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Providing Content Items Based On Determination That A Chat Conversation Relates To A Business Transaction

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ABSTRACT

An online messaging application receives content that describes a conversation conducted via the online messaging application between a user and a business entity having a presence on the online messaging application. Features are extracted from the content and a transaction prediction model is applied to predict a likelihood that the conversation describes a transaction between the user and the business entity. Based on the predicted likelihood that a transaction has occurred, content items are identified for presentation to the user.

KEYWORDS

- Online messaging
- E-commerce
- Machine learning
- Online transaction
- Financial transaction
- Targeted advertising
- Targeted content

BACKGROUND

Online messaging applications allow users to engage in conversations with each other by exchanging messages. Online messaging applications also allow business entities to have a presence such that messages can be communicated between the users and the business entities. Furthermore, various types of transactions occur between business entities and users of the online messaging applications during the course of conducting e-commerce. Such transactions can include, e.g., a user purchasing a product from a business entity, subscribing to a service provided by the business entity, redeeming an offer provided by the business entity, etc. These transactions are described in messaging conversations between the business entities and the users, such as through image data (e.g., an image of a bank receipt or a payment receipt), text data (e.g., information describing the type of transaction, a transaction identification number), etc.

To improve user engagement with online messaging applications, online messaging applications select content for presentation to their users based on the users' predicted affinity for the content. An affinity of a user for content can be predicted based on various types of information such as information describing transactions that previously did or did not occur between the user and business entities. For example, an online messaging application may predict that a user of the online messaging application has a higher affinity for a first content item than for a second content item, if a transaction previously occurred between the user and a business entity associated with the first content item, and did not previously occur between the user and a business entity associated with the second content item.

However, it is difficult to accurately determine the content to present to users. One reason for this is that manual review of conversations between a user and a business entity associated with the content may be required to determine whether the conversation describes a transaction that occurred between the user and the business entity. Such manual review can be too time-consuming and expensive to be feasible for large numbers of users. Therefore, online messaging applications are unable to utilize transaction information when predicting affinities of users to content.

DESCRIPTION

An online messaging application as described herein predicts a likelihood that a conversation conducted via the online messaging application describes a transaction between a user and a business entity. More specifically, the online messaging application receives (from the user and/or the business entity) content describing the conversation and extracts features from the content. For example, the features are extracted by applying a feature extraction model that is trained to extract features from the content. Features can include, e.g., a set of image patterns extracted from image data included among the content, a set of word embeddings extracted from text data included among the content, etc.

The online messaging application then utilizes a transaction prediction model that is trained to predict a likelihood that a conversation describes a transaction between the user and a business entity. The transaction prediction model is trained based on additional features extracted from content describing conversations between users and business entities, as well as information describing one or more transactions occurring between the users and the business entities. The transaction prediction model utilizes the features extracted from the content to predict the likelihood that the conversation describes a transaction.

Based on the predicted likelihood and/or information received from the business entity that confirms the transaction, the online messaging application adjusts a value associated with presenting a content item associated with the business entity to the user. The adjusted value is provided to a content selection process that selects content for presentation to the user.

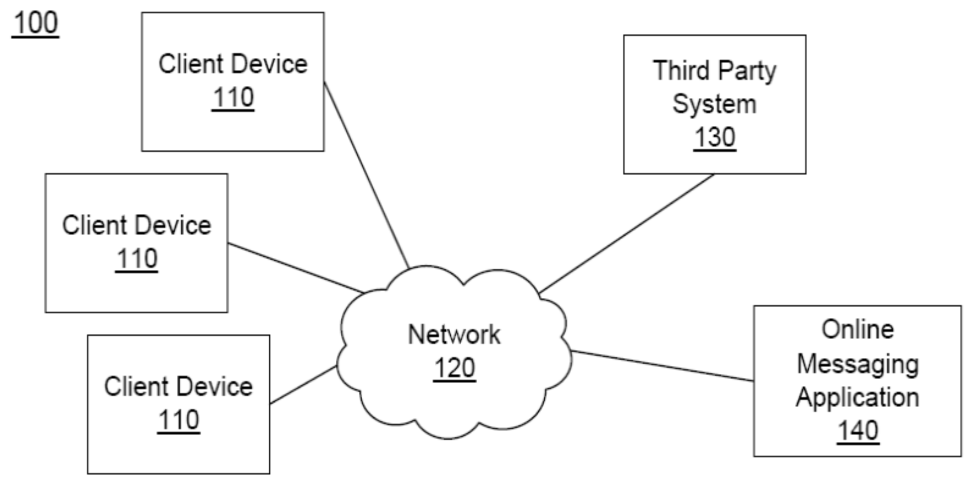

FIG. 1

FIG. 1 is a block diagram of a system environment 100 for an online messaging application 140. The system environment in FIG. 1 includes client devices 110, one or more third-party systems 130, and the online messaging application, all of which communicate with each other via a network 120.

The client devices can a computer, phone, tablet, or other electronic device capable of receiving user input, as well as transmitting and/or receiving data via the network. The client device executes an application to allow a user of the client device to interact with the online messaging application via the network.

The third-party system is operated by an application provider that communicates with the online messaging application via the network, so as to communicate information such as advertisements or other content for presentation by the client device. The third-party system also communicates information about or for use by an application provided by the third-party system and that executes on the client device.

FIG. 2 is a flowchart of an example method (200) to predict a likelihood that a conversation via the online messaging application describes a transaction between a user and a business entity. The operations shown in the flowchart need not necessarily occur in the exact order shown. Furthermore, various operations may be removed, modified, combined, or added, as appropriate in specific implementations.

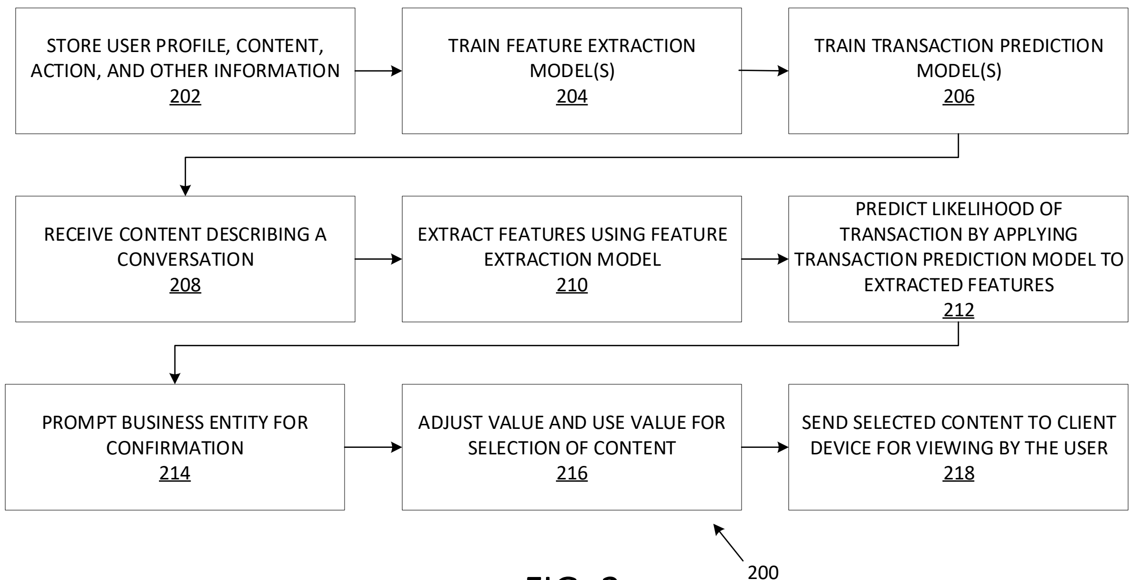

FIG. 2

Each user of the online messaging application has a user profile, which is stored (202) by the online messaging application. A user profile includes information about the user that was provided by the user, and also may include profile information inferred by the online messaging application such as relationships with other persons, frequency or amount of interaction with other users or with business entities, a level of interest in a piece of content, etc. The online messaging application also stores user profiles for entities such as businesses or organizations, so as to enable an entity to post information about itself or its products/services. Users and business entities store objects, such as text, images, a page (e.g., a brand page), videos, online postings, links, advertisements, and other types of content items or media that can be shared with other entities/users via the online messaging application, thereby enhancing the interaction between users/entities through the online messaging application.

The online messaging application also stores information to track/log user actions. Examples of actions include adding a connection to another user, sending a message to another user, uploading an image, reading a message from another user, viewing content associated with another user, etc. Actions can also involve the users' interaction with an object or with an entity, such as commenting on text, image, or other content posted by other users or business entities; sharing links; creating or accessing content items; joining an event or group; engaging in a transaction (including viewing a branding webpage, clicking on advertisements, and other shopping and buying patterns and activities); etc.

Data about the user's actions is used to infer interests/preferences of the user, thereby augmenting the information included in the user's user profile and enabling a more complete understanding of the user preferences for purposes of predicting affinities of the user.

The online messaging application also stores content describing one or conversations conducted via the online messaging application between the user and a business entity. The content is contained in or associated with one or more messages sent between the user and the business entity. Each message can include various types of data, such as text, images (e.g., graphics, photos, a payment receipt for a transaction, a bank receipt , etc.), videos, audio (e.g., voice messages, music, etc.), hyperlinks, or any other types of data/content. The content may also include metadata that identifies the user and business entity, the times/duration of the conversation, device information (e.g., device ID, geographic location, etc.) of the client device involved in the conversation, and other information. As an example, messages between a user and a business entity may include text discussing a product being offered for sale, a submission by the user of an order for the product, and an image of a receipt from the business entity to evidence a payment for the product.

The stored content may be redacted, obfuscated, or otherwise made anonymous in some circumstances. For example, address or credit card information may be redacted from the stored content. Users or business entities are given options to specify whether or how their information is stored and used. For instance, a user may disallow certain types of information from being stored, may limit the storage duration of the information, and may also specify conditions under which the information is permitted to be used.

Stored content describing one or more conversations is used (with user consent) for training using machine-learning techniques. For example, the content may be used to train (204) a feature extraction model to extract features from the content of other conversations. The features may include a pattern, character (e.g., a letter or a number), a logo, or any other suitable type of graphic from image data, and may include words, phrases, word embeddings (e.g., vector representations of words), etc. from text data. The feature extraction model may be trained by using a natural language processing technique, a word embedding algorithm, an image classification algorithm, or any other suitable type of machine-learning technique. The feature extraction model may be retrained (e.g., periodically or after a threshold amount of training data is received at the online messaging application) as needed in order to provide updated or more refined results.

The extracted features are used to train (206) a transaction prediction model to predict a likelihood that a conversation between a user and a business entity describes a transaction between them. Examples of types of transactions with a business entity include a purchase of a product, a subscription to a service, a redemption of an offer, etc. The likelihood predicted by the transaction prediction model can be in the form of a percentage, a range of percentages, a decimal, etc.

The transaction prediction model may be trained based on training data that includes a set of features extracted from content describing a set of conversations between a set of users and a set of business entities (e.g., a set of features extracted by the feature extraction model), as well as information describing one or more transactions that occurred between the set of users and the set of business entities. In an example, the transaction prediction model may be implemented using a convolutional neural network. The transaction prediction model may be retrained as needed (e.g., periodically or after a threshold amount of training data is received at the online messaging application) to provide updated or more refined results.

The transaction prediction model may also be trained to predict a likelihood that a conversation between a user and a business entity describes a transaction, based on an intent of the user. The intent of the user may be determined based on a set of features extracted from the content (e.g., a set of word embeddings extracted from text data). For example, the content may include text data such as “I would like to subscribe to your newsletter. My email address is …”). In this example, based on features extracted from the text data, the transaction prediction model may determine that an intent of the user corresponds to subscribing to a service provided by the business entity and predict a likelihood that the conversation describes a transaction between the user and the business entity based on the intent of the user.

With the models thus trained as described above, the online messaging application can thereafter use the trained models to extract features from incoming content and to make predictions based on the extracted features. Content is received (208) that describes a conversation conducted via the online messaging application between a user and a business entity. The online messaging application receives the content from a client device of the user and/or the business entity.

The content is provided as an input to the feature extraction model to extract (210) features from the content. The feature extraction model provides the extracted features as an output.

The transaction prediction model is then applied to the extracted features to predict (212) a likelihood that a conversation between a user and a business entity describes a transaction between them. The transaction prediction model may then provide an output corresponding to a predicted likelihood that the conversation describes a transaction.

If the predicted likelihood meets at least a threshold likelihood, the online messaging application prompts (214) the business entity to confirm whether the transaction occurred. If the business entity confirms that the transaction occurred, then a value (e.g., a value associated with presenting a content item associated with a business entity to a user) is adjusted (216) to a higher value, or adjusted to a lower value if the business entity confirms that the transaction did not occur.

In another situation, if the predicted likelihood is less than the threshold likelihood, the online messaging application may also prompt the business entity to confirm whether the transaction occurred. In this situation, if the business entity confirms that the transaction did not occur, the value is adjusted to a lower value, and the value is adjusted to a higher value if the business entity confirms that the transaction occurred.

The value can be adjusted based on other criteria, such as an adjustment based on a bid amount associated with the content item, a cost to present a given number of the content item, etc. The value may also be adjusted based on a predicted likelihood that a conversation describes a transaction between the user and the business entity. For example, the value may be adjusted such that the value is proportional to the predicted likelihood. After the adjustment of the value, the adjusted value is provided to a content selection process. The content selection process uses the adjusted value to select one or more content items for presentation to the viewing user.

A content item eligible for presentation to a viewing user can be a content item associated with at least a threshold number of targeting criteria satisfied by characteristics of the viewing user. For example, measures of relevance of various content items to a viewing user can be determined based on the stored user profile and based on the viewing user's affinity for different content items. Content items having the highest measures of relevance or value (e.g., a bid amount), or having at least a threshold measure of relevance or value are selected. Content items can also be ranked based on their associated measures of relevance or value, and content items having the highest positions in the ranking or having at least a threshold position in the ranking can be selected. A conversion factor may be used to unify the bid amount and the measure of relevance associated with a content item into a single value used in the ranking process.

The content item can include one or more advertisements as well as other types of content items that may be of interest to the user, such as content describing actions associated with other users connected to the viewing user. An order in which selected content items are presented to the user can also be determined. For example, the content items may be presented in an order based on likelihood of the viewing user interacting with various content items. Once selected, the content item(s) is sent (218) for display in the client devices of the viewing user.

CONCLUSION

The techniques described herein enable an online messaging application to predict a likelihood that a conversation conducted via the online messaging application describes a transaction between a user and a business entity. Based on the predicted likelihood that a transaction has occurred, content items are identified for presentation to the user.