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Graphical Augmentation of Message Content

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Graphical Augmentation of Message Content

ABSTRACT

This disclosure describes techniques for automatic augmentation and/or generation of message content. Per techniques of this disclosure, message content is visually augmented based on content recognition and/or user indication. The visual augmentation includes emphasis of specific message content and/or addition of graphical overlay elements based on the message content or user selection. The visual augmentation is portable across platforms and devices. With user permission and express consent, trained machine learning models are used to detect sentiment being expressed in a message and/or key reference points included in the message. Augmentations are suggested based on the detected sentiment or key reference points. Textual cues provided by the user are utilized to surface entities that are related to the textual cues. Based on the entities, user intent and sentiment, a suitable graphical overlay is provided. An augmented message with suggested overlays is displayed to the user, ready for sending or further edits.

KEYWORDS

- Content augmentation
- Message annotation
- Content annotation
- Editing tool
- Graphical overlay
- Content highlights
- Sentiment detection

BACKGROUND

Messaging via email and social media is a popular way of communication between users. Historically, messaging platforms (email, chat, etc.) mainly supported plain text, but have evolved to increasingly support rich text format and inclusion of ideograms such as emojis, etc. Messaging platforms require users to perform the formatting edits.

Some messaging platforms provide predictive content to assist users in composing messages. The predictive content is generated by utilizing trained machine learning models and provides an improved messaging experience for end users. The quality of predicted responses varies significantly, depending on the application in use. Users often create repetitive content for the same purpose, e.g., writing congratulatory emails, birthday wishes, etc. and perform actions to format the content for presentation before sending messages to other users.

DESCRIPTION

This disclosure describes techniques for augmentation of message content. Per techniques of this disclosure, implemented with user permission to access content, message content is visually augmented based on content recognition and/or user indication. The visual augmentation can include emphasis of certain portions of the message content, addition of graphical overlay elements based on the message content, etc. The visual augmentation is portable across platforms and devices. The techniques are implemented using the following components:

- **Trained machine learning models** that detect content sentiment and key reference points in messages.
- **Automated discovery of entities** associated with message content across diverse datasets.

- **User interface** to support manual, automated, and hybrid editing of augmented messages.

Trained ML models that detect content sentiment and key reference points

Machine learning models are trained to detect sentiment, e.g., positive/negative, happy/sad, increase/decrease, growth/decline, etc. that is expressed in a message. Natural language classifiers are utilized to cover a variety of use cases that include emotional, social, financial, etc. reference points. The sentiment can also be manually provided by the creator of the message.

The machine learning models are also trained to detect key reference points, constructs, keywords, and content that is likely of higher importance relative to other content within the same message. The models can utilize a variety of user-permitted factors from the message content for the detection of the key reference points.

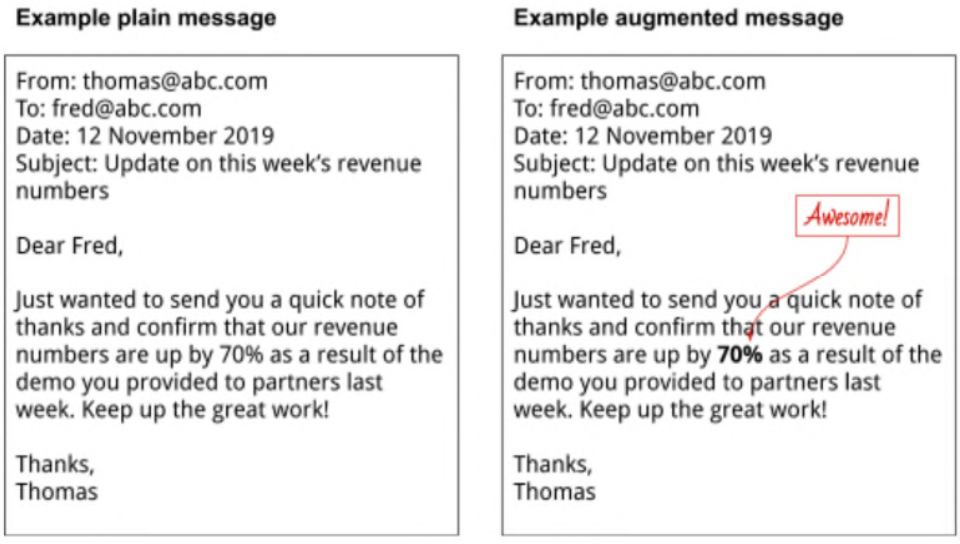

Fig. 1: A key portion within the message is highlighted

Fig. 1 illustrates an example of message augmentation, per techniques of this disclosure. In this illustrative example, a user has composed an email message to a colleague regarding improved revenue numbers and expressing gratitude to the colleague.

Per techniques of this disclosure, with user permission and express consent, augmentations to the email message are suggested to the user. A positive sentiment for the message is detected based on the content in the email message. Additionally, the content "70%" is determined to be a key reference point as content that is likely of higher importance to the sender and recipient(s) relative to other message content and is highlighted.

A graphical overlay that includes a box, colored text, and an arrow and provides additional emphasis to the key reference point is included in the augmented email message. The location of the graphical overlay is associated with the key reference point within the message body content to enable suitable display of the augmented email message on the device(s) of the recipient(s). The user is provided with an option to select some or all of the suggested augmentations or to modify augmentations before sending the augmented email message.

The association of the key reference point(s) with the graphical overlay enables suitable display of overlays on a variety of recipient devices and platforms, independent of a presentation layer within a messaging application that is utilized by the recipient. The graphical overlays can dynamically adjust based on a variation in shape and size of the message window(s) of the recipient(s) viewing the augmented message.

The user is also provided with an option, e.g., via a formatting toolbar, to manually augment the message, wherein users can manually select text to highlight and augment with an associated graphic.

Automated discovery of entities associated with message content

In addition to key reference point(s) determined using machine learning techniques, textual cues provided by the user can be utilized to surface entities that are related to the provided textual cues. Some examples of such cues are:

- "happy birthday <name/>"
- "throwback to when I was in <place/>"
- "trip to <place/> with <person/>"
- "<food/> in <place/> with <person/>"

The textual cues can be provided by the user, or selected from a list of suggested cues. The cues are automatically linked to entities (person, place, food, etc.) related to the user. With user permission and express content, entities (photographs, location details, trip details, etc.) related to the textual cue(s) are obtained and ranked in order of their relevance to the textual cue(s).

The related entities are ranked using natural language techniques such as named entity recognition, intent classification, sentiment detection, etc.; computer vision techniques (object detection, segmentation, etc.); and/or information retrieval techniques such as learning to rank. The related entities can be stitched together coherently using a sequence-to-sequence machine learning model.

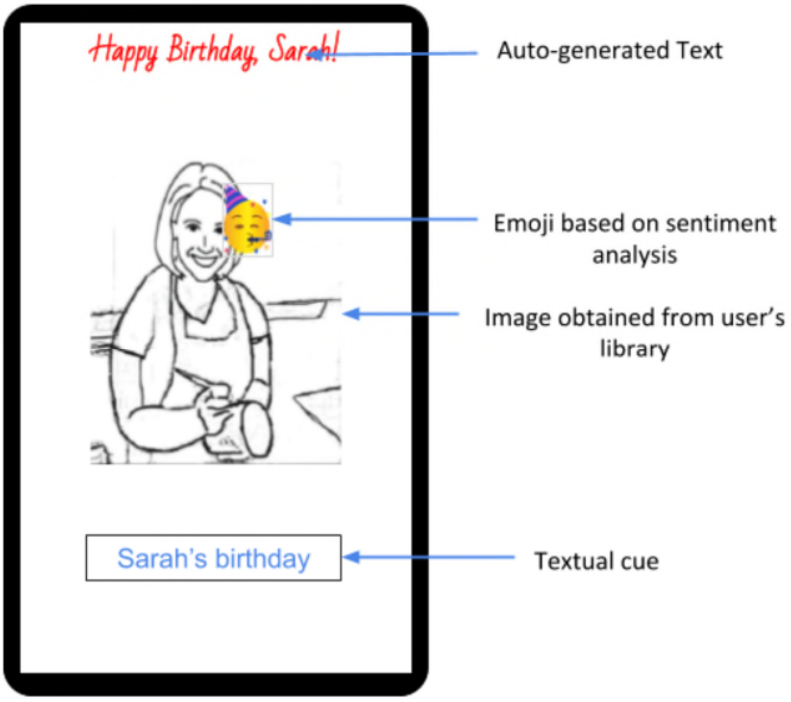

Fig. 2: Automatic generation and overlay of annotations

Fig. 2 illustrates an example generation and overlay of annotations based on a user provided textual cue. In this illustrative example, the user has provided a textual cue - "Sarah's birthday."

If the user permits, based on the textual cue, the entity "Sarah" is identified from user data, e.g., the user's photo library, the user's social graph, etc. The user can be provided multiple options of the entity for the user to select to display. It is determined that the user is composing a message to wish Sarah for her birthday. Based on the determined intent and sentiment, a suitable template is selected from a suite of thematic and context specific templates. With user permission and express consent, an image of Sarah is obtained, and incorporated into the selected template. Templates can be static (specific positions and/or formatting for specific types of content) or can be dynamic (generated using machine learning techniques).

Text is generated and formatted based on the user input (“Happy Birthday, Sarah!”) by a machine learning model and is suitably positioned in the message. Emojis and/or GIFs are incorporated to either replace or complement existing message content. Placement of the content can be based on the template.

The generated message is displayed to the user. The user can transmit the message in the suggested form or make additional edits.

User interface to support manual, automated, and hybrid editing of augmented messages

A user interface is provided for augmented message creation that supports manual editing, automated editing, and hybrid editing of messages. The user interface can be particularly useful in mobile devices where editing message content can be more difficult due to the limited viewing space, absence of physical keyboard, etc. Options of overlays for augmented messaging can be provided for user selection via a formatting toolbar that enables expanded editing capabilities. The options can be provided in a variety of messaging applications - email, chat/messaging, social media, etc. Automated predictive editing can be provided via a user interface that enables messages to be automatically augmented with emphasized content and/or overlays without any user intervention. Hybrid options can also be provided wherein a combination of user-provided and automated edits are combined to obtain an augmented message.

The techniques described herein can be utilized to provide a more powerful set of editing capabilities in messaging applications. The editing capabilities can be adapted to the context and use case, e.g., enterprise, social, advertising, etc. The use of augmented messaging as described herein has many advantages such as:

- Expands traditional message editing capabilities

- Provides a new paradigm for emphasizing content within messages
- Transcends email, SMS, text, IM messaging formats
- Transcends mobile, web, desktop messaging clients
- Transcends vendor-specific implementations
- Provides recipients with the ability to identify items of higher relevance faster
- Provides creators with the ability to associate and convey sentiment
- Classifiers can be expanded based on themes (social, financial, retail, manufacturing, engineering, etc.)

Further to the descriptions above, a user may be provided with controls allowing the user to make an election as to both if and when systems, programs or features described herein may enable collection of user information (e.g., information about a user's social network, social actions or activities, profession, a user's preferences, or a user's current location), and if the user is sent content or communications from a server. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user's identity may be treated so that no personally identifiable information can be determined for the user, or a user's geographic location may be generalized where location information is obtained (such as to a city, ZIP code, or state level), so that a particular location of a user cannot be determined. Thus, the user may have control over what information is collected about the user, how that information is used, and what information is provided to the user.

CONCLUSION

This disclosure techniques for automatic augmentation and/or generation of message content. Per techniques of this disclosure, message content is visually augmented based on

content recognition and/or user indication. The visual augmentation includes emphasis of specific message content and/or addition of graphical overlay elements based on the message content or user selection. The visual augmentation is portable across platforms and devices. With user permission and express consent, trained machine learning models are used to detect sentiment being expressed in a message and/or key reference points included in the message. Augmentations are suggested based on the detected sentiment or key reference points. Textual cues provided by the user are utilized to surface entities that are related to the textual cues. Based on the entities, user intent and sentiment, a suitable graphical overlay is provided. An augmented message with suggested overlays is displayed to the user, ready for sending or further edits.

REFERENCES

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