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Context-aware Message Delivery With Sender-Specified Priority

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Context-aware Message Delivery With Sender-Specified Priority

ABSTRACT

Solutions to manage incoming messages such as email, chat, etc. put the burden on the message recipient. In the absence of cues from the message sender about the urgency and/or importance, the recipient cannot determine whether a message requires immediate attention without reading the message first. As a result, many users hesitate to adopt solutions that defer message delivery or notification out of a fear of missing an urgent message that requires prompt action. This disclosure describes techniques to provide message senders capabilities to augment sent messages by specifying additional information, such as priority and contextual delivery parameters. Recipient applications can use the sender-provided additional information about the message to manage incoming message delivery. With user permission, relevant information regarding the recipient's context can be used as an additional factor in determining appropriate message delivery times.

KEYWORDS

- Text message
- Chat message
- Messaging app
- Message priority
- Message delivery
- Voice assistant
- Do Not Disturb (DND)
- User context

BACKGROUND

Messaging, including email and chat, is one of the major uses of smartphones and other client devices. The constant arrival of incoming communication via various messaging applications can make people feel pressured to read and respond immediately, thus increasing stress. To reduce such stress, users often employ one or more mitigation strategies such as skimming messages and delaying any response, limiting checking messages to specific times, activating special device modes to limit interruptions from incoming messages, etc. For instance, a user may choose to turn notifications off or set their device to a "Do Not Disturb" mode. All of these solutions to manage incoming messages put the burden of deciding when to receive incoming messages on the message recipient.

In the absence of cues from the message sender about the urgency and/or importance of a message, the recipient cannot determine whether the message requires immediate attention without reading the message first. As a result, many users hesitate to adopt solutions that defer message delivery or notification out of a fear of missing an urgent message that requires prompt action.

DESCRIPTION

This disclosure describes techniques to provide message senders capabilities to augment sent messages by specifying additional information, such as priority and contextual delivery parameters. Recipient applications can use the sender-provided additional information about the message to manage incoming message delivery according to the recipient user's convenience and preferences. With user permission, relevant information regarding the recipient's context can be used as an additional factor in determining appropriate message delivery times.

For each message, a sender can specify a priority setting indicating the urgency with which the message should reach the recipient. The setting can take one of several possible values, such as:

- **Urgent**: The message is to be delivered immediately, e.g., a message about a critical security incident.
- **As soon as possible**: The message is to be delivered at the earliest possibility, e.g., message regarding plans for the next day.
- **Anytime**: The message is to be delivered whenever convenient for the recipient, with the appropriate delivery time determined automatically with the permission of the recipient.

In addition to the priority setting, the sender can specify one or more contextual delivery parameters based on factors such as time, events, etc. If the recipient permits, such parameters can be based on determining information related to the recipient's context. For instance, such parameters can include:

- **Times**: Time-based specification for delivering the message, e.g., "at 9 p.m.," "after lunch," "at the end of the business day," "first thing next morning," etc.
- **Events**: Event-based specification for delivering the message, e.g., "on her birthday," "one hour before the next meeting," "when she reaches home," etc.

The user interface (UI) and user experience (UX) of message composition is augmented to include the ability for senders to assign priorities and delivery parameters with minimal effort. For example, such UI/UX extensions can include one or more of the following mechanisms:

- **Voice assistant**: Voice commands issued to a voice assistant, e.g., "This message is urgent," "Make sure Alice gets the message one hour before our next meeting," etc.

- **Contextual menu**: Menus that contain various options for specifying priority and delivery parameters that are available on demand via UI mechanisms such as right clicks, long presses, etc.
- **Automated inference**: Machine learning based mechanisms to automatically infer and assign priority and/or delivery parameters based on the output of a machine learning model that processes, with the sender's permission, the message input and additional contextual information about the sender.

In each case, senders receive information regarding the assigned priority and/or delivery parameters, e.g., shown on a display, announced via voice, etc. The described mechanisms can be combined with message composition. For instance, the sender can issue a voice command to a voice assistant that includes the message content along with the priority, delivery parameters, and recipient, e.g., "Ask Alice 'How was your ride?' when she reaches home." By default, messages have no priority or delivery parameters attached. In such cases, the message delivery operation functions the same as the current operation that lacks any sender-specified additional information.

On the recipient side, a message delivery module processes each incoming message, with the recipient's permission. The processing involves examining the incoming message for sender-specified information regarding priority and/or delivery parameters. If no sender-specified information exists, messages are delivered to the recipient immediately or upon explicit request from the recipient, depending on the delivery settings of the recipient messaging application and/or the device operating system.

In case the sender has specified priority and/or delivery parameters, the message is delivered at an appropriate time corresponding to the sender-specified information. For instance,

the message can be delivered at a precisely specified time (e.g., “at 10 a.m. Monday morning”) or during a time interval in which the recipient is likely to be receptive to the particular message. In the latter case, if the recipient permits, the appropriate message delivery time interval most suitable to the recipient can be based on one or more of several factors such as: highest probability of reading and responding to the message based on recipient availability, low amount of distraction in the recipient’s environment, lack of explicit non-interaction indicators, such as “Do Not Disturb” mode. Measures of relevant factors, such as response probability, availability, distraction, can in turn be based on one or more aspects related to the recipient’s messaging practices and situational context, obtained with permission. These aspects can include, e.g., ongoing messaging activity, typical messaging reading and responding routines, explicitly scheduled time for message processing, free slot on the calendar, etc.

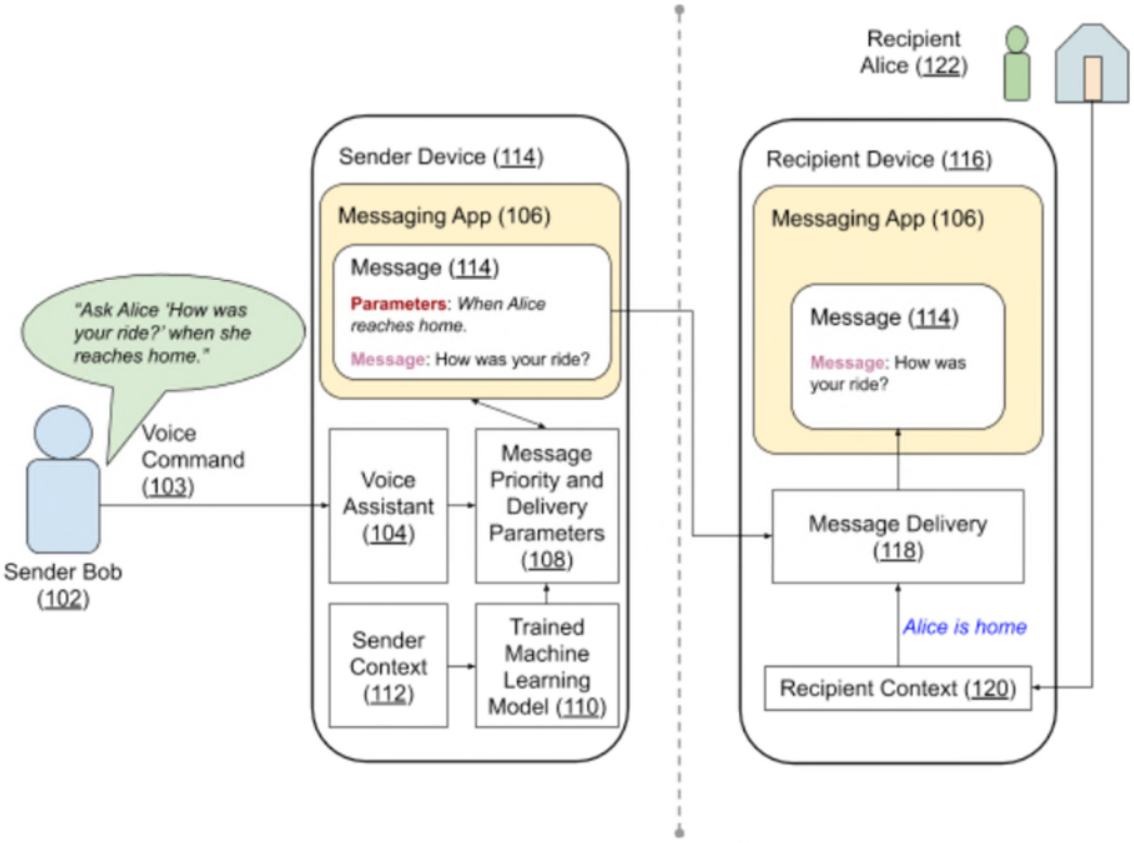

Fig. 1: Contextually appropriate message delivery based on sender-specified parameters

Fig. 1 shows an example of operational implementation of the techniques described in this disclosure. The user Bob (102) issues a voice command (103) to a voice assistant (104). The command specifies that Bob wishes to send the message "how was your ride?" to a recipient user Alice (122) when Alice reaches home by inclusion of the content and delivery parameters for messaging Alice (122) "Ask Alice <message> when she reaches home."

The command is provided to a message priority and delivery parameters module (108) on Bob's device (114), e.g., smartphone, smart speaker, or other device. The module is configured to determine the contents of Bob's message as well as any message priority and/or delivery parameters. The determination is based on the relayed command and the output of a trained machine learning model (110) that (optionally) analyzes Bob's context (112) with Bob's permission. The output of the message priority and delivery parameters module is passed on to the messaging app (106) which displays the message (114) along with priority and/or delivery parameters.

After Bob's approval, the message is sent to the message delivery module (118) on Alice's device (116). The module analyzes information about Alice's context (120) obtained with Alice's permission. Upon receiving indication that Alice has reached home, Bob's message is relayed to Alice and shown in the messaging app on her device. While the foregoing discussion refers to message analysis on respective client devices, server-based analysis of the message can be performed when sender and recipients provide permission for such analysis.

The techniques described above can be integrated within the UI/UX and operation of any messaging or email application and/or implemented as a service operating at the operating system or platform level. Further, the techniques can be used to extend the text messaging capabilities provided by various utility applications, such as maps, translation software, etc. As

described above, voice assistants can be augmented to support the enhanced messaging functionalities presented in this disclosure.

The described techniques enable message recipients to optimize their attention to incoming communication without worrying about missing critical messages. With permission from users, the described techniques perform message delivery in a manner that respects the delivery requirements of senders as well as recipients, thus improving the UX of messaging applications.

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 describes techniques to provide message senders capabilities to augment sent messages by specifying additional information, such as priority and contextual delivery parameters. Recipient applications can use the sender-provided additional information about the message to manage incoming message delivery according to their convenience and preferences.

With user permission, relevant information regarding the recipient's context can be used as an additional factor in determining appropriate message delivery times. The techniques can be integrated within any messaging or email application and/or implemented as a service operating at the operating system or platform level. The described techniques enable message delivery that respects the delivery preferences of senders as well as recipients and improves the UX of messaging applications.