Representations from Transformers) for Natural Language Processing (NLP), and a Recurrent Neural Network (RNN) model such as Long Short-Term Memory (LSTM) for video processing. The CNN is trained on a dataset of flowchart images annotated with corresponding API calls and network nodes, enabling it to identify nodes such as inventory, PCF, and UDM within new flowchart images. The Transformer-based model is trained on a dataset of voice commands and textual descriptions of workflows paired with correct API sequences, allowing it to transcribe and interpret spoken instructions to extract relevant API calls and their sequence. The RNN model is trained on videos demonstrating various workflows, with each frame annotated with corresponding API interactions, enabling it to analyse the sequence of frames to identify key elements and the order of API calls for generating a dynamic workflow from video inputs. The trained model is trained on a dataset comprising various interfaces and corresponding API signatures, incorporating techniques from Natural Language Processing, for example, Vector DB, retrieval augmented generation (RAG).

[0081] The signatures correspond to information relates to the API, including details such as API credentials, parameters, attributes, request schema, response schema, terms of use, error messages, endpoints, and data models. Each network node is associated with different API documentation or signatures. Consequently, the model is trained on the comprehensive information to accurately understand and generate the necessary API sequences for various network nodes. For example, an API for accessing user data might have documentation specifying the required authentication credentials, input parameters like user ID, attributes such as username and email, the format of the request and response, usage terms, error messages, and the endpoint URL. Each network node is associated with different API documentation or signatures. Consequently, the model is trained on this comprehensive information to accurately understand and generate the necessary API sequences for various network nodes. For instance, a network node handling inventory management will have distinct API signatures detailing how to query, update, and manage inventory data, while another node for user authentication will have APIs focused on login, token generation, and session management.

[0082] The dynamic workflow generated by the workflow generation unit [107] is configured for specific sequence of APIs and is configured to be adaptable, allowing for changes in the workflow as the requirements of the FMS evolve. The ability to generate dynamic workflows based on different sequences of APIs is a key feature of the system, providing flexibility and efficiency in workflow management that addresses the limitations of traditional static workflows.

[0083] The system [101] comprises the retrieving unit [109] communicatively coupled to the workflow generation unit [107]. The retrieving unit [109] is configured to retrieve one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes. After the workflow generation unit [107] has created the dynamic workflow using the extracted sequence of APIs, the retrieving unit [109] fetches relevant data metrics that are necessary for the execution of the workflow. The data metrics could include information such as network performance, resource availability, or other node-specific parameters for the proper functioning of the workflow. The storage unit, from which the data metrics are retrieved, serves as a repository for all such data, ensuring that the retrieving unit [109] has access to the most up-to-date information. By associating these data metrics with the respective network nodes involved in the workflow, the system [101] ensures that each node can operate optimally, based on its current state and available resources. The capability of retrieving relevant data metrics dynamically based on the workflow requirements enhances the efficiency and adaptability of the FMS, addressing some of the key challenges in traditional workflow management systems.

[0084] Referring to FIG. 2 an exemplary method flow diagram [200], for dynamic workflow creation in accordance with exemplary embodiments of the present invention is shown. In an implementation the method [200] is performed by the system [101]. As shown in Figure 2, the method [200] starts at step [202].

[0085] At [204], the method flow [200] as disclosed by the present disclosure comprises receiving, by a receiving unit [103], a trigger, wherein the trigger corresponds to any or a combination of an image or a flow chart representing a sequence of application programming interfaces (APIs). The trigger is received as an uploaded image or flow chart created on a page or a whiteboard by the user. In a preferred implementation, the trigger may be received at a user device, but the disclosure is not limited thereto. For instance, a user may create the flow chart on a sheet of paper and upload

on the user device. Furthermore, the method comprises performing, by the receiving unit [103], image processing to the received trigger.

[0086] The trigger facilitates in initiating the dynamic workflow creation process within the system. The trigger can be an image, such as a diagram or photograph, or a flow chart that visually depicts the sequence of APIs involved in a particular workflow. The ability of the receiving unit [103] to accept triggers in these formats allows for a more intuitive and user-friendly way for users to input the desired sequence of APIs. Once the trigger is received, it is passed on to other components of the system for further processing, including the extraction of the API sequence, generation of the dynamic workflow, and retrieval of data metrics based on the generated workflow. This process facilitates the automation and customization of workflows in the fulfilment management system (FMS), addressing the limitations of traditional static workflows.

[0087] Next at step [206], the method comprising extracting, by an extraction unit [105], the sequence of APIs that corresponds to one or more network nodes based on the received trigger. The sequence of APIs includes a series of API signatures, each signature of the series of API signature comprises at least one of parameters, data types, and return values that define a specific function or method associated with an API.

[0088] The signatures correspond to information relates to the API, including details such as API credentials, parameters, attributes, request schema, response schema, terms of use, error messages, endpoints, and data models. Each network node is associated with different API documentation or signatures. Consequently, the model is trained on the comprehensive information to accurately understand and generate the necessary API sequences for various network nodes. For example, an API for accessing user data might have documentation specifying the required authentication credentials, input parameters like user ID, attributes such as username and email, the format of the request and response, usage terms, error messages, and the endpoint URL. Each network node is associated with different API documentation or signatures. Consequently, the model is trained on this comprehensive information to accurately understand and generate the necessary API sequences for various network nodes. For instance, a network node handling inventory management will have distinct API signatures detailing how to query, update, and manage inventory data, while another node for user authentication will have APIs focused on login, token generation, and session management.

[0089] Now, the sequence of APIs may be captured from the received trigger at the receiving unit [103]. Once the receiving unit [103] receives the trigger, which could be in the form of an image or a flow chart representing a sequence of APIs, this information is forwarded to the extraction unit [105]. The extraction unit [105] then processes this trigger to identify and extract the specific sequence of APIs depicted in the trigger. The sequence defines the order and nature of the APIs that need to be executed for a particular process or task within the fulfilment management system (FMS). The extraction process facilitates in automating and customizing workflows in the FMS, allowing for greater flexibility and efficiency in workflow management.

[0090] Further, at step [208] the method encompasses generating, by a workflow generation unit [107] using a trained model, a dynamic workflow based on the extracted sequence of APIs. The trained model is trained based on a dataset comprising a plurality of interfaces and their corresponding API signatures. The trained model is trained further based on Natural Language Processing and image processing techniques. Once the extraction unit [105] has identified and extracted the sequence of APIs from the received trigger, this sequence is passed on to the workflow generation unit [107]. Here, a trained model is employed to transform the extracted sequence of APIs into a dynamic workflow. The trained model is trained on a dataset comprising various interfaces and corresponding API signatures, incorporating techniques from Natural Language Processing and/or image processing. The dynamic workflow generated by the workflow generation unit [107] is configured for specific sequence of APIs and is configured to be adaptable, allowing for changes in the workflow as the requirements of the FMS evolve. The ability to generate dynamic workflows based on different sequences of APIs is a key feature of the system, providing flexibility and efficiency in workflow management that addresses the limitations of traditional static workflows.

[0091] In an implementation, the dynamic workflow may utilise AI/ML techniques to train on a plurality of interfaces and also their corresponding API signatures. In a preferred implementation, generating automatically generate a dynamic workflow based on Natural Language Processing and/or image processing techniques but the present disclosure is not limited thereto. Continuing with the above example, the uploaded image on the user device may be processed using image processing techniques for automatically generating a dynamic workflow.

[0092] In an implementation, the method flow comprises creating a set of states further comprising a request/response schema, a set of attributes, a plurality of end points and a plurality of mappings.

Furthermore, automatically stitching the set of states and subsequently, automatically generating dynamic workflow.

[0093] For example, the method flow involves creating a set of states, each comprising a request/response schema, a set of attributes, a plurality of endpoints, and a plurality of mappings. For example, consider a fulfilment management system designed to automate the processing of online orders. The method would create several states to manage different stages of the order process.

[0094] One state might be the "Check Inventory State." In this state, the request/response schema includes a request with the item ID and quantity, and the response provides the availability status. The attributes associated with this state could include the item ID, quantity, and warehouse location. The endpoints would involve the inventory service URL, and the mappings would connect the request details to the inventory database fields and map the response to an availability status.

[0095] Another state could be the "Process Payment State." Here, the request/response schema involves sending payment details in the request and receiving the transaction status in the response. Attributes might include the credit card number, expiration date, and amount. The endpoints would point to the payment gateway URL, with mappings that link the payment details in the request to the payment gateway fields and map the response to the transaction status.

[0096] A third state might be the "Package Item State" In this state, the request/response schema includes order details in the request and packaging status in the response. Attributes could encompass the order ID, item list, and packaging instructions. The endpoints would refer to the packaging service URL, with mappings that connect the order details in the request to the packaging system fields and map the response to a packaging status.

[0097] Finally, there could be a "Ship Order State." In this state, the request/response schema involves shipment details in the request and a tracking number in the response. Attributes might include the order ID, destination address, and shipping method. The endpoints would point to the shipping service URL, with mappings that link the shipment details in the request to the shipping service fields and map the response to the tracking number.

[0098] Furthermore, the fulfilment management system automatically stitches these states together to form a coherent sequence and subsequently generates a dynamic workflow. For example, the system links the "Check Inventory" state to the "Process Payment" state, then to the "Package Item" state, and finally to the "Ship Order" state. It would be appreciated by the person skilled in the art that the automatic stitching facilitates that the workflow executes in the correct order. If the "Check Inventory" state indicates an item is out of stock, the dynamic workflow can adjust by including a state to "Notify Customer" or "Reorder Item," demonstrating the flexibility and adaptability of the dynamic workflow. Further, the proposed technique minimizes manual effort, streamlines the integration process, and ensures that the workflow remains efficient and relevant to the current context.

[0099] Thereafter, the method [200] comprises at step [210] retrieving, by a retrieving unit [109], one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes. After the workflow generation unit [107] has created a dynamic workflow using the extracted sequence of APIs, the retrieving unit [109] fetches relevant data metrics that are necessary for the execution of the workflow. The data metrics could include information such as network performance, resource availability, or other node-specific parameters for the proper functioning of the workflow. The storage unit, from which the data metrics are retrieved, serves as a repository for all such data, ensuring that the retrieving unit [109] has access to the most up-to-date information. By associating these data metrics with the respective network nodes involved in the workflow, the system [101] ensures that each node can operate optimally, based on its current state and available resources. The capability of retrieving relevant data metrics dynamically based on the workflow requirements enhances the efficiency and adaptability of the FMS, addressing some of the key challenges in traditional workflow management systems. The data metrics corresponds to information associated with the one or more network nodes, segregation of an API based on application, schema associated with request or response, and one or more attributes associated with the schema associated with request or response. The one or more data metrics comprises a repository of data associated with the one or more network nodes. Further, the data may be associated with API segregation that may comprise a request/response schema encompassing a set of attribute details.

[00100] Segregation of the API is based on application refers to organizing and categorizing APIs according to their specific functions and use cases within different applications. For example, when the system receives a trigger in the form of a flowchart or image, it employs AI/ML

techniques to interpret the sequence of APIs. These APIs are then segregated based on their application. For instance, APIs related to number management might include functions for querying available numbers and updating their status. APIs for network provisioning might include configuring the Policy Control Function (PCF) and the Unified Data Manager (UDM). When generating a dynamic workflow, the system ensures that the APIs are grouped and utilized according to their specific applications, such as number management or network provisioning, thereby optimizing the workflow for efficiency and accuracy. This segregation allows the system to automatically associate the appropriate set of states for each application, ensuring that the generated workflow aligns with the distinct functional requirements of each API category.

[00101] The method terminates at step [212].

[00102] FIG. 3A illustrates an exemplary workflow [300a] created by fulfilment management service (FMS), in accordance with exemplary embodiments of the present disclosure.

[00103] At [302], an image, video, or voice corresponding to a sequence of application programming interfaces (APIs) is uploaded. This uploaded media acts as a trigger for the workflow generation process within the Fulfilment Management System (FMS).

[00104] At [304], the sequence of APIs, corresponding to one or more network nodes, is extracted based on the received trigger. AI/ML-based techniques are then employed to interpret the trigger and generate a dynamic workflow based on the extracted sequence of APIs. These techniques involve analysing the uploaded media to understand the structure and interactions of the APIs visually or audibly represented.

[00105] At [306], one or more data metrics are retrieved from a storage unit based on the generated dynamic workflow. The one or more data metrics provide essential information associated with the one or more network nodes (include Network Node 1, Network Node 2, Network Node 3, and Network Node 4) disclosed at [308].

[00106] FIG. 3B illustrates an exemplary workflow created by a fulfilment management service (FMS), in accordance with exemplary embodiments of the present disclosure.

[00107] The process starts when the user provides workflow [300b] as a trigger in the form of a flowchart or image. The trigger is received by the system's receiving unit, which can interpret inputs such as voice, video, or images that represent a sequence of APIs.

[00108] Upon receiving the trigger, the extraction unit processes the flowchart to extract the sequence of APIs associated with different network nodes. Each step in the flowchart corresponds to specific API calls. For example, "Step 1: Find free number inventory" involves an API call to query the database for available numbers, while "Step 2: Update number status inventory" involves another API call to change the status of the selected number to reserved.

[00109] The workflow generation unit then utilizes one or more trained models, which have been trained on datasets comprising various interfaces and their corresponding API signatures. These models are further refined using Natural Language Processing (NLP) and image processing techniques to accurately interpret the details of the flowchart. Based on the extracted sequence of APIs, the workflow generation unit creates a dynamic workflow that automates the outlined steps.

[00110] Once the dynamic workflow is generated, the retrieving unit accesses relevant data metrics from a storage unit. These metrics are associated with the network nodes involved in the workflow. For example, during "Step 3: Create provisioning PCF" and "Step 4: Create provisioning UDM," the system retrieves necessary configuration data for the Policy Control Function (PCF) and User Data Management (UDM) systems, respectively. This ensures that all provisioning steps are correctly executed based on the predefined API signatures.

[00111] Each step in the flowchart comprises specific API signatures that define parameters, data types, and return values. These signatures ensure that each API call performs its intended function, such as querying databases, updating statuses, or provisioning network functions. The system also creates a set of states that include request schemas, attributes, endpoints, and mappings, which are automatically associated by the workflow generation unit to form a coherent and executable workflow.

[00112] FIG. 4 illustrates an exemplary block diagram of a computing device [400] (also referred to herein as a computer system [400]) upon which an embodiment of the present disclosure may be implemented. In an implementation, the computing device implements the method for dynamic workflow creation in the FMS using the system [101]. In another implementation, the computing

device itself implements the method for dynamic workflow creation in the FMS by using one or more units configured within the computing device, wherein said one or more units are capable of implementing the features as disclosed in the present disclosure.

[00113] The computing device [400] encompasses a wide range of electronic devices capable of processing data and performing computations. Examples of computing device [400] include, but are not limited only to, personal computers, laptops, tablets, smartphones, servers, and embedded systems. The devices may operate independently or as part of a network and can perform a variety of tasks such as data storage, retrieval, and analysis. Additionally, computing device [400] may include peripheral devices, such as monitors, keyboards, and printers, as well as integrated components within larger electronic systems, highlighting their versatility in various technological applications.

[00114] The computing device [400] may include a bus [402] or other communication mechanism for communicating information, and a processor [404] coupled with bus [402] for processing information. The processor [404] may be, for example, a general-purpose microprocessor. The computing device [400] may also include a main memory [406], such as a random-access memory (RAM), or other dynamic storage device, coupled to the bus [402] for storing information and instructions to be executed by the processor [404]. The main memory [406] also may be used for storing temporary variables or other intermediate information during execution of the instructions to be executed by the processor [404]. Such instructions, when stored in non-transitory storage media accessible to the processor [404], render the computing device [400] into a special-purpose machine that is customized to perform the operations specified in the instructions. The computing device [400] further includes a read only memory (ROM) [408] or other static storage device coupled to the bus [402] for storing static information and instructions for the processor [404].

[00115] A storage device [410], such as a magnetic disk, optical disk, or solid-state drive is provided and coupled to the bus [402] for storing information and instructions. The computing device [400] may be coupled via the bus [402] to a display [412], such as a cathode ray tube (CRT), for displaying information to a computer user. An input device [414], including alphanumeric and other keys, may be coupled to the bus [402] for communicating information and command selections to the processor [404]. Another type of user input device may be a cursor controller [416], such as a mouse, a trackball, or cursor direction keys, for communicating direction information and command selections to the processor [404], and for controlling cursor movement

on the display [412]. This input device typically has two degrees of freedom in two axes, a first axis (e.g., x) and a second axis (e.g., y), that allow the device to specify positions in a plane.

[00116] The computing device [400] may implement the techniques described herein using customized hard-wired logic, one or more ASICs or FPGAs, firmware, and/or program logic which in combination with the computing device [400] causes or programs the computing device [400] to be a special-purpose machine. According to one embodiment, the techniques herein are performed by the computing device [400] in response to the processor [404] executing one or more sequences of one or more instructions contained in the main memory [406]. Such instructions may be read into the main memory [406] from another storage medium, such as the storage device [410]. Execution of the sequences of instructions contained in the main memory [406] causes the processor [404] to perform the process steps described herein. In alternative embodiments, hard-wired circuitry may be used in place of or in combination with software instructions.

[00117] The computing device [400] also may include a communication interface [418] coupled to the bus [402]. The communication interface [418] provides a two-way data communication coupling to a network link [420] that is connected to a local network [422]. For example, the communication interface [418] may be an integrated services digital network (ISDN) card, cable modem, satellite modem, or a modem to provide a data communication connection to a corresponding type of telephone line. As another example, the communication interface [418] may be a local area network (LAN) card to provide a data communication connection to a compatible LAN. Wireless links may also be implemented. In any such implementation, the communication interface [418] sends and receives electrical, electromagnetic, or optical signals that carry digital data streams representing various types of information.

[00118] The computing device [400] can send messages and receive data, including program code, through the network(s), the network link [420] and the communication interface [418]. In the Internet example, a server [430] might transmit a requested code for an application program through the Internet [428], the Internet Service Provider (ISP) [426], the host [424] the local network [422] and the communication interface [418]. The received code may be executed by the processor [404] as it is received, and/or stored in the storage device [410], or other non-volatile storage for later execution.

[00119] FIG. 5 illustrates an exemplary block diagram of a user equipment (UE) [102] for dynamic creation of workflow in a fulfilment management system (FMS), in accordance with exemplary embodiments of the present disclosure. In an embodiment, the UE [102] comprises a processor [102A] and a memory [102B].

[00120] As illustrated, the processor [102A] is configured to transmit a trigger. The trigger is sent for dynamic workflow creation in a fulfilment management system (FMS). The trigger corresponds to at least one of an image or a voice or a video representing a sequence of application programming interfaces (APIs). Further, for dynamic workflow creation comprises: extracting the sequence of APIs that corresponds to one or more network nodes based on the trigger; generating, using one or more trained models, a dynamic workflow based on the extracted sequence of APIs; and retrieving one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

[00121] An aspect of the present disclosure provides a user equipment comprising a processor. The processor is configured to transmit a trigger for dynamic workflow creation in a fulfilment management system (FMS), wherein the trigger corresponds to at least one of a voice or a video representing a sequence of application programming interfaces (APIs) and wherein for dynamic workflow creation comprises: extracting the sequence of APIs that corresponds to one or more network nodes based on the trigger; generating, using one or more trained models, a dynamic workflow based on the extracted sequence of APIs; and retrieving one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

[00122] Yet another aspect of the present disclosure provides a non-transitory computer-readable storage medium storing instruction for dynamic workflow creation in a fulfilment management system (FMS), the storage medium comprising executable code which, when executed by one or more units of a system, causes: a receiving unit configured to receive a trigger, wherein the trigger corresponds to at least one of a voice or a video representing a sequence of application programming interfaces (APIs); an extraction unit configured to extract the sequence of APIs that corresponds to one or more network nodes based on the received trigger; a workflow generation unit configured to generate, using one or more trained models, a dynamic workflow based on the extracted sequence of APIs; and a retrieving unit configured to retrieve one or more data metrics

from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

[00123] Further, in accordance with the present disclosure, it is to be acknowledged that the functionality described for the various components/units can be implemented interchangeably. While specific embodiments may disclose a particular functionality of these units for clarity, it is recognized that various configurations and combinations thereof are within the scope of the disclosure. The functionality of specific units, as disclosed in the disclosure, should not be construed as limiting the scope of the present disclosure. Consequently, alternative arrangements and substitutions of units, provided they achieve the intended functionality described herein, are considered to be encompassed within the scope of the present disclosure.

[00124] As is evident from the above, the present disclosure provides a technically advanced solution for dynamic workflow creation in a fulfilment management system (FMS). The invention enables the generation of workflows based on user-provided flowcharts or images, utilizing AI and ML based trained model on existing interfaces and their API signatures. The method involves receiving a trigger in the form of a flowchart, extracting the sequence of APIs, generating a dynamic workflow, and retrieving data metrics associated with the workflow. Consequently, the need for extensive manual workflow design is minimized, and a generic framework is created to facilitate the seamless integration of new functionalities into existing systems by creating new services within existing flows. This approach significantly enhances efficiency and reduces the time required for system integration and workflow execution.

[00125] While considerable emphasis has been placed herein on the disclosed embodiments, it will be appreciated that many embodiments can be made and that many changes can be made to the embodiments without departing from the principles of the present disclosure. These and other changes in the embodiments of the present disclosure will be apparent to those skilled in the art, whereby it is to be understood that the foregoing descriptive matter to be implemented is illustrative and non-limiting.

We Claim:

1. A method for dynamic workflow creation, said method comprising:

receiving, by a receiving unit [103], a trigger, wherein the trigger corresponds to representing a sequence of application programming interfaces (APIs);

extracting, by an extraction unit [105], the sequence of APIs that corresponds to one or more network nodes based on the received trigger;

generating, by a workflow generation unit [107] using one or more trained models, a dynamic workflow based on the extracted sequence of APIs; and

retrieving, by a retrieving unit [109], one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

2. The method as claimed in claim 1, wherein the one or more data metrics corresponds to information associated with at least one of the one or more network nodes, segregation of an API based on application, schema associated with a request, and one or more attributes associated with the schema associated with the request.

3. The method as claimed in claim 1, wherein the sequence of APIs comprises a series of API signatures, each signature of the series of API signature comprises at least one of parameters, data types, and return values that define a specific function associated with an API.

4. The method as claimed in claim 1, wherein the one or more trained models are trained based on a dataset comprising a plurality of interfaces and corresponding API signatures.

5. The method as claimed in claim 4, wherein the one or more trained models comprises at least one of a Convolutional Neural Network (CNN) (Bidirectional Encoder Representations from Transformers) BERT, and a Recurrent Neural Network (RNN) model, and Long Short-Term Memory (LSTM).

6. The method as claimed in claim 1, wherein the trigger is received based on receipt of flowchart, image, voice, video from a user.

7. The method as claimed in claim 1, wherein the method comprises creating a set of states comprising a request schema, a set of attributes, a plurality of end points, and a plurality of mappings.

8. The method as claimed in claim 7, wherein the method comprises automatically associating, by the workflow generation unit [107], the set of states.

9. The method as claimed in claim 1, wherein the method comprises performing, by the workflow generation unit [107], at least one of image processing, video processing, voice processing on the received trigger.

10. A system for dynamic workflow creation, the system comprises:

a receiving unit [103] configured to receive a trigger, wherein the trigger corresponds to representing a sequence of application programming interfaces (APIs);

an extraction unit [105] configured to extract the sequence of APIs that corresponds to one or more network nodes based on the received trigger;

a workflow generation unit [107] configured to generate, using one or more trained models, a dynamic workflow based on the extracted sequence of APIs; and

a retrieving unit [109] configured to retrieve one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

11. The system as claimed in claim 10, wherein the one or more data metrics corresponds to information associated with the at least one of one or more network nodes, segregation of an API based on application, schema associated with a request, and one or more attributes associated with the schema associated with the request.

12. The system as claimed in claim 10, wherein the sequence of APIs comprises a series of API signatures, each signature of the series of API signatures comprises at least one of parameters, data types, and return values that define a specific function associated with an API.

13. The system as claimed in claim 10, wherein the one or more trained models are trained based on a dataset comprising a plurality of interfaces and corresponding API signatures.

14. The system as claimed in claim 13, wherein the one or more trained models comprises at least one of at least one of a Convolutional Neural Network (CNN) (Bidirectional Encoder

Representations from Transformers) BERT, and a Recurrent Neural Network (RNN) model, and Long Short-Term Memory (LSTM).

15. The system as claimed in claim 10, wherein the trigger is received based on receipt of flowchart, image, voice, video from a user.

16. The system as claimed in claim 10, wherein the workflow generation unit is further configured to create a set of states comprising a request schema, a set of attributes, a plurality of end points, and a plurality of mappings.

17. The system as claimed in claim 16, wherein the workflow generation unit [107] is further configured to automatically associate the set of states.

18. The system as claimed in claim 10, wherein the workflow generation unit [107] is further configured to perform at least one of image processing, video processing, and voice processing on the received trigger.

19. A user equipment [102] comprising:

a processor [102A] configured to:

transmit a trigger for dynamic workflow creation, wherein the trigger corresponds to representing a sequence of application programming interfaces (APIs) and wherein for dynamic workflow creation comprises:

extracting the sequence of APIs that corresponds to one or more network nodes based on the trigger;

generating, using one or more trained models, a dynamic workflow based on the extracted sequence of APIs; and

retrieving one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

20. A non-transitory computer-readable storage medium storing instruction for dynamic workflow creation, the storage medium comprising executable code which, when executed by one or more units of a system, causes:

a receiving unit [103] to receive a trigger, wherein the trigger corresponds representing a sequence of application programming interfaces (APIs);

an extraction unit [105] to extract the sequence of APIs that corresponds to one or more network nodes based on the received trigger;

a workflow generation unit [107] to generate, using one or more trained models, a dynamic workflow based on the extracted sequence of APIs; and

a retrieving unit [109] to retrieve one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes.

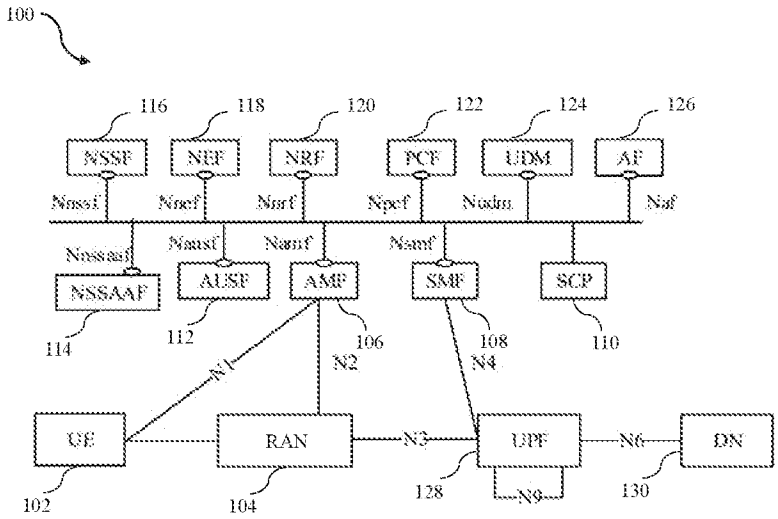

100
116
118
120
122
124
126
NSSF
NEF
NRF
PCF
UDM
AF
Nnssf
Nnef
Nnrf
Npcf
Nudm
Naf
Nnssaaf
Nausf
Namf
Nsmf
NSSAAF
AUSF
AMF
SMF
SCP
114
112
106
108
110
N1
N2
N4
UE
RAN
N3
UPF
N6
DN
102
104
128
N9
130

FIG. 1A

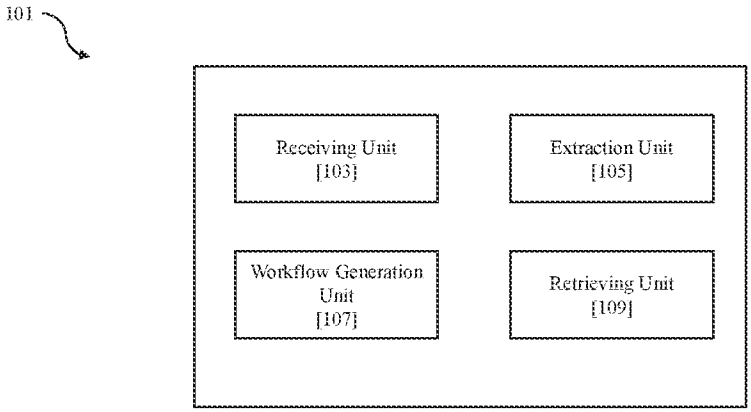

101
Receiving Unit
[103]
Extraction Unit
[105]
Workflow Generation
Unit
[107]
Retrieving Unit
[109]

FIG. 1B

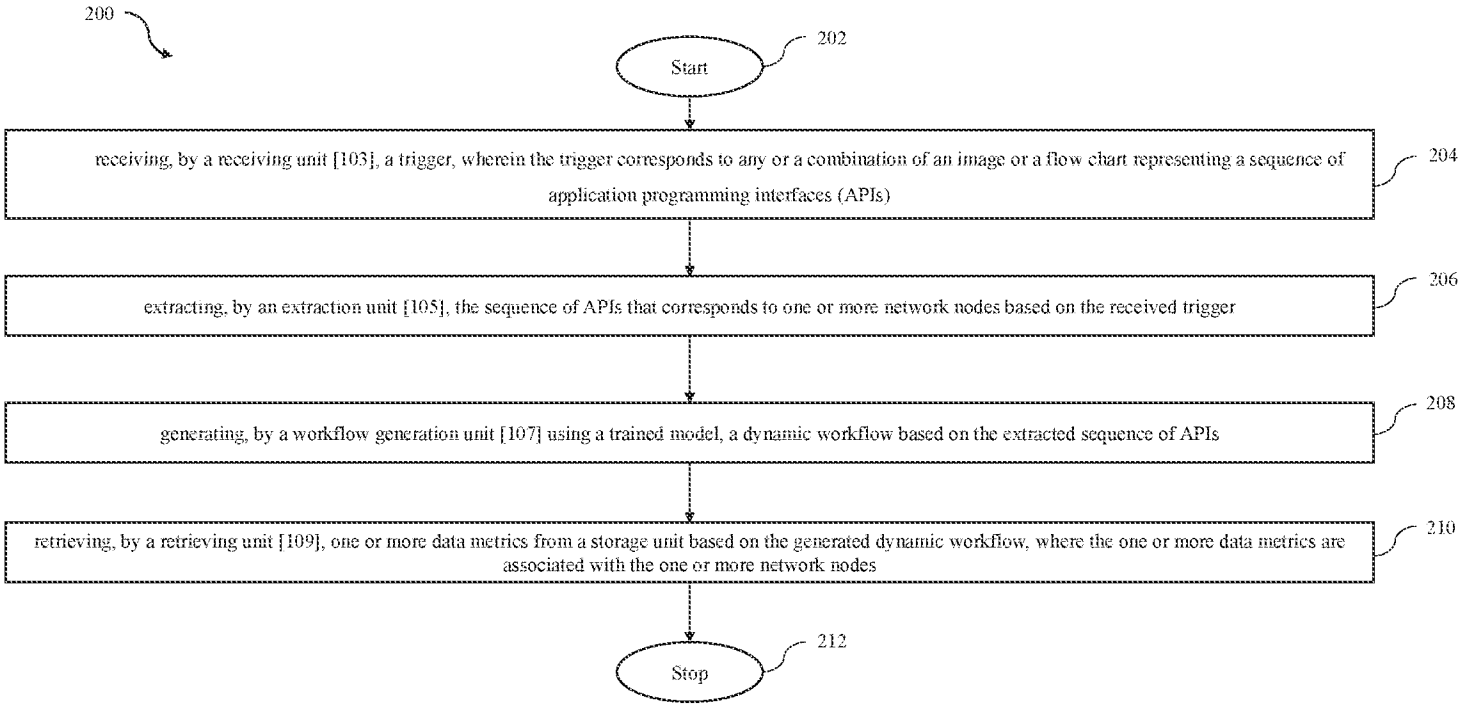

200
Start
202
receiving, by a receiving unit [103], a trigger, wherein the trigger corresponds to any or a combination of an image or a flow chart representing a sequence of application programming interfaces (APIs)
204
extracting, by an extraction unit [105], the sequence of APIs that corresponds to one or more network nodes based on the received trigger
206
generating, by a workflow generation unit [107] using a trained model, a dynamic workflow based on the extracted sequence of APIs
208
retrieving, by a retrieving unit [109], one or more data metrics from a storage unit based on the generated dynamic workflow, where the one or more data metrics are associated with the one or more network nodes
210
Stop
212

FIG. 2

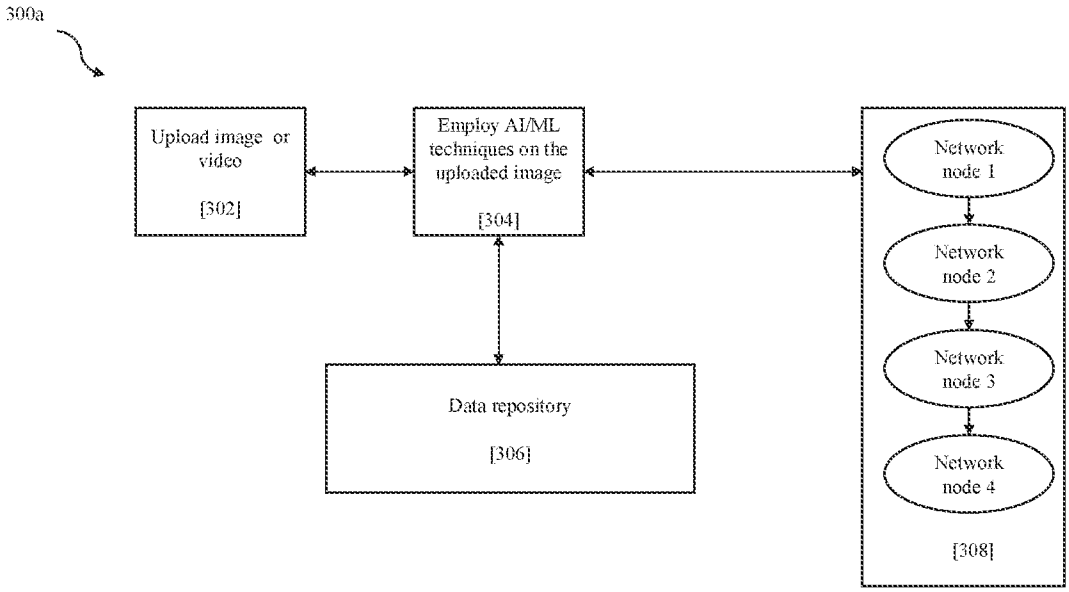

300a
Upload image or video
[302]
Employ AI/ML techniques on the uploaded image
[304]
Data repository
[306]
Network node 1
Network node 2
Network node 3
Network node 4
[308]

FIG. 3A

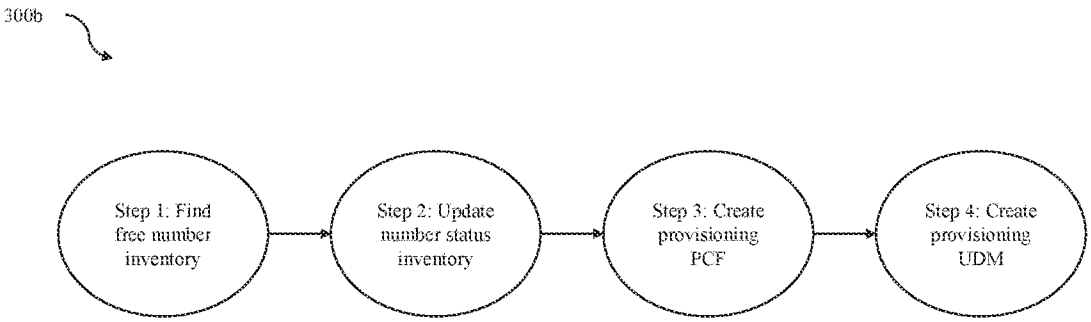

300b
Step 1: Find free number inventory
Step 2: Update number status inventory
Step 3: Create provisioning PCF
Step 4: Create provisioning UDM

FIG. 3B

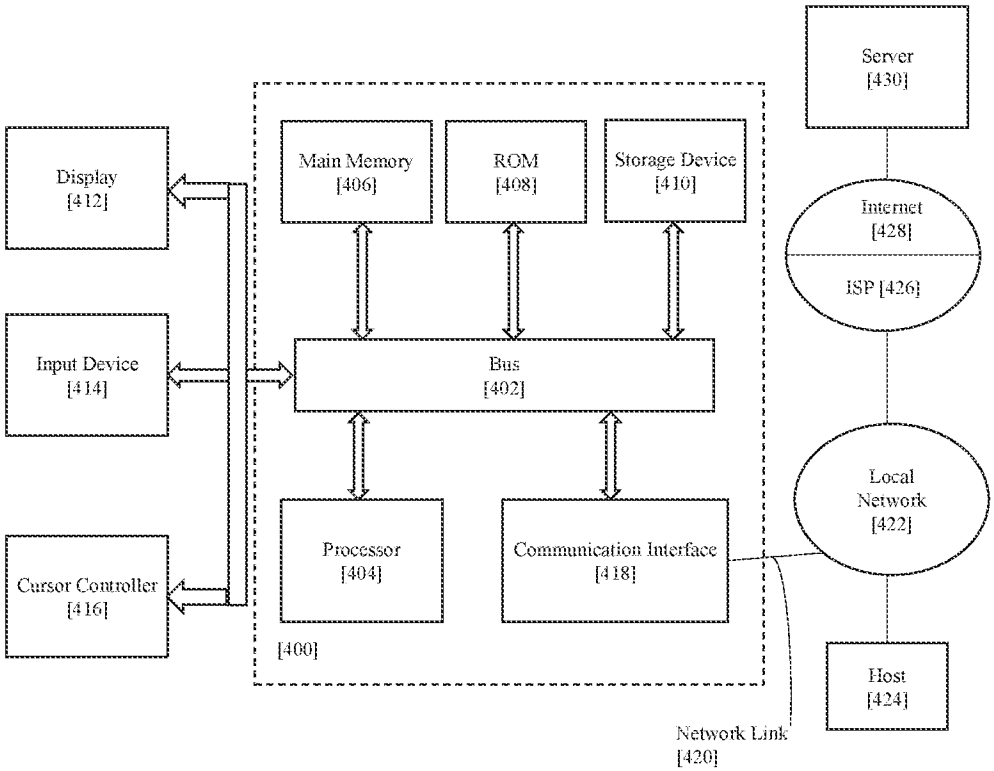

Server
[430]
Main Memory
[406]
ROM
[408]
Storage Device
[410]
Display
[412]
Internet
[428]
ISP [426]
Input Device
[414]
Bus
[402]
Local
Network
[422]
Processor
[404]
Communication Interface
[418]
Cursor Controller
[416]
[400]
Host
[424]
Network Link
[420]

FIG. 4

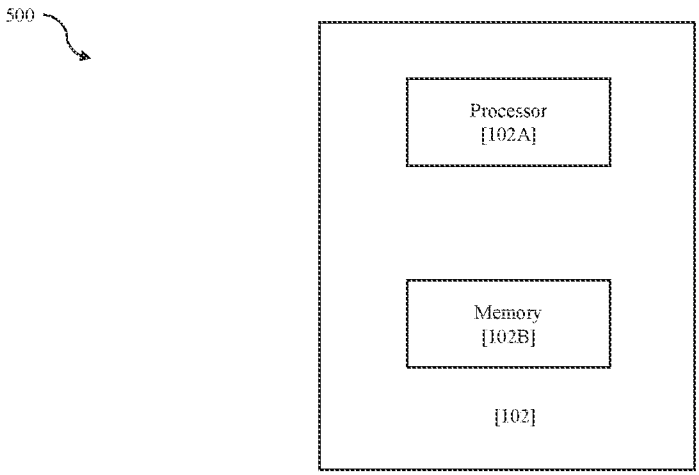


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2024/050911

A. CLASSIFICATION OF SUBJECT MATTER
G06Q10/0633,G06F9/54,H04L67/02 Version=2024.01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

G06Q, G06F, H04L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic database consulted during the international search (name of database and, where practicable, search terms used)

PatSeer, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US20220066847A1 (FUJITSU LTD) 03 March 2022 (03/03/2022) abstract, paragraphs [0005], [0022]-[0030]-[0039], [0145], Fig 3, 5	1-20
X	CN114445047A(BEIJING BAIDU NETCOM SCIENCE TECHNOLOGY CO., LTD.) 06 March 2022 (06/05/2022)(refer translation and paragraph numbers from Patentscope) abstract, paragraphs[0008]-[0014], [0041], [0201]	1-20

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:
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"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21-10-2024	21-10-2024

Name and mailing address of the ISA/	Authorized officer
Indian Patent Office Plot No.32, Sector 14,Dwarka,New Delhi-110075 Facsimile No.	Rakesh Chandra Joshi Telephone No. +91-1125300200

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IN2024/050911

Citation	Pub.Date	Family	Pub.Date
US 20220066847 A1	03-03-2022	JP 2022041907 A	11-03-2022
CN 114445047 A	06-05-2022	WO 2023142451 A1	03-08-2023