

TECHNICAL FRAMEWORK FOR CONSTRUCTING CUSTOMIZED SOFTWARE APPLICATIONS

Technical Field

[0001] This disclosure relates generally to software frameworks and, more specifically, to a technical framework for constructing customized software applications, with AI and GenAI technologies natively embedded at the architectural level, to perform cognitive tasks of different organizational roles within specific entity that typically handled by employees.

Background

[0002] Organizations often have teams of employees managing manual or semi-manual processes across their operations, such as processing financial transactions or handling compliance alerts. Many organizations rely on software for their employees to perform tasks that are specific to a particular role or function, such as responding to customer service inquiries, conducting internal investigations, and performing financial operations. These tasks often involve collecting data from multiple data sources and systems, analysing or interpreting the data, generating outputs based on that analysis, and taking further action, such as updating records or communicating results to other systems or users.

[0003] Existing approaches to developing software for performing tasks in specific organizational staff roles often require custom-built software applications tailored to specific functions or departments. These software applications typically integrate with internal data sources and systems, process relevant information, and provide task-specific outputs. However, such solutions are frequently rigid, expensive to develop and maintain, and difficult to adapt when business needs change. In many cases, different staff roles within the same organization use siloed tools or entirely separate systems, leading to inefficiencies and duplication of effort.

[0004] While some platforms support modular development or workflow configuration to create customized software applications, these are often limited in flexibility as they lack consistent integration capabilities across different systems or provide only basic support for

advanced technologies such as artificial intelligence (AI). Additionally, incorporating intelligent automation into these solutions, such as using models for classification, prediction, or language understanding, usually requires significant engineering effort, making it impractical for widespread or role-specific use.

Summary

[0005] According to a first aspect, there is provided a technical framework for constructing customized software applications, each customized software application configured to perform multiple different tasks comprised in one or more different staff roles within an organization, the technical framework comprising:

- configurable data processing components for extracting and ingesting relevant information from data obtained from at least one data source comprising at least one of: a core system of the organization, a database, a data lake, an email system of the organization, and the internet;

- configurable decision-making components that use at least one of a plurality of AI models or computations for generating at least one determination from the relevant information;

- configurable output task components that use at least one of a plurality of AI models or computations for generating at least one output task for execution according to the at least one determination; and

- configurable integration components that use at least one external programming package or software application for executing the at least one output task;

- wherein the technical framework has a modular architecture provided for:

- configuring the data processing components, the decision-making components, the output task components, and the integration components; and

- assembling a set of configured components comprising the configured data processing components, the configured decision-making components, the configured output task components and the configured integration components to form the customized software application.

[0006] The plurality of AI models may comprise at least one of:

- a supervised model and an unsupervised learning model to enhance decision-

making and automation;

a rule-based decision engine configured to make automated decisions based on predefined rules and conditions;

a natural language processing (NLP) module for understanding, generating, and interpreting human language to facilitate task execution;

a computer vision AI model configured to process image-based inputs and extract structured data therefrom;

a computer audition AI model configured to analyse audio inputs and generate textual or semantic representations thereof;

a time series analysis AI model configured to analyse temporally ordered data and detect patterns, anomalies, or forecast future values; and

a generative AI (GenAI) model for creating new content or outputs based on data patterns.

[0007] The at least one output task may include at least one of: a synthesis task, a calculation task, a data handling task, and execution of the at least one external programming package or software application.

[0008] The synthesis task may comprise generation of at least one of: text, an image, an audio stream, and a video.

[0009] The calculation task may use at least one of a computer, code, AI model or GenAI model and comprises at least one of: performing general calculations, executing functions and calculating statistics; performing an analysis of the relevant information; classifying the relevant information; performing a prediction based on the relevant information; performing a conditional logic test; and performing graph computation.

[0010] The data handling task may use at least one of a computer, code, AI model or GenAI model and comprises at least one of: establishing at least one connection with the at least one data source; aggregating fields in the at least one data source query to obtain more relevant information; ensuring data consistency, uniform formats, and handling missing or inconsistent values; writing data back to the at least one data source or another data format; extracting information from the at least one data source; identifying data that fulfil

predetermined conditions; and finding specific information in the at least one data source.

[0011] The execution of the at least one external programming package or software application may use at least one of a computer, code, AI model or GenAI model and comprises at least one of: running the at least one external programming package or software application; performing a web search and reading information from a website; citing sources for response by an AI Large Language Model (LLM) or other models; and presenting a result.

[0012] The technical framework may further comprise a graphical user interface provided for a user to configure at least one of: the data processing components; the decision-making components; the output task components; the integration components; and to assemble the set of components.

[0013] According to a second aspect, there is provided a customized software application configured to perform a specific role in an organization and created using the technical framework of the first aspect, the customized software application comprising:

- a data processing module comprising the configured data processing components and configured to ingest data from the at least one data source, the external programming package or software application; and to extract relevant information from the ingested data;

- a cognitive module comprising the configured decision-making components and configured output task components, the cognitive module configured to process the relevant information, generate a determination, and generate output tasks for execution according to the determination;

- an integration module comprising the configured integration components and configured to receive the output tasks from the cognitive module and execute the output tasks with the at least one of: the data source and the at least one external programming package or software application;

- an execution module configured to execute the customized software application and to integrate and control the data processing module, the cognitive module, and the integration module when the customized software application is deployed, and

- a database for storing therein: the data obtained from the at least one data source, the set of configured components, and results and output obtained from execution of output tasks when the customized software application is executed.

[0014] The data processing module may use at least one of a plurality of AI models or computations, and may further comprise at least one of:

- an interface mechanism to ingest data;
- a data validation mechanism to ensure accuracy and integrity of the ingested data; and
- a filtering mechanism to extract relevant information and remove irrelevant data.

[0015] The data processing module may be further configured to continuously obtain new data from the at least one data source using the configured data processing components to process the obtained data using at least one of the configured decision-making components according to relevance of the obtained data.

[0016] The the configured decision-making components may be configured to:

- use historical or real-time data from the relevant information to make dynamic decisions based on evolving conditions; and
- generate a determination of potential outcomes or recommended actions to optimize task automation.

[0017] The configured output task components may be configured to:

- execute required tasks or orchestrate multi-step workflows to complete complex tasks;
- and
- trigger corresponding actions with the at least one data source, the external programming package or software application based on the relevant information and the generated determination.

[0018] The output tasks may be further configured to automatically update a database of the organization with processed results presented on a graphical user interface and trigger a notification to an interested person.

[0019] The cognitive module may be configured to refine decision-making processes by learning from previous tasks and outcomes and wherein the customized software application continuously improves its performance by integrating new data and adjusting the AI models accordingly.

[0020] The integration module may be configured to:
establish communication protocols with the at least one data source and the at least one external programming package or software application; and
synchronize data between the customized software application and the at least one data source, the external programming package or software application to ensure consistency in the execution of the output tasks.

[0021] The integration module may further comprise data encryption and secure authentication protocols to safeguard sensitive information during task execution and further comprises a role-based access control mechanism configured to limit scope of interaction with the other software application.

[0022] The execution module may be further configured to manage storing of data in the database.

[0023] The database may be further configured to store therein data obtained from the external programming package or software application.

[0024] The database may be further configured to store therein policies, procedures, practices and internal controls of the organization that are relevant to the role, and the execution module may be configured to execute the customized software application in accordance with the stored policies, procedures, practices and internal controls.

Brief Description of the Drawings

[0025] Exemplary embodiments of the present invention are hereinafter further described, by way of example only, with reference to the accompanying drawings, in which:

[0026] FIG. 1 is a schematic illustration of an exemplary technical framework for constructing customized software applications.

[0027] FIG. 2 is a schematic illustration of an exemplary customized software application constructed using the technical framework of FIG. 1.

Detailed Description

[0028] Referring to FIG. 1, the present disclosure describes a technical framework 100 provided for the construction of customized software applications 200 that are configured to perform multiple different tasks comprised in one or more different staff roles within a specific organization. The technical framework comprises configurable components for data processing 102, decision-making 106, output task generation 110, and system integration 112 that can be readily assembled for rapidly constructing a customized software application 200 (see also FIG. 2) without requiring the development of role and entity-specific software from scratch.

[0029] The technical framework 100 has a modular architecture that advantageously enables the components 102, 106, 110, 112 of the technical framework 100 to be configured independently and assembled in different combinations to enhance task automation, decision-making, and process integration for customizing software applications that can perform a variety of tasks across different roles within an organization. This minimizes the need for redundant software development and engineering work for multiple applications for different roles. This modular approach reduces the need to develop bespoke software from the ground up for each staff role. Instead, the configurable components for data processing 102, decision making 106, output task generation 110, and system integration 112 can be adapted and assembled across multiple different customized software applications 200 for specific tasks across different staff roles. This simplifies the development of each customized software application 200, improves its maintainability, and supports more rapid deployment of the software application 200.

[0030] The technical framework 100 advantageously allows use of various types of AI models or computations 108 to be used by the customized software application 200, whether as part of the customized software application 200 itself as shown in FIG. 2 or remaining external to the customized software application 200. Such AI models or computations 108 include but are not limited to natural language processing, supervised and unsupervised learning, rule-based engines, and generative models. These AI models or computations 108 can be used in decision-making and output task generation, supporting intelligent automation in diverse business processes. The technical framework 100 also allows for integration of various forms of automated logic, including machine-learning models, deterministic rule sets,

or procedural algorithms. These elements can be used, for example, to make determinations based on retrieved data, generate corresponding outputs, or execute actions in external systems.

[0031] In addition, the technical framework 100 supports connectivity of the customized software application 200 to any number of data sources 104, including enterprise databases, internal systems, communication platforms, and external resources. Data retrieved from these sources 104 can be processed through configured logic before output is generated or actions are performed. Customized software applications 200 built using the technical framework 100 can thus, for example, retrieve data from internal or external systems such as databases or email platforms, apply AI-driven or logic-based determinations, and generate outputs such as reports, classifications, synthesized responses, or commands to external software.

[0032] Broadly, the technical framework 100 comprises configurable data processing components 102 for extracting and ingesting relevant information from data obtained from at least one data source 104, such as core systems of the organization, databases, data lakes, email systems, and external sources like the internet.

[0033] The technical framework 100 also includes configurable decision-making components 106 that use at least one of a plurality of AI models or computations 108 for generating at least one determination from the relevant information.

[0034] The technical framework 100 further includes configurable output task components 110 that use at least one of a plurality of AI models or computations 108 for generating at least one output task for execution according to the at least one determination.

[0035] The technical framework 100 additionally includes configurable integration components 112 that use at least one external programming package or software application 114 for executing the at least one output task.

[0036] The modular architecture of the technical framework 100 provides for each component type in the technical framework 100 (i.e., the data processing components 102, the decision-making components 106, the output task components 110, and the integration components 112) to be configurable to form a specific corresponding module with a standard

interface, allowing individual components 102, 106, 110, to be configured to form configured data processing components 202, configured decision-making components 206, configured output task components 210 and configured integration components 212 that are collectively referred to as a set of configured components and that are assembled into a task and entity-specific customized software application 200 as shown in FIG. 2, without requiring hard-coded dependencies between them. Modules in a customized software application 200 may thus be implemented as software services, functions, or classes depending on the deployment environment, and can be selected and configured based on the requirements of a given role or task flow of a specific entity that is to be performed by the customized software application 200.

[0037] The modular architecture of the technical framework 100 supports extensibility by allowing new component types or implementations to be introduced without modifying the underlying technical framework 100. For example, a new data processing module 282 designed to extract information from a proprietary system can be configured by configuring available data processing components 102 of the technical framework 100 into configured data processing components 202 and selected for inclusion in a customized software application 200 (FIG. 2) without changes to the surrounding infrastructure. Configuration of each module of the customized software application 200 may be performed through declarative means, via a graphical user interface, or through a scripting environment, for example.

[0038] At runtime, the customized software application 200 executes its configured components 202, 206, 210, 212 according to a defined sequence or logic flow, that may be represented as a directed graph or pipeline. Data flows from one module to the next, with intermediate outputs being passed as structured objects. In some embodiments, the modules 282, 284, 286, 288 of the customized software application 200 may be loosely coupled using message queues or event-driven architecture, allowing for asynchronous execution and improved scalability.

[0039] The modular architecture of the technical framework 100 may also allow for version control at the component level, supporting testing and validation of individual components in isolation, and enabling rapid reconfiguration or reuse of components across different customized software applications 200.

AI Models

[0040] As mentioned above, the technical framework 100 enhances decision-making and automation capabilities by leveraging various AI models or computations 108, each tailored to a particular type of task or data input. These models 108 include supervised learning models, unsupervised learning models, rule-based decision engines, natural language processing (NLP) modules, computer vision AI models, computer audition AI models, time series analysis AI models, and generative AI (GenAI) models. These AI Models or computations 108 may be part of the customized software application 200 or may remain external to the customized software application 200. Using these AI models or computations 108, the customized software application 200 that is constructed using the technical framework 100 can handle a wide range of tasks, from text classification and customer service automation to predictive financial modelling and fraud detection. The modular nature of the technical framework 100 allows organizations to customize their AI-driven processes for a variety of tasks for different roles, enhancing both operational efficiency and the quality of decision-making across different domains.

[0041] Supervised learning models are employed to make determinations based on labelled training data for tasks of different roles within a specific entity. For instance, in a customer service scenario, a supervised model could classify customer inquiries into categories such as billing, technical support, general inquiry and so on. Techniques such as logistic regression, decision trees, or support vector machines (SVM) are used for such tasks. The supervised learning models can generalize to new, unseen data by taking what has been learnt from labelled training data and applying that knowledge to new situations, in order to automate tasks like classification, recommendation, or prediction. In the context of the investigations service scenario, supervised models could be applied to categorize incident reports, identify key factors contributing to fraud, or predict potential suspects based on known data. The supervised learning models are typically trained on historical case data, learning to identify features or patterns that correlate with successful investigation outcomes.

[0042] Unsupervised learning models are used to uncover hidden patterns or groupings in the data without predefined labels for tasks of different roles within a specific entity. For example, clustering algorithms like K-means or hierarchical clustering could be employed to

group customer complaints by similarity, which could help identify emerging trends or common issues in customer service. In investigative contexts, unsupervised models might detect anomalous behaviours or suspicious activity patterns that do not fit established profiles, offering valuable insights for further investigation. Unsupervised learning models are also used in anomaly detection tasks, such as identifying fraudulent transactions. In a financial service context, these models can analyse vast datasets of financial transactions and flag outliers that may indicate money laundering activities.

[0043] Rule-based decision engines use predefined rules and conditions to automate decision-making processes for tasks of different roles within a specific entity. For instance, in a customer service context, a rule-based engine could be used to automatically generate responses to customer queries based on keywords or specific customer attributes, such as account status or previous interactions. The rules are typically defined in a knowledge base or decision table, and the engine matches incoming data to these predefined conditions. In a financial service context, a rule-based decision engine could be used to approve or reject loan applications based on specific financial criteria such as debt-to-income ratio, credit score, and loan amount. These engines can provide quick, reliable decision-making where the rules are clear and consistent.

[0044] NLP is a branch of AI focused on enabling machines to understand, interpret, and generate human language for tasks of different roles within a specific entity. NLP models can analyse and generate text in a variety of ways, making them especially useful for tasks such as customer service response generation, document classification, sentiment analysis, and language translation. In a customer service context, NLP modules are particularly useful for analysing customer emails or chat messages, enabling to classify the intent of the message (e.g., inquiry, complaint, and request for information) and generate an appropriate response. NLP models can also be used for extracting key information from unstructured text, such as identifying customer names, product types, or issue descriptions. For the financial service context, NLP models might be used to process financial reports, extracting key data points and trends from text-based documents like quarterly earnings reports or news articles about financial markets.

[0045] Computer vision AI models are configured to perform computational interpretation

of digital image or video data for tasks of different roles within a specific entity. Such models may be trained to detect, recognize, classify, segment, or otherwise analyse visual content for the purpose of automating decision-making tasks or generating structured data representations. In some embodiments, the computer vision models may include convolutional neural networks (CNNs), vision transformers (ViT), or hybrid architectures combining convolutional and attention-based mechanisms. Tasks performed by computer vision AI models may include, but are not limited to object detection, image classification, facial recognition, semantic segmentation, instance segmentation, scene understanding, and optical character recognition (OCR).

[0046] Computer audition AI models are configured to analyse and interpret audio data for the purpose of recognizing patterns, extracting features, or generating textual or symbolic representations for tasks of different roles within a specific entity. These models may operate on raw waveform data or transformed representations such as spectrograms or Mel-frequency cepstral coefficients (MFCCs). In various embodiments, computer audition models may include convolutional neural networks, recurrent neural networks (e.g., long short-term memory (LSTM) or gated recurrent unit (GRU) networks), attention-based models (e.g., transformers), or a combination thereof.

[0047] Time series analysis AI models are designed to process sequential data indexed by time for the purpose of modelling temporal patterns, forecasting future values, detecting anomalies, or classifying time-dependent behaviours for tasks of different roles within a specific entity. Such models may operate on univariate or multivariate time series data derived from sensors, transactional systems, logs, or other time-stamped sources. In various embodiments, time series analysis models may include statistical methods (e.g., autoregressive integrated moving average (ARIMA), vector autoregression (VAR)), deep learning models (e.g., LSTM, GRU, temporal convolutional networks (TCNs)), or attention-based architectures (e.g., Transformer, Informer, Temporal Fusion Transformer).

[0048] GenAI models, such as Generative Adversarial Networks (GANs) or large language models (LLMs) like GPT, are designed to create new content or outputs based on learned patterns from data for tasks of different roles within a specific entity. These models are used to generate text, images, audio, or video, making them highly versatile in applications

ranging from content creation to design. In a customer service context, GenAI models can be employed to automatically generate responses to customer inquiries, creating human-like communication that is tailored to the context of the customer's message. In a financial service context, generative models could be applied to create financial reports, visualizations, or simulated data for use in predictive modelling and analysis. Additionally, they might be used to generate insights from complex datasets or to create synthetic data for model training purposes when real-world data is scarce.

Output Tasks

[0049] As mentioned above, the framework 100 includes configurable output task components 110 that are responsible for generating output tasks based on the determinations produced by the decision-making components 106. The configurable output task components 110 enable the integration of decision-making components 106 with tangible actions to generate output tasks.

[0050] The specific output tasks are customized according to the specific needs of the role within the organization that will be performed by the customized software application 200 and are designed to automate critical aspects of organizational workflows. These output tasks represent specific actions or operations that are to be performed in response to the processed information. Each output task may involve synthesizing content, performing a calculation, handling data, or initiating a process in at least one external package or software application. Each output task type corresponds to a different mode of execution within the framework and may utilize one or more AI models or computations 108 to carry out its function.

[0051] By using synthesis, calculation, and data handling tasks, combined with the ability to execute external software applications, the customized software application 200 ensures that the right output is generated in response to decisions made by the AI models. This flexibility enhances the customized software's ability to provide timely, contextually relevant responses and actions across different organizational domains.

[0052] Synthesis tasks refer to processes that combine data, information, or input from various sources and produce a new, meaningful output for tasks of different roles within a

specific entity. Synthesis tasks are commonly used in applications where content or insights need to be generated from raw data obtained from the data sources 104, which may then be used to drive further actions or decisions.

[0053] In a customer service context, synthesis tasks can include generating responses to customer queries, synthesizing information from multiple support channels, or producing summaries of customer interaction history. For instance, a synthesis task may take a customer's request, analyse data such as the customer's account information, previous interactions, and any related service data, and then generate a comprehensive, context-aware reply.

[0054] In an investigative service context, synthesis tasks could involve the creation of investigative reports that consolidate information from various data sources 104 such as incident reports, historical case data, and analytics tools. These reports may be used to summarize findings and provide insights into ongoing investigations. The synthesis tasks could also involve identifying emerging trends in fraud detection, such as collusion patterns or geographical hotspots for fraudulent activity.

[0055] In a financial service context, synthesis tasks might involve generating financial reports by aggregating data from various financial systems, such as transaction databases, accounting software, and market analytics. The output reports such as profit and loss statements, balance sheets, or financial summaries may further be reviewed by decision-makers or stakeholders.

[0056] In general, synthesis tasks are integral to the technical framework 100's functionality, as they combine input data to generate new content or information that may be used for further action or decision-making. The synthesis of such content allows the customized software application 200 to create rich, multimodal outputs based on the relevant information extracted from processed data. Generation of different forms of content, including text, images, audio streams, and video, will be discussed below.

[0057] Text generation enables creation of written content based on inputs for tasks of different roles within a specific entity. This could involve generating responses to customer inquiries (for example in email form), drafting reports, creating summaries, or generating

automated documentation.

[0058] In a customer service context, for example, text generation is used to automatically generate personalized responses to customer emails, chatbot queries, or support tickets. Using NLP techniques, the customized software application 200 can analyse the customer's query, determine intent, extract relevant information, and then formulate a coherent and contextually appropriate response. Other implementations might use LLMs to generate human-like text that accurately responds to complex inquiries with a high degree of fluency and relevance.

[0059] In an investigative service context, text generation could be employed to draft investigative reports based on the collected data. Text generation may include summarizing findings from interviews, document analysis, or evidence logs. The synthesis of structured and unstructured data would allow for the automatic creation of reports that highlight important details, making it easier for investigators to focus on the most critical aspects of the case.

[0060] In a financial service context, text generation tasks might involve generating financial reports or summaries based on raw financial data, such as generating quarterly earnings reports, explaining financial trends, or producing investment analysis documents. These reports could be automatically generated from structured data stored in external financial systems or databases.

[0061] Image generation allows the customized software application 200 to produce pictorial content from the relevant information based on obtained data or predefined templates for tasks of different roles within a specific entity. Image generation could involve creating charts, graphs, infographics, or even custom illustrations that visualize complex data or concepts in a more accessible and understandable format.

[0062] In a customer service context, image generation could be used to automatically generate customer satisfaction visualizations, infographics summarizing customer feedback, product images for customer inquiries, and so on. For example, using the customized software application 200, a customer service bot may generate an image showing a guide on troubleshooting a product based on the customer's reported issue.

[0063] In an investigative service context, image generation can be used to create visualizations of investigative data such as diagrams representing the relationships between different suspects, geospatial visualizations of crime or fraud hotspots, or flowcharts illustrating investigative processes. These visuals could help investigators quickly grasp complex connections and make more informed decisions.

[0064] In a financial service context, image generation can be applied to create financial charts and graphs such as stock price movements, risk analysis diagrams, and portfolio performance visualizations. This allows financial analysts or decision-makers to quickly interpret financial data in a more visual and digestible format.

[0065] Audio stream generation involves synthesizing audible content from the relevant information, which can be useful for customized software applications 200 requiring voice-based interfaces or notifications for tasks of different roles within a specific entity. This capability enables the customized software application 200 to automatically generate speech from text, allowing for a more interactive user experience.

[0066] In a customer service context, audio stream generation can be used to create voice responses to customer queries. For example, the customized software application 200 could provide an automatic voice response via an interactive voice response system, guiding the customer through common troubleshooting steps or account inquiries.

[0067] In an investigative service context, audio stream generation might be used for producing voice notes or summaries for investigators, enabling a user to listen to case summaries. It could also be used to generate verbal alerts or reminders for ongoing investigations, making it easier for team members to stay up to date with the latest developments.

[0068] In a financial service context, audio generation could be applied in the customized software application 200 to offer voice-based financial advice, allowing a user to hear market summaries, portfolio performance reviews, or investment advice via spoken content.

[0069] Video generation enables creation of dynamic visual content such as video

tutorials, explanatory videos, or presentations for tasks of different roles within a specific entity. This capability is powerful in situations where complex concepts need to be communicated clearly and engagingly.

[0070] In a customer service context, video generation could be used to create personalized video responses to customer inquiries, providing detailed explanations or visual troubleshooting guides. For example, when a customer encounters a technical issue, the customized software application 200 could generate a video showing how to resolve the problem, along with visual aids like product diagrams and step-by-step instructions.

[0071] In an investigative service context, video generation could be used to create detailed visual reports of investigative findings. This could include visual reconstructions of events, animated timelines of criminal activity, or video summaries of case details.

[0072] In a financial service context, video generation might be used to produce financial market analysis videos, investment advice tutorials, or animated graphs illustrating financial performance over time. The generated videos can be shared with clients or stakeholders to help them better understand complex financial data and trends.

[0073] Calculation tasks involve using computational techniques (such as at least one of a computer, code, AI model or GenAI model) to process data and perform specific operations such as general calculations, statistical analyses, or advanced data transformations for tasks of different roles within a specific entity. These calculation tasks play a crucial role in an organization that requires numerical decision-making, modelling, or reporting.

[0074] In a customer service context, calculation tasks might involve processing numerical data related to customer accounts, such as calculating an account balance or determining overdue payments.

[0075] In an investigative service context, these tasks could include performing calculations related to patterns of fraud, calculating probabilities or risks associated with different investigative paths, or generating risk assessments.

[0076] In a financial service context, calculation tasks may include calculating stock price movements, performing risk assessments on investments, or running complex financial models such as value-at-risk calculations. For example, the AI models or computations 108 involved may use historical market data and economic indicators to forecast trends or generate predictive insights.

[0077] As can be appreciated, the output task components 110 of the technical framework 100 can thus be configured to support a wide variety of calculation types in the customized software application 200, each of which is suited for different output tasks. This includes both basic and advanced forms of calculation that are essential for decision-making and analysis.

[0078] Calculation tasks may comprise performing general calculations, executing mathematical functions and calculating statistics for tasks of different roles within a specific entity. These may involve basic arithmetical operations such as addition, subtraction, multiplication, and division, as well as more complex functions such as exponential or logarithmic functions. General calculations also include the application of formulas to derive key values that drive further decision-making. In addition to basic arithmetic, calculation tasks in the customized software application 200 can also be configured to execute more complex mathematical functions and statistical calculations. These tasks are useful for deriving insights from large datasets, such as computing averages, variances, or correlations. More advanced statistical operations, such as regression analysis or hypothesis testing, can also be provided.

[0079] In a customer service context, general calculations could involve computing service metrics such as response times, the total number of customer interactions, or service level agreement compliances. These general calculations are useful for reporting purposes, performance monitoring, and ensuring that customer service operations are functioning within predefined benchmarks. Statistical calculations might involve determining customer satisfaction metrics based on survey results, performing sentiment analysis on customer feedback, or analysing trends in service inquiries.

[0080] In an investigative service context, general calculations might be used to quantify metrics related to the investigation, such as the number of fraud incidents detected, the monetary value of identified fraudulent transactions, or calculating trends based on historical

data. For example, a calculation task of the customized software 200 may use an AI model 108 to calculate the frequency of fraudulent activities across different regions or time periods to aid in decision-making for resource allocation. Statistical calculations can help identify patterns or outliers in large datasets, such as transaction histories or surveillance data. The calculation tasks in the customized software application 200 might perform correlation analysis to detect patterns of fraudulent behaviour across multiple cases or generate risk scores based on statistical models of criminal activity.

[0081] In a financial service context, general calculations might be used to calculate the growth rate of assets, the average return on investments, or the standard deviation of financial returns over a set period. These general calculations help financial analysts and portfolio managers evaluate investment performance and make informed decisions. Statistical calculations are indispensable in risk management and investment analysis. For instance, a calculation task of the customized software application 200 could be configured to perform Monte Carlo simulations to model the potential future performance of a portfolio or perform stress testing to assess the impact of market fluctuations on a portfolio.

[0082] As mentioned above, calculation tasks may comprise performing an analysis of the relevant information, classify the relevant information, and perform a prediction based on the relevant information for tasks of different roles within a specific entity. The AI models 108 are integral to many advanced calculation tasks, especially for tasks that require pattern recognition, decision-making, or prediction. These AI models 108 can further be trained to handle large volumes of data, identify patterns, and provide insights based on the information provided.

[0083] In a customer service context, AI models 108 can be used for predictive tasks, such as forecasting customer behaviour, predicting customer service demand, or categorizing support types based on their urgency or complexity. For example, an AI model 108 might predict the likelihood that a customer will escalate an issue based on historical interaction data, allowing customer service agents to prioritize cases accordingly.

[0084] In an investigative service context, AI models 108 can be used for tasks such as fraud detection, where machine learning algorithms may be used to analyse transaction data to

predict the likelihood of fraudulent activity. A calculation task of the customized software application 200 might use a classification model 108 to label transactions as either legitimate or fraudulent based on patterns observed in historical data. Additionally, predictive models can be used to forecast future incidents of fraud or crime based on historical patterns and known risk factors.

[0085] In a financial service context, AI models 108 can be used for financial prediction and analysis. For example, regression models might be used to predict stock prices based on historical trends, while classification models could identify risky investment opportunities. Predictive models can also be applied to forecast market conditions or the future value of assets, based on historical and real-time financial data.

[0086] Calculation tasks may also comprise performing a conditional logic test, such as using conditional logic in code to perform at least one of: checks, integration of models and systems, and integration of functionalities for tasks of different roles within a specific entity. Conditional logic is an essential part of calculation tasks, enabling the customized software application 200 to apply specific actions or processes based on predefined conditions.

[0087] In a customer service context, conditional logic could be used to trigger specific actions based on customer inputs. For example, the customized software application 200 could automatically classify a customer's request and determine whether it should be handled by an AI model or forwarded to a human representative. Conditional logic could also be applied to check whether the customer is eligible for a refund or if additional verification is required before processing the request.

[0088] In an investigative service context, conditional logic is crucial for decision-making in complex investigations. For instance, the customized software application 200 might check whether a particular case meets certain criteria before escalating it to a higher level of investigation. Similarly, it might decide whether to run additional checks based on the available evidence or if a particular action should be taken when certain conditions are met.

[0089] In a financial service context, conditional logic could be used to trigger specific actions based on the state of the financial data. For example, the customized software

application 200 could decide whether to trigger a buy action in a stock portfolio based on market conditions, or whether to issue a warning if an investment falls below a predefined risk threshold.

[0090] Calculation tasks may also comprise performing graph computations, especially for tasks of different roles within a specific entity. Graph computation refers to the process of analysing and computing relationships between entities in a graph-based structure. This is useful in fraud detection, social network analysis, and financial portfolio management.

[0091] In a customer service context, graph computation could be used to analyse relationships between customer interactions, such as identifying clusters of customers with similar issues or preferences. This can be useful for detecting patterns or for segmenting customers based on their behaviour, allowing for targeted marketing or support strategies.

[0092] In an investigative service context, graph computation is useful for visualizing and analysing complex relationships between suspects, incidents, and locations. The customized software application 200 could be configured to build a graph of relationships and interactions to identify risks that may not be obvious, aiding in the investigation process.

[0093] In a financial service context, graph computation could be applied to analyse relationships between assets, transactions, or market events. For example, it could be used to detect correlations between different stocks or assets, or to visualize the flow of funds through a financial system, helping to uncover hidden patterns of risk or opportunity.

[0094] Data handling tasks may involve the manipulation, extraction, transformation, and storage of data for tasks of different roles within a specific entity. Data handling tasks, which may use at least one of a computer, code, AI model or GenAI model, are essential for maintaining data consistency, ensuring the quality of input, and enabling integration with other systems and processes. Data handling tasks ensure that data is processed correctly and in alignment with the requirements.

[0095] In a customer service context, data handling tasks could involve extracting information from customer inquiries or account records, ensuring that data is consistent and in

the correct format, and updating records as necessary. These data handling tasks might also include integrating customer data with external systems such as customer relationship management (CRM) or marketing platforms, verifying the completeness of customer profiles, and ensuring that customer queries are routed to the correct department or agent.

[0096] In an investigative service context, data handling tasks are critical for aggregating data from disparate sources such as case files, surveillance data, and reports from third-party services. These data handling tasks could involve cleaning and preparing data for analysis, verifying the consistency of case data, and ensuring that sensitive information is handled according to legal requirements.

[0097] In a financial service context, data handling tasks might include connecting to external financial data sources such as banks, exchanges, or other financial institutions. These data handling tasks could also include updating transactional records, normalizing data from various systems to ensure compatibility, and transforming raw financial data into structured formats for further analysis.

[0098] Data handling tasks may comprise establishing at least one connection with at least one data source 104 for tasks of different roles within a specific entity. This is a step in data processing that involves connecting to databases, core systems, data lakes, email systems, or external data sources (such as APIs or the Internet) in a reliable and secure manner.

[0099] In a customer service context, data handling tasks could involve establishing connections with CRM systems, email servers, or ticketing systems to retrieve relevant customer information. For example, a data handling task of the customized software application 200 might be configured to connect the customized software application 200 to an email server to retrieve new customer inquiries, or it could connect to a CRM to pull up past interactions to better inform the response.

[0100] In an investigative service context, data connections may involve pulling information from various sources, such as law enforcement databases, financial systems, or public records. For example, a data handling task of the customized software application 200 might be configured to connect the customized software application 200 to a government

database to retrieve information related to suspects or incidents under investigation, or to an internal database that stores investigation logs and evidence.

[0101] In a financial service context, data handling tasks of the customized software application 200 might be configured to establish connections of the customized software application 200 to accounting software, market data providers, or banking systems to retrieve financial data. For example, a data handling task of the customized software application 200 could connect the customized software application 200 to a financial data feed to pull in the latest stock prices or access a company's accounting system to retrieve quarterly earnings reports.

[0102] Data handling tasks may also comprise aggregating fields in the at least one data source query to obtain more relevant information for tasks of different roles within specific entity. Once a connection to a data source 104 is established, the relevant fields or data points need to be aggregated for the decision-making processes. Data aggregation involves querying and collecting the appropriate data fields, ensuring that the data is relevant and useful for the task at hand.

[0103] In a customer service context, data aggregation might involve querying a customer database for specific fields such as customer ID, issue history, or service requests. The customized software application 200 might aggregate these data points to provide a complete view of the customer's interaction history.

[0104] In an investigative service context, data aggregation might involve pulling together data from various sources such as case files, logs, and historical investigation data. The customized software application 200 could aggregate key information such as incident reports, criminal records, and witness statements to help form a comprehensive case overview.

[0105] In a financial service context, data aggregation could include pulling in relevant financial data, such as transaction histories, account balances, or market data. The customized software application 200 might aggregate fields from multiple systems to generate a holistic view of a financial position or to assess the overall performance of an investment portfolio.

[0106] Data handling tasks may also comprise ensuring data consistency and format uniformity, and handling missing or inconsistent values for tasks of different roles within a specific entity. Data consistency and uniformity are essential for accurate decision-making and analysis. Data often comes from multiple sources in various formats, and one of the core responsibilities of data handling tasks is to ensure that the data is consistent, properly formatted, and free from errors. Data handling tasks may also include mechanisms to deal with such issues, whether by filling in missing values, correcting errors, or excluding problematic data.

[0107] In a customer service context, ensuring data consistency might involve standardizing customer contact details or correcting discrepancies between data from different data sources. For example, if customer information exists in both an email system and a CRM, the customized software application 200 might need to ensure that the contact information matches across both platforms. Handling missing data could involve identifying missing customer information and attempting to fill in those gaps through other data sources, such as verifying a phone number or email address through a third-party service. If there is missing information in a customer inquiry, the customized software application 200 may issue a request to the customer for additional details.

[0108] In an investigative service context, ensuring data consistency could involve validating the accuracy of case file information, ensuring that witness statements are correctly recorded and matching them with other pieces of evidence. The customized software application 200 might perform checks to verify that data pulled from various sources is consistent and aligned. Handling missing data might involve flagging incomplete or inconsistent case files and then querying external sources to retrieve additional details. For example, if a suspect's address is missing from a case file, the customized software application 200 might automatically query a public records database to retrieve the address.

[0109] In a financial service context, ensuring data consistency might involve verifying that financial transactions are correctly logged and that account balances across different platforms match. For instance, a bank statement from one system might need to be cross-referenced with a ledger entry in another system to ensure that there are no discrepancies. The customized software application 200 might also handle missing data by cross-referencing data

from multiple sources (e.g., matching records from a bank and accounting system) to fill in gaps or notify users of the inconsistencies.

[0110] Data handling tasks may also comprise writing data back to the at least one data source 104 or another data format such as in a database 210 of the customized software application 200 for tasks of different roles within a specific entity. Once the data has been processed, it is necessary to write or update the data back to its source or to store it in another format. This might involve updating databases with new information or writing results to log files or reports.

[0111] In a customer service context, writing data back could involve updating a service request status in the CRM after an inquiry has been responded to, or logging customer feedback in a central database. Similarly, after resolving an issue, the customized software application 200 may write a summary of the interaction back to the customer's account.

[0112] In an investigative service context, writing data back could involve updating the status of an investigation, adding new findings to case files, or logging new evidence discovered during the investigation. For example, the customized software application 200 might write new findings about a suspect into a central law enforcement database.

[0113] In a financial service context, writing data back could involve updating transaction records, storing financial analysis results, or writing summaries of financial reports back to a central financial system. The customized software application 200 might also generate and store regular reports that summarize financial performance over a period.

[0114] Data handling tasks may also comprise identifying and extracting relevant data, e.g., using code to extract information from the at least one data source 104, using code to identify data that fulfil predetermined conditions, as well as using code to find specific information in the at least one data source 104, for tasks of different roles within a specific entity. In particular, data handling tasks may also include the ability to extract specific pieces of information from large datasets based on predetermined conditions. This can include identifying key trends, flags, or anomalies that are relevant to the task.

[0115] In a customer service context, identifying and extracting relevant data could involve identifying specific customer inquiries based on keywords or extracting historical data related to frequent issues. For example, the configured output task components 210 might include one or more data handling tasks configured to extract all customer service requests related to a particular product issue and one or more synthesis tasks configured to generate a report summarizing the frequency and severity of these requests.

[0116] In an investigative service context, the configured output task components 210 could extract specific case details based on predefined conditions, such as identifying cases that involve a particular suspect or finding transaction records that match a known fraudulent pattern. The configured output task components 210 may also flag suspicious activity that fits certain patterns, such as unusually large transactions or rapid movements of funds.

[0117] In a financial service context, identifying and extracting relevant data could involve pulling transaction records that meet certain risk thresholds or extracting stock price data for a specific time period to perform trend analysis.

[0118] Execution of the at least one external programming package or software application as an output task, which may use at least one of a computer, code, AI model or GenAI mode, involves triggering the execution of external applications or services as part of the workflow for tasks of different roles within a specific entity. This could include the activation of third-party software applications, APIs, or services that are needed to complete a task or integrate additional capabilities into the customized software application 200, which provide valuable functionality that the customized software application 200 itself does not natively perform.

[0119] In a customer service context, the customized software application 200 might execute other software to check for customer account status in an external database or system, perform a web search to gather additional information for a customer, or execute a knowledge base system to provide support information. Executing external software could also include invoking a ticketing system or CRM software, which may not be part of the internal platform. The customized software application 200 might automatically launch a CRM system to update a customer's profile or retrieve additional customer history, depending on the inquiry.

[0120] In an investigative service context, executing other software could involve executing investigative tools, such as specialized fraud detection systems or integration with public records databases to gather additional data or conduct research. These output tasks could also include invoking external tools to visualize investigative findings or to check against external blacklists of fraudulent entities or suspects. Execution of external software might also involve connecting to specialized investigation tools or law enforcement databases. For example, the customized software application 200 might call an external software that performs forensic analysis on digital evidence or invoke a legal database to search for case precedents related to an ongoing investigation.

[0121] In a financial service context, execution of other software could involve triggering applications to execute trades, interact with financial market data providers, or run complex portfolio optimization software. For example, an AI model 108 could be used to trigger a stock trading algorithm to buy or sell assets based on market predictions, or it could initiate an automated report generation tool for financial analysts. The execution of external software could also involve launching financial modelling software, running stock trading algorithms, or interacting with an external accounting tool to process financial transactions or generate detailed reports. The customized software application 200 could execute an external software application to perform complex financial calculations or simulations that are too specialized or resource-intensive for the customized software application 200 itself.

[0122] The execution of external software may also comprise performing a web search and read information from a website for tasks of different roles within a specific entity.

[0123] In a customer service context, web searches might be used to pull in real-time data about products or services. For example, if a customer asks about the availability of a specific item, the customized software application 200 could search the company's website or third-party retail platforms to check the item's availability, pricing, and shipping details.

[0124] In an investigative service context, web searches might be used to gather public records, news articles, or legal documents relevant to an investigation. For example, if a suspect's information needs to be verified, the customized software application 200 could perform a web search to find news reports, court records, or social media activity.

[0125] In a financial service context, web searches may involve gathering market data, financial news, or updates on economic conditions. For example, the customized software application 200 might search financial news platforms to pull in news about a company or industry, which could then inform an investment strategy or a financial risk assessment.

[0126] The execution of external software may also comprise citing sources for response by an AI LLM or other models for tasks of different roles within a specific entity and presenting a result, for example by using an AI model 108 and code with Retrieval-Augmented Generation (RAG). In particular, RAG is an AI approach that enhances the capabilities of LLMs by combining their generative abilities with the retrieval of relevant information from external sources.

[0127] In a customer service context, RAG could be used to automatically retrieve information about products, services, policies, procedures, practices and/or internal controls from an internal knowledge base of the organization or from external sources (such as FAQs or product manuals) and use this information to generate accurate, relevant responses to customer inquiries.

[0128] In an investigative service context, RAG could be used to pull data from multiple legal or investigative databases, such as case files, public records, or incident reports, to generate comprehensive reports or summaries for investigators. For instance, the customized software application 200 could retrieve information about a suspect's prior offenses from criminal databases, legal records, or online databases, and use this data to generate a report summarizing the suspect's history.

[0129] In a financial service context, RAG could be applied to enhance financial decision-making. For instance, the customized software application 200 could retrieve the latest financial news or historical data related to specific assets or companies and then use this data to generate detailed financial analysis reports. The customized software application 200 might retrieve historical stock prices or financial reports and use this to generate forecasts, investment strategies, or detailed analyses for clients.

[0130] The technical framework 100 may further include a graphical user interface (GUI),

not shown, that is provided for a user to configure at least one of: the data processing components 102, decision-making components 106, output task components 110, and integration components 112 of the technical framework 100, and to assemble the set of configured components 202, 206, 220, 212 to construct the customized software application 200 that is tailored to a specific organizational role of an entity. Through the GUI, a user can select, modify, and link components using a visual or form-based interface, thereby eliminating the need for low-level programming or manual system integration. The GUI is designed to support intuitive navigation and efficient workflow setup, promoting adaptability across a range of operational contexts. In this way, the customized software application 200 can be rapidly deployed and customized for various applications, including but not limited to customer service operations, investigative workflows, and financial process automation.

[0131] Referring to FIG. 2, the customized software application 200 constructed using the technical framework 100 will be described in greater detail below.

[0132] The customized software application 200 is configured to perform a specific role in an organization and comprises a data processing module 282 configured to ingest data from the at least one data source 104, the external programming package or software application, and to extract relevant information from the ingested data using the configured data processing components 202.

[0133] The customized software application 200 also comprises a cognitive module 284 configured to process the relevant information and generate a determination using the configured decision-making components 206, and to generate output tasks for execution using the configured output task components 210 according to the determination.

[0134] The customized software application 200 also comprises an integration module 286 configured to receive the output tasks from the cognitive module 284 and execute the output tasks using the configured integration components 212 with the at least one external programming package or software application 114.

[0135] The customized software application 200 also comprises an execution module 288 configured to execute the customized software application 200. The execution module 288 is

configured to integrate and control the data processing module 202, the cognitive module 204, and the integration module 206 when deploying the customized software application 200.

[0136] The customized software application 200 also comprises a database 280 for storing therein: the data obtained from at least one data source 104, the set of configured components, and results and output obtained from execution of output tasks when the customized software application 200 is executed. The database 280 may be further configured to store therein data obtained from the external programming package or software application. In some embodiments, the execution module 288 is further configured to manage storing of data in the database 280. Notably, policies, procedures, practices and internal controls of the organization that are relevant to the specific role are also stored in the database 280. The execution module 288 is configured to execute the customized software application 200 in accordance with the stored policies, procedures, practices and internal controls, thereby ensuring that the output of the customized software application 200 meets the requirements of the specific role.

[0137] The data processing module 282, which uses at least one AI model or computation, may be further equipped with mechanisms to ensure the quality and relevance of incoming data. In particular, the data processing module 282 may incorporate an interface mechanism to ingest data, a data validation mechanism that performs structural and semantic checks on ingested data to verify conformity with expected schemas, enforce data type constraints, and detect missing or anomalous entries. These validation procedures may leverage standard data profiling libraries, regex-based field verification, or schema validation tools.

[0138] In addition, the data processing module 282 may include a filtering mechanism to identify and isolate information that is relevant to the specific role-based task. This filtering may involve rule-based exclusion, keyword extraction, metadata classification, or machine learning classifiers trained to distinguish between signal and noise within a given data context. For example, in a customer service context, irrelevant correspondence or spam can be programmatically excluded, while in an investigative service context, only documents matching case-specific criteria may be retained for further processing.

[0139] To maintain currency and responsiveness, the data processing module 282 may be configured to continuously obtain new data from the specified data sources using the

configured data processing components 202. This can be implemented using polling mechanisms, event-driven webhooks, or stream-processing. Once new data is acquired, the data processing module 282 may apply prioritization and categorization logic using one or more of the configured decision-making components 206. These components may rank data by relevance, urgency, or impact, using scoring algorithms or heuristics specific to the operational role. For example, high-priority incidents in an investigation's workflow may be flagged for immediate analysis.

[0140] The decision-making components 206 may be further enhanced to support the use of historical or real-time data from the relevant information to make dynamic decisions based on evolving conditions. This dual-mode capability enables the customized software application 200 to make informed decisions that account for temporal patterns and recent developments. The decision-making components 206 may also generate a determination of potential outcomes or recommended actions to optimize task automation, e.g., by using predictive analytics. Predictive analytics models, including time series forecasting, decision trees, or neural networks, may be employed to forecast potential outcomes based on observed trends. These models may recommend optimal actions, such as pre-emptively reallocating resources in a finance scenario or escalating tickets in a customer support workflow.

[0141] The configured output task components 210 may be capable of executing required tasks or orchestrating multi-step workflows to complete complex tasks and triggering corresponding actions with the at least one data source, the external programming package or software application based on the relevant information and the generated determination, allowing the customized software application 200 to execute sequences of tasks. Each step in a workflow may interact with the other software applications 114 to perform specialized functions. For example, a customer inquiry may trigger a data retrieval task, followed by AI-based summarization, a compliance check, and finally a response generation routine integrated into an email client.

[0142] The output tasks of the customized software application 200 may be further configured to automatically update a database of the organization with processed results presented on a graphical user interface and trigger a notification to an interested person. As mentioned before, some output tasks may include writing processed results back into

organizational databases and notifying relevant stakeholders. These notifications can be issued through integrated communication tools such as email or dashboard alerts and may use rule-based logic to determine appropriate recipients based on task content, urgency, or departmental affiliation.

[0143] The integration module 286 may be further configured to establish communication protocols with the at least one data source, the at least one external programming package or software application and synchronize data between the customized software application and the at least one data source, the external programming package or software application to ensure consistency in the execution of the output tasks. In such case, the integration module 286 facilitates advanced synchronization with the other software applications used by the organization. To ensure consistency during task execution, the integration module may establish communication protocols using standard APIs and employ synchronization techniques such as eventual consistency or real-time mirroring. These approaches can maintain data coherence across different systems, even in distributed architectures.

[0144] The integration module 286 may further comprise data encryption and secure authentication protocols to safeguard sensitive information during task execution and further comprises a role-based access control mechanism configured to limit scope of interaction with the other software application. To address security and access control concerns, the integration module 286 may also support encryption of data in transit using protocols and authentication using token-based mechanisms. For example, role-based access control can be implemented to restrict component behaviour and data access according to user identity or assigned permissions. This ensures that integration actions are compliant with organizational policies and regulatory standards.

[0145] In some embodiments, the cognitive module 284 can refine decision-making processes by learning from previous tasks and outcomes, such that the customized software application 200 continuously improves its performance by integrating new data and adjusting the AI models 108 accordingly. The cognitive module 284 may monitor previous task outcomes, collects feedback, and adjusts decision parameters or retrain AI models as necessary. This can involve supervised learning pipelines, reinforcement learning loops, or auto-ML processes that fine-tune model weights or update decision trees. By integrating new

data and incorporating the results of completed workflows, the customized software application 200 becomes progressively more accurate, efficient, and aligned with organizational goals.

[0146] Illustrative embodiments of customized software applications 200 in the contexts of customer service, investigative services, and financial services will be described below to demonstrate how the technical framework 100 can be used to construct the customized software application 200.

Example 1: Customer Service GenAI Twin®

[0147] In a first exemplary embodiment, the technical framework 100 is used to construct a customized software application 200 referred to as "Customer Service GenAI Twin®" for handling incoming customer inquiries. The "Customer Service GenAI Twin®" embodiment illustrates how the technical framework 100 can be used to construct the customized software application 200 to automate and optimize customer service tasks, from data intake to response generation and system integration.

[0148] The "Customer Service GenAI Twin®" is configured to automate and improve workflows associated with customer service roles. This embodiment focuses on efficiently processing customer inquiries, analysing them, and generating responses. The modular architecture of the technical framework 100 provides for the configuration and assembly of various components 102, 106, 110, 112 of the technical framework 100 into an assembled set of configured components 202, 206, 220, 212 that can handle tasks ranging from email intake to data analysis and response generation according to requirements of customer service roles.

[0149] In the "Customer Service GenAI Twin®", the configured data processing components 202 are used to form a data processing module 282 that can extract customer inquiries or complaints from an organization's CRM system or email system using standard integration protocols such as RESTful APIs, SQL queries, or cloud-native data connectors. The data processing module 282 can gather internal data from internal sources, such as customer records or previous service interactions stored within the organization's databases or CRM systems. The data processing module 282 may collect external data, including customer

sentiment from social media posts or third-party customer feedback platforms. The configured data processing components 202 may further source external internet data through web scraping techniques or APIs to gather relevant social media sentiment or product reviews that assist in identifying customer issues. The data processing module 282 can process and prepare obtained data to provide relevant information for further analysis and decision-making.

[0150] The relevant information from the data processing module 282 is then passed to a cognitive module 284 of the “Customer Service GenAI Twin®”. The cognitive module 284 is configured to process the relevant information and generate a determination using configured decision-making components 206. In particular, the configured decision-making components 209 may use AI models or computations 108 for generating determinations based on the relevant information.

[0151] In the “Customer Service GenAI Twin®”, the AI models or computations 108 used by the configured decision-making components 206 may include NLP algorithms for understanding and interpreting customer queries, supervised learning models such as decision trees or deep learning networks for classifying customer queries into categories (e.g., complaint, inquiry, and support request) by topic or urgency, and unsupervised learning models for identifying trends or anomalies in the data. The decision-making components 106 configured for the “Customer Service GenAI Twin®” may also employ reinforcement learning models to enhance the decision-making process over time by learning from feedback to improve response accuracy. The configured decision-making components 206 may also apply a rule-based decision engine to handle specific, predefined customer service protocols. For example, if an inquiry concerns an urgent issue like a product return or complaint, the configured decision-making components 106 may prioritize it automatically.

[0152] In the “Customer Service GenAI Twin®”, the cognitive module 284 is used to generate output tasks for execution using the configured output task components 210 according to the determination. In particular, once a determination is made by the configured decision-making components 206, the configured output task components 210 will then generate the appropriate response. For instance, the configured output task components 210 may draft a response email or initiate a chatbot session. If human intervention is required, the “Customer Service GenAI Twin®” can escalate the issue and trigger an alert to a customer service

representative. These tasks may be automatically executed, ensuring that customer queries are resolved efficiently.

[0153] The configured output task components 210 of the “Customer Service GenAI Twin®” are capable of generating specific outputs based on the decisions made. This could involve generating automatic responses to customer inquiries. For text generation, advanced NLP models like GPT-based models may be used by the configured output task components 110 to generate human-like responses, while AI-driven sentiment analysis helps tailor the tone of the generated response. If the output task involves generation of an audio stream, an image or a video (e.g., instructional video for troubleshooting), generative AI models like Generative Adversarial Networks (GANs) may also be used by the configured output task components 110. Additionally, these output tasks can include creating reminders or alerts for customer service agents, generating reports, or invoking workflows in external systems.

[0154] The “Customer Service GenAI Twin®” also comprises an integration module 286 configured to receive the output tasks from the cognitive module 286 and execute the output tasks using configured integration components 212 with the at least one external programming package or software application 114. In particular, the configured integration components 212 for the “Customer Service GenAI Twin®” allow it to interact with external software applications or programming packages used within the organization in order to execute the generated output task. These tasks may involve invoking internal APIs to update customer accounts, initiating workflows in the organization's CRM system, or interacting with other enterprise software to carry out specific functions such as issue resolution or data synchronization. In various implementations, this integration may be accomplished using established frameworks or through direct API calls using different communication protocols, depending on the complexity and architecture of the software applications or programming packages involved.

[0155] The “Customer Service GenAI Twin®” also comprises an execution module 288 configured to execute the “Customer Service GenAI Twin®” customized software application 200 and to integrate and control the data processing module 282, the cognitive module 284, and the integration module 286 when deploying the “Customer Service GenAI Twin®”.

[0156] The “Customer Service GenAI Twin®” also comprises a database 280 for storing the data obtained from the at least one data source 104, the set of configured components 202, 206, 220, 212, and the results and output obtained from execution of output tasks when the “Customer Service GenAI Twin®” is executed.

Example 2: Compliance GenAI Twin®

[0157] In a second exemplary embodiment, the technical framework 100 is used to construct a customized software application 200 referred to as “Compliance GenAI Twin®” that is configured to automate internal investigative workflows by collecting case data, analysing patterns, and coordinating investigative steps. The “Compliance GenAI Twin®” embodiment illustrates how the technical framework 100 can be used to construct the customized software application to support investigative roles by processing internal and external data, analysing it for anomalies or fraud, and automating investigation tasks.

[0158] The “Compliance GenAI Twin®” is configured to automate and optimize tasks in investigative contexts. This embodiment allows for the efficient extraction, analysis, and task execution required for investigative work, ensuring that relevant data is efficiently processed, and actionable insights are generated. The modular architecture of the technical framework 100 provides for the configuration and assembly of various components 102, 106, 110, 112 from the technical framework 100 into an assembled set of configured components 202, 206, 220, 212 that can handle tasks such as fraud detection, compliance monitoring, or internal investigations according to requirements of investigative roles.

[0159] In the “Compliance GenAI Twin®”, the configured data processing components 202 are used form a data processing module 284 that can extract relevant information (such as transaction records, customer activity logs, or employee data) from various data sources 104 (including internal case management systems, databases, and law enforcement data repositories), and external sources (such as news outlets and public records). The data processing module 282 may collect external data from external sources, which might utilize public APIs or web scraping to track news articles, criminal databases, or social media mentions of relevant cases. Additionally, the data processing module 282 may process structured data from internal systems or databases to gather incident reports, surveillance data,

or witness statements. The data processing module 282 can further process and prepare obtained data to provide relevant information for analysis and decision-making.

[0160] The relevant information from the data processing module 282 is then passed to a cognitive module 284 of the "Compliance GenAI Twin®". The cognitive module 284 can then process the relevant information and generate a determination using the configured decision-making components 206. In particular, the configured decision-making components 206 may use AI models or computations 108 for generating determinations based on the relevant information.

[0161] In the "Compliance GenAI Twin®", decision-making made by the configured decision-making components 206 can be augmented through the AI models or computations 108 that classify data or identify patterns indicative of fraudulent activity or criminal behaviour. The decision-making components 206 configured for the "Compliance GenAI Twin®" may employ techniques like supervised learning (e.g., logistic regression or neural networks) for fraud detection to help in predicting likely suspects based on historical case data. The configured decision-making components 206 for the "Compliance GenAI Twin®" may also apply unsupervised models to detect anomalies in the data as well as to identify clusters of related incidents or flag anomalies (which could be critical in investigations where patterns often emerge from diverse data sources). The configured decision-making components 206 for the "Compliance GenAI Twin®" may also apply a reinforcement learning approach to optimize investigative strategies over time. The decision-making components 206 for the "Compliance GenAI Twin®" may also be configured to employ NLP to analyse textual data from external sources, such as news articles or social media posts, to identify potential risks or threats related to the investigation.

[0162] In the "Compliance GenAI Twin®", the cognitive module 284 is used to generate output tasks for execution using the configured output task components 210 according to the determination. In particular, once a determination is made by the configured decision-making components 206, the configured output task components 210 will then execute appropriate tasks. For instance, the configured output task components 210 may execute tasks such as flagging suspicious transactions, generating reports, summarizing investigation findings, alerts about suspicious activities or even notifications to human investigators. For example, if an

anomaly is detected in a financial transaction, the “Compliance GenAI Twin®” may generate an alert and create a case file for further investigation. If human intervention is required, the “Compliance GenAI Twin®” software application can trigger an alert to human investigators when certain triggers (e.g., certain keywords or patterns) are detected. The configured output task components 210 may also ensure that tasks such as reporting, alert generation, or system updates are carried out automatically.

[0163] In the "Compliance GenAI Twin®", the AI models or computations 108 used by the configured output task components 210 may include generative AI which can automatically generate detailed incident reports based on input data, summarizing key facts and evidentiary support. Predictive tasks such as estimating the likelihood of a case outcome could also be performed using the AI models or computations 108.

[0164] The "Compliance GenAI Twin®" also comprises an integration module 286 configured to receive the output tasks from the cognitive module 284 and execute the output tasks using the configured integration components 212 with the at least one external programming package or software application 114. In particular, the configured integration components 212 for the "Compliance GenAI Twin®" software application allow it to interact with external software applications or programming packages (such as case management platforms or third-party fraud detection services) in order to traceability and compliance with legal or regulatory requirements. These tasks may involve invoking law enforcement databases or third-party investigative software via APIs, facilitating data sharing and coordination across multiple platforms. The configured integration components 212 of the “Compliance GenAI Twin®” may further employ technologies like microservices or API gateways to facilitate communication between different systems, and work with external task orchestration tools to manage and automate investigative workflows.

[0165] The "Compliance GenAI Twin®" also comprises an execution module 288 configured to execute the "Compliance GenAI Twin®" software application 200 and to integrate and control the data processing module 282, the cognitive module 284, and the integration module 286 when deploying the "Compliance GenAI Twin®".

[0166] The "Compliance GenAI Twin®" also comprises a database 280 for storing the

data obtained from the at least one data source 104, the set of configured components 202, 206, 220, 212, and results and output obtained from execution of output tasks when the "Compliance GenAI Twin®" is executed.

Example 3: Finance GenAI Twin®

[0167] In a third exemplary embodiment, the technical framework 100 is used to construct a customized software application 200 referred to as "Finance GenAI Twin®" that is configured to perform financial data analysis, generate reports, and interface with accounting systems to support financial operations. The "Finance GenAI Twin®" embodiment illustrates how the technical framework 100 can be used to construct the customized software application to automate financial tasks, leveraging AI models and modular components to enhance financial decision-making and task execution.

[0168] The "Finance GenAI Twin®" is configured to automate and optimize tasks associated with financial service roles. This embodiment allows for the efficient extraction, analysis, and task execution required for financial work, ensuring that relevant data is efficiently processed, and actionable insights are generated. The modular architecture of the technical framework 100 provides for the configuration and assembly of various components 102, 106, 110, 112 from the technical framework 100 into an assembled set of configured components 202, 206, 220, 212 that can handle tasks such as reporting, budgeting, forecasting, and compliance, streamlining financial workflows and improving decision-making accuracy according to requirements of financial roles.

[0169] In the "Finance GenAI Twin®", the configured data processing components 202 are used to form a data processing module 282 that can gather financial data. The data processing module 282 for the "Finance GenAI Twin®" can gather internal financial data (which is related to income, expenses, and other financial transactions) from internal sources (such as general ledgers, transaction databases, and accounting software), and can also gather external financial data (such as market feeds, economic indicators, and news articles) from the financial data providers via APIs or through real-time web scraping to track stock prices, financial news, and economic indicators. The data processing module 282 may further process and prepare obtained data to provide relevant information for further analysis and decision-

making.

[0170] The relevant information from the data processing module 282 is then passed to a cognitive module 284 of the " Finance GenAI Twin®". The cognitive module 284 can then process the relevant information and generate a determination using the configured decision-making components 206. In particular, the configured decision-making components 206 may use AI models or computations 108 for generating determinations based on the relevant information.

[0171] In the " Finance GenAI Twin®", decision-making made by the configured decision-making components 206 can be augmented through the AI models or computations 108 that generate financial recommendations or analyses. The configured decision-making components 206 in the " Finance GenAI Twin®" may employ supervised learning models for predictive financial analytics, such as forecasting future revenue or identifying potential financial risks so as to predict the creditworthiness of loan applicants. The configured decision-making components 206 in the " Finance GenAI Twin®" may also use unsupervised learning models to identify anomalous financial transactions indicative of fraud. The configured decision-making components 206 in the " Finance GenAI Twin®" may also use rule-based decision engines to ensure that financial operations comply with regulatory standards, such as tax regulations or industry-specific compliance rules, and reinforcement learning models to optimize investment strategies by learning from market interactions, identifying the best portfolio management techniques based on real-time data. The configured decision-making components 206 in the " Finance GenAI Twin®" may employ NLP to analyse unstructured financial data, such as news articles or regulatory reports, to derive actionable insights related to market trends or risks.

[0172] In the " Finance GenAI Twin®", the cognitive module 284 is used to generate output tasks for execution using the configured output task components 210 according to the determination. In particular, once a determination is made by the configured decision-making components 206, the configured output task components 210 will then execute appropriate tasks. In one example, the configured output task components 210 may execute tasks such as generation of financial reports, risk assessments, or investment portfolio suggestions. In another example, if the " Finance GenAI Twin®" detects an unusual expenditure or transaction,

it may automatically generate an alert or initiate an investigation process. If human intervention is required, the "Finance GenAI Twin®" software application 200 can trigger an alert to human investigators when certain triggers (e.g., certain keywords or patterns) are detected, or escalate cases to human investigators. The configured output task components 210 may also ensure that tasks are carried out automatically.

[0173] In the " Finance GenAI Twin®", the AI models or computations 108 used by the configured output task components 210 may include generative AI which can automatically generate create summaries of financial performance or generate predictive insights for upcoming quarters. The AI models or computations 108 can be used to perform calculation tasks that involve complex financial modelling, such as calculating net present value, internal rate of return, or running Monte Carlo simulations for risk assessment. The AI models or computations 108 may further perform data handling tasks including aggregating transaction data, ensuring consistency across financial records, and processing various formats of financial data.

[0174] The " Finance GenAI Twin®" also comprises an integration module 286 configured to receive the output tasks from the cognitive module 286 and execute the output tasks using the configured integration components 212 with the at least one external programming package or software application 114. In particular, the configured integration components 212 for the " Finance GenAI Twin®" software application 200 allow it to interact with external software applications or programming packages used within the organization, such as banking software, ERP systems, payroll services and compliance platforms. The configured integration components 212 may also allow the " Finance GenAI Twin®" to integrate with financial market data providers or payment processors to execute tasks like performing currency conversions, updating stock holdings, or calculating tax liabilities. In general, the configured integration components 212 for the " Finance GenAI Twin®" ensure that tasks such as payment processing, reporting, and regulatory compliance checks are executed across multiple different systems, ensuring accuracy and efficiency. External task orchestration tools might also be used by the " Finance GenAI Twin®" software application 200 to manage and automate investigative workflows, such that processes like financial closing or transaction reconciliation are executed in sequence without manual intervention.

[0175] The " Finance GenAI Twin@" also comprises an execution module 288 configured to execute the " Finance GenAI Twin@" software application 200 and to integrate and control the data processing module 282, the cognitive module 284, and the integration module 286 when deploying the " Finance GenAI Twin@" software application 200.

[0176] The " Finance GenAI Twin@" also comprises a database 280 for storing the data obtained from the at least one data source 104, the set of components, and results and output obtained from execution of output tasks when the " Finance GenAI Twin@" software application 200 is executed.

[0177] From the above disclosure, it can be appreciated that the disclosed technical framework 100 allows various software components to be configured and assembled into customized software applications 200 that can perform the functions of a wide range of specific organizational roles of specific entity. By supporting integration with various data sources and other software systems, the technical framework 100 allows task flows to be defined and also modified whenever needed without requiring rewriting of large portions of code.

[0178] Using the disclosed technical framework 100, customized software applications 200 can be constructed with AI and GenAI technologies natively embedded at the architectural level, to perform cognitive tasks of different organizational roles within a specific entity that are typically handled by employees. The customized software applications 200 are virtual replicas of an organisation's employees in any roles, simulating their behaviour and performing manual and semi-manual tasks, in adherence with the organisation's policies, procedures, practices and internal controls. Each customized software application 200 effectively breaks down the employees' daily tasks, tasks performed in adherence with the organization's policies, procedures, and internal controls, into knowledge bases that are stored in the database 208. The customized software application 200 leverages large language models and other generative AI models 108 to provide the cognitive frameworks to execute the tasks based on the established knowledge bases, tasks typically performed by an employee or a group of employees.

[0179] Each customized software application 200 is tailored to perform specifically tasks typically handled by employees. By automating these tasks, it allows employees to focus on reviewing output of the customized software application 200, handling tasks beyond its scope,

or engaging in more value-added activities. Organizations can thus deploy various customized software applications 20 across their entire operations, such as sales, procurement, finance, compliance, or internal audit. Each customized software application 200 can be customized to the unique tasks of employees in these areas, allowing automation throughout the entire operations.

[0180] Implementation of the customized software applications 200 thus enhances productivity, consistency, efficiency, and decision-making within an organization. Unlike human workers, the customized software applications 200 do not require time off or financial compensation, leading to significant cost savings and productivity gains. Furthermore, by automating repetitive tasks, employees can focus on more complex, value-added responsibilities, which can boost employee morale. The customized software applications 200 also help reduce human error, ensure compliance, and streamline operations.

[0181] While there has been described in the foregoing description exemplary embodiments of the present invention, it will be understood by those skilled in the technology concerned that many variations in details of design, construction and/or operation may be made without departing from the present invention. It will be appreciated that many further alterations, modifications and permutations of various aspects of the described embodiments are possible that fall within the spirit and scope of the appended claims.

[0182] Throughout this specification and the claims which follow, unless the context requires otherwise, the word “comprise”, and variations such as “comprises” or “comprising”, will be understood to imply the inclusion of a stated integer or group of integers or steps but not the exclusion of any other integer or group of integers. The reference in this specification to any prior publication (or information derived from it), or to any matter which is known, is not, and should not be taken as an acknowledgment or admission or any form of suggestion that that prior publication (or information derived from it) or known matter forms part of the common general knowledge in the field of endeavour to which this specification relates.

Claims

1. A technical framework for constructing customized software applications, each customized software application configured to perform multiple different tasks comprised in one or more different staff roles within an organization, the technical framework comprising:
 - configurable data processing components for extracting and ingesting relevant information from data obtained from at least one data source comprising at least one of: a core system of the organization, a database, a data lake, an email system of the organization, and the internet;
 - configurable decision-making components that use at least one of a plurality of AI models or computations for generating at least one determination from the relevant information;
 - configurable output task components that use at least one of a plurality of AI models or computations for generating at least one output task for execution according to the at least one determination; and
 - configurable integration components that use at least one external programming package or software application for executing the at least one output task;wherein the technical framework has a modular architecture provided for:
 - configuring the data processing components, the decision-making components, the output task components, and the integration components; and
 - assembling a set of configured components comprising the configured data processing components, the configured decision-making components, the configured output task components and the configured integration components to form each customized software application.
2. The technical framework of claim 1, wherein the plurality of AI models comprise at least one of:
 - a supervised model and an unsupervised learning model to enhance decision-making and automation;
 - a rule-based decision engine configured to make automated decisions based on predefined rules and conditions;
 - a natural language processing (NLP) module for understanding, generating, and interpreting human language to facilitate task execution;

a computer vision AI model configured to process image-based inputs and extract structured data therefrom;

a computer audition AI model configured to analyse audio inputs and generate textual or semantic representations thereof;

a time series analysis AI model configured to analyse temporally ordered data and detect patterns, anomalies, or forecast future values; and

a generative AI (GenAI) model for creating new content or outputs based on data patterns.

3. The technical framework of claim 1 or claim 2, wherein the at least one output task includes at least one of: a synthesis task, a calculation task, a data handling task, and execution of the at least one external programming package or software application.
4. The technical framework of claim 3, wherein the synthesis task comprises generation of at least one of: text, an image, an audio stream, and a video.
5. The technical framework of claim 3 or claim 4, wherein the calculation task uses at least one of a computer, code, AI model or GenAI model and comprises at least one of: performing general calculations, executing functions and calculating statistics; performing an analysis of the relevant information; classifying the relevant information; performing a prediction based on the relevant information; performing a conditional logic test; and performing graph computation.
6. The technical framework of any one of claims 3 to 5, wherein the data handling task uses at least one of a computer, code, AI model or GenAI model and comprises at least one of: establishing at least one connection with the at least one data source; aggregating fields in the at least one data source query to obtain more relevant information; ensuring data consistency, uniform formats, and handling missing or inconsistent values; writing data back to the at least one data source or another data format; extracting information from the at least one data source; identifying data that fulfil predetermined conditions; and finding specific information in the at least one data source.

7. The technical framework of any one of claims 3 to 6, wherein the execution of the at least one external programming package or software application uses at least one of a computer, code, AI model or GenAI model and comprises at least one of: running the at least one external programming package or software application; performing a web search and reading information from a website; citing sources for response by an AI Large Language Model (LLM) or other models; and presenting a result.
8. The technical framework of any one of the preceding claims, further comprising a graphical user interface provided for a user to configure at least one of: the data processing components; the decision-making components; the output task components; the integration components; and to assemble the set of components.
9. A customized software application configured to perform a specific role in an organization and created using the technical framework of any one of claims 1 to 8, the customized software application comprising:
 - a data processing module comprising the configured data processing components and configured to ingest data from the at least one data source, the external programming package or software application; and to extract relevant information from the ingested data;
 - a cognitive module comprising the configured decision-making components and configured output task components, the cognitive module configured to process the relevant information, generate a determination, and generate output tasks for execution according to the determination;
 - an integration module comprising the configured integration components and configured to receive the output tasks from the cognitive module and execute the output tasks with the at least one of: the data source and the at least one external programming package or software application;
 - an execution module configured to execute the customized software application and to integrate and control the data processing module, the cognitive module, and the integration module when the customized software application is deployed, and
 - a database for storing therein: the data obtained from the at least one data source, the set of configured components, and results and output obtained from execution of output tasks when the customized software application is executed.

10. The customized software application of claim 9, wherein the data processing module uses at least one of a plurality of AI models or computations, and further comprises at least one of:
 - an interface mechanism to ingest data;
 - a data validation mechanism to ensure accuracy and integrity of the ingested data; and
 - a filtering mechanism to extract relevant information and remove irrelevant data.
11. The customized software application of claim 9 or claim 10, wherein the data processing module is further configured to continuously obtain new data from the at least one data source using the configured data processing components to process the obtained data using at least one of the configured decision-making components according to relevance of the obtained data.
12. The customized software application of any one of claims 9 to 11, wherein the configured decision-making components are configured to:
 - use historical or real-time data from the relevant information to make dynamic decisions based on evolving conditions; and
 - generate a determination of potential outcomes or recommended actions to optimize task automation.
13. The customized software application of any one of claims 9 to 12, wherein the configured output task components are configured to:
 - execute required tasks or orchestrate multi-step workflows to complete complex tasks;
 - and
 - trigger corresponding actions with the at least one data source, the external programming package or software application based on the relevant information and the generated determination.
14. The customized software application of any one of claims 9 to 13, wherein the output tasks are further configured to automatically update a database of the organization with processed results presented on a graphical user interface and trigger a notification to an interested person.

15. The customized software application of any one of claims 9 to 14, wherein the cognitive module is configured to refine decision-making processes by learning from previous tasks and outcomes and wherein the customized software application continuously improves its performance by integrating new data and adjusting the AI models accordingly.
16. The customized software application of any one of claims 9 to 15, wherein the integration module is configured to:
 - establish communication protocols with the at least one data source and the at least one external programming package or software application; and
 - synchronize data between the customized software application and the at least one data source, the external programming package or software application to ensure consistency in the execution of the output tasks.
17. The customized software application of any one of claims 9 to 16, wherein the integration module further comprises data encryption and secure authentication protocols to safeguard sensitive information during task execution and further comprises a role-based access control mechanism configured to limit scope of interaction with the other software application.
18. The customized software application of any one of claims 9 to 17, wherein the execution module is further configured to manage storing of data in the database.
19. The customized software application of any one of claims 9 to 18, wherein the database is further configured to store therein data obtained from the external programming package or software application.
20. The customized software application of any one of claims 9 to 19, wherein the database is further configured to store therein policies, procedures, practices and internal controls of the organization that are relevant to the role, and wherein the execution module is configured to execute the customized software application in accordance with the stored policies, procedures, practices and internal controls.