[0011] According to a first aspect of the present disclosure, there is provided a computer-implemented method performed by one or more data processors, including: collecting a data set for training a machine-learning model to predict response messages, wherein collecting the data set for the training includes storing one or more previous messages included in a previous communication session between any network device of a plurality of network devices and any terminal device of a plurality of terminal devices; facilitating a communication session between a first terminal device of the plurality of terminal devices and a first network device of the plurality of network devices, wherein the first terminal device is associated with an agent and the first network device is associated with a user, and wherein the communication session enables the first terminal device and the first network device to exchange one or more messages; receiving a new message during the communication session; evaluating the new message using the trained machine-learning model, wherein evaluating the new message using the trained machine-learning model includes evaluating any messages exchanged before the new message was received, and wherein evaluating the new message using the trained machine-learning model further comprises dynamically, and in real-time, determining the routing of a response to the new message; predicting the response to the new message, wherein predicting the response includes using a result of the evaluation to determine which previous message to select from the data set as the predicted response to the new message; and facilitating routing and displaying the predicted response at the first terminal device, wherein when the predicted response is selected, the predicted response is automatically routed and transmitted to the first network device during the communication session.

[0012] According to a second aspect of the present disclosure, there is provided a system, including: one or more data processors; and a non-transitory computer-readable storage medium containing instructions which, when executed on the one or more data processors, cause the one or more data processors to perform operations including: collecting a data set for training a machine-learning model to predict response messages, wherein collecting the data set for the training includes storing one or more previous messages included in a previous communication session between any network device of a plurality of network devices and any terminal device of a plurality of terminal devices; facilitating a communication session between a first terminal device of the plurality of terminal devices and a first network device of the plurality of network devices, wherein the first terminal device is associated with an agent and the first network device is associated with a user, and wherein the communication session enables the first terminal device and the first network device to exchange one or more messages; receiving a new message during the communication session; evaluating the new message using the trained machine-learning model, wherein evaluating the new message using the trained machine-learning model includes evaluating any messages exchanged before the new message was received, and wherein

evaluating the new message using the trained machine-learning model further comprises dynamically, and in real-time, determining the routing of a response to the new message; predicting the response to the new message, wherein predicting the response includes using a result of the evaluation to determine which previous message to select from the data set as the predicted response to the new message; and facilitating routing and displaying the predicted response at the first terminal device, wherein when the predicted response is selected, the predicted response is automatically routed and transmitted to the first network device during the communication session.

[0013] According to a third aspect of the present disclosure, there is provided a computer-program product tangibly embodied in a non-transitory machine-readable storage medium, including instructions configured to cause a data processing apparatus to perform operations including: collecting a data set for training a machine-learning model to predict response messages, wherein collecting the data set includes storing one or more previous messages included in a previous communication session between any network device of a plurality of network devices and any terminal device of a plurality of terminal devices; facilitating a communication session between a first terminal device of the plurality of terminal devices and a first network device of the plurality of network devices, wherein the first terminal device is associated with an agent and the first network device is associated with a user, and wherein the communication session enables the first terminal device and the first network device to exchange one or more messages; receiving a new message during the communication session; evaluating the new message using the trained machine-learning model, wherein evaluating the new message includes evaluating any messages exchanged before the new message was received, and wherein evaluating the new message using the trained machine-learning model further comprises dynamically, and in real-time, determining the routing of a response to the new message; predicting the response to the new message, wherein predicting the response includes using a result of the evaluation to determine which previous message to select from the data set as the predicted response to the new message; and facilitating routing and displaying the predicted response at the first terminal device, wherein when the predicted response is selected, the predicted response is automatically routed and transmitted to the first network device during the communication session.

[0014] Advantageously, the increasingly dynamic nature of data ingested into and processed by systems (e.g., routing systems, the communication server described herein, and other suitable systems) introduces complexity into network environments. Executing bot scripts to autonomously and automatically process tasks involving the complex ingested data can cause undue burden on processing resources in the systems (e.g., incorrect routing of messages may cause servers or queues to be overloaded). Embodiments of the present disclosure provide

CLAIMS

1. A computer-implemented method performed by one or more data processors, comprising:

collecting a data set for training a machine-learning model to predict response messages, wherein collecting the data set for the training includes storing one or more previous messages included in a previous communication session between any network device of a plurality of network devices and any terminal device of a plurality of terminal devices;

facilitating a communication session between a first terminal device of the plurality of terminal devices and a first network device of the plurality of network devices, wherein the first terminal device is associated with an agent and the first network device is associated with a user, and wherein the communication session enables the first terminal device and the first network device to exchange one or more messages;

receiving a new message during the communication session;

evaluating the new message using the trained machine-learning model, wherein evaluating the new message using the trained machine-learning model includes evaluating any messages exchanged before the new message was received, and wherein evaluating the new message using the trained machine-learning model further comprises dynamically, and in real-time, determining the routing of a response to the new message;

predicting the response to the new message, wherein predicting the response includes using a result of the evaluation to determine which previous message to select from the data set as the predicted response to the new message; and

facilitating routing and displaying the predicted response at the first terminal device, wherein when the predicted response is selected, the predicted response is automatically routed and transmitted to the first network device during the communication session.

2. The computer-implemented method of claim 1, further comprising:

identifying an attribute associated with a previous message included in the data set;

appending an attribute tag to the previous message, wherein the attribute tag corresponds to the identified attribute; and

training the machine-learning model using the attribute tag.

3. The computer-implemented method of claim 1, wherein the communication session between the first terminal device and the first network device includes a bot, wherein the bot is configured to autonomously communicate with the first network device.

4. The computer-implemented method of claim 3, further comprising:

evaluating the new message using the bot, wherein evaluating the new message includes automatically identifying a query from the new message, and wherein the new message is evaluated in real-time as the new message is received;

querying a database using the identified query; and

displaying one or more results of the querying at the terminal device.

5. The computer-implemented method of claim 1, wherein the machine-learning model includes a recurrent neural network (RNN) or a convolutional neural network (CNN).

6. The computer-implemented method of claim 1, wherein determining the predicted response message further comprises:

generating a vector representation of the new message;

using the machine-learning model to compare the vector representation of the new message to an additional vector representation of the one or more previous messages included in the data set; and

selecting a previous message from the one or more previous messages included in the data set, wherein the previous message is selected based on the comparison.

7. The computer-implemented method of claim 1, further comprising:

generating a matrix for a candidate message, wherein the matrix includes a number of words included in the previous message and a vector representation of the previous message;

generating an additional matrix for the new message, wherein the additional matrix includes a number of words included in the new message and a vector representation of the new message; and

comparing the matrix with the additional matrix to determine whether to select the previous message as the predicted response.

8. A system, comprising:

one or more data processors; and

a non-transitory computer-readable storage medium containing instructions which, when executed on the one or more data processors, cause the one or more data processors to perform operations including:

collecting a data set for training a machine-learning model to predict response messages, wherein collecting the data set for the training includes storing one or more previous messages included in a previous communication session between any network device of a plurality of network devices and any terminal device of a plurality of terminal devices;

facilitating a communication session between a first terminal device of the plurality of terminal devices and a first network device of the plurality of network devices, wherein the first terminal device is associated with an agent and the first network device is associated with a user, and wherein the communication session enables the first terminal device and the first network device to exchange one or more messages;

receiving a new message during the communication session;

evaluating the new message using the trained machine-learning model, wherein evaluating the new message using the trained machine-learning model includes evaluating any messages exchanged before the new message was received, and wherein evaluating the new message using the trained machine-learning model further comprises dynamically, and in real-time, determining the routing of a response to the new message;

predicting the response to the new message, wherein predicting the response includes using a result of the evaluation to determine which previous message to select from the data set as the predicted response to the new message; and

facilitating routing and displaying the predicted response at the first terminal device, wherein when the predicted response is selected, the predicted response is automatically routed and transmitted to the first network device during the communication session.

9. The system of claim 8, wherein the operations further comprise:

identifying an attribute associated with a previous message included in the data set;

appending an attribute tag to the previous message, wherein the attribute tag corresponds to the identified attribute; and

training the machine-learning model using the attribute tag.

10. The system of claim 8, wherein the communication session between the first terminal device and the first network device includes a bot, wherein the bot is configured to autonomously communicate with the first network device.

11. The system of claim 10, further comprising:

evaluating the new message using the bot, wherein evaluating the new message includes automatically identifying a query from the new message, and wherein the new message is evaluated in real-time as the new message is received;

querying a database using the identified query; and

displaying one or more results of the querying at the terminal device.

12. The system of claim 8, wherein the machine-learning model includes a recurrent neural network (RNN) or a convolutional neural network (CNN).

13. The system of claim 8, wherein predicting the response further comprises:

generating a vector representation of the new message;

using the machine-learning model to compare the vector representation of the new message to an additional vector representation of the one or more previous messages included in the data set; and

selecting a previous message from the one or more previous messages included in the data set, wherein the previous message is selected based on the comparison.

14. The system of claim 8, wherein the operations further comprise:

generating a matrix for a candidate message, wherein the matrix includes a number of words included in the previous message and a vector representation of the previous message;

generating an additional matrix for the new message, wherein the additional matrix includes a number of words included in the new message and a vector representation of the new message; and

comparing the matrix with the additional matrix to determine whether to select the previous message as the predicted response.

15. A computer-program product tangibly embodied in a non-transitory machine-readable storage medium, including instructions configured to cause a data processing apparatus to perform operations including:

collecting a data set for training a machine-learning model to predict response messages, wherein collecting the data set includes storing one or more previous messages included in a previous communication session between any network device of a plurality of network devices and any terminal device of a plurality of terminal devices;

facilitating a communication session between a first terminal device of the plurality of terminal devices and a first network device of the plurality of network devices, wherein the first terminal device is associated with an agent and the first network device is associated with a user, and wherein the communication session enables the first terminal device and the first network device to exchange one or more messages;

receiving a new message during the communication session;

evaluating the new message using the trained machine-learning model, wherein evaluating the new message includes evaluating any messages exchanged before the new message was received, and wherein evaluating the new message using the trained machine-learning model further comprises dynamically, and in real-time, determining the routing of a response to the new message;

predicting the response to the new message, wherein predicting the response includes using a result of the evaluation to determine which previous message to select from the data set as the predicted response to the new message; and

facilitating routing and displaying the predicted response at the first terminal device, wherein when the predicted response is selected, the predicted response is automatically routed and transmitted to the first network device during the communication session.

16. The computer-program product of claim 15, wherein the operations further comprise:

identifying an attribute associated with a previous message included in the data set;

appending an attribute tag to the previous message, wherein the attribute tag corresponds to the identified attribute; and

training the machine-learning model using the attribute tag.

17. The computer-program product of claim 15, wherein the communication session between the first terminal device and the first network device includes a bot, wherein the bot is configured to autonomously communicate with the first network device.

18. The computer-program product of claim 17, further comprising:

evaluating the new message using the bot, wherein evaluating the new message includes automatically identifying a query from the new message, and wherein the new message is evaluated in real-time as the new message is received;

querying a database using the identified query; and

displaying one or more results of the querying at the terminal device.

19. The computer-program product of claim 15, wherein the machine-learning model includes a recurrent neural network (RNN) or a convolutional neural network (CNN).

20. The computer-program product of claim 15, wherein predicting the response further comprises:

generating a vector representation of the new message;

using the machine-learning model to compare the vector representation of the new message to an additional vector representation of the one or more previous messages included in the data set; and

selecting a previous message from the one or more previous messages included in the data set, wherein the previous message is selected based on the comparison.