Technical Disclosure Commons

Defensive Publications Series

September 2020

Contextual Locally Generated Suggestions

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Contextual Locally Generated Suggestions

ABSTRACT

This disclosure describes techniques for automatic generation and presentation of communication parameters via a virtual assistant dialog to a user that is engaged in another activity, e.g., driving a vehicle. The parameters are generated locally based on user-permitted contextual factors. Users can select from the presented options by using any combination of voice input, touch/gesture input, etc. The generated parameters can include, e.g., call/message recipients, message content, etc. The recipients are suggested based on prior on-device activity. Upon user selection of a message recipient, message content options are provided based on ranking candidate messages based on the context. With user permission, appropriate contextual information, e.g.. a destination, current location, etc. is included in the body of the candidate message.

KEYWORDS

- Voice assistant
- Virtual assistant
- Cognitive load
- Hands-free mode
- In-car voice assistant
- Message body
- Suggested response
- Contextual suggestion
- User context

BACKGROUND

While driving, users can access a virtual assistant that is integrated in an in-vehicle audio and navigation system or by utilizing their mobile device virtual assistant by placing the mobile device in a driving mode. A common use case for a virtual assistant when a user is driving is for communication related tasks, e.g., placing and receiving calls, sending and receiving messages, etc. Such tasks are a source of cognitive distraction to the driver since the tasks involve multiple steps that include identification of a recipient, selection of a mode of communication, composition of message, etc. Additionally, road noise, vehicle noise, and other distractions can introduce errors in the performance of the task, e.g. during selection of options, etc. Always-available, fast, and responsive techniques for interaction with a virtual assistant can minimize driver distraction thus enhancing the user experience and can also improve safety.

DESCRIPTION

This disclosure describes the automatic generation and presentation of communication-related options and parameters for easy user selection via a virtual assistant dialog for use when driving (or in other contexts where distraction is a factor). The options and parameters are generated locally, based on user context (obtained with user permission) and can be selected by a user using a suitable combination of voice dialog and on-screen selection. The described techniques can be implemented in virtual assistant software accessed via a device directly installed in a vehicle, e.g. integrated into a head unit or dashboard of a car and/or in virtual assistant software accessed via user mobile devices configured in a driving mode.

With user permission and express consent, on-device and contextual information available locally on a user's device such as location (e.g., GPS-based location) information, vehicle information, navigation information, network strength, etc., are utilized to generate

communication parameters, e.g. message recipient, message body, etc. The contextual information is obtained by utilizing first-party application programming interfaces (API) or third-party APIs. Examples of contextual information include a navigation state (e.g., time-to-destination, destination, current location, whether the destination is a home location or a work location), recipients and/or originators of recent calls and/or messages with the user , locally stored messages that were previously received and/or sent, network signal strength, etc.

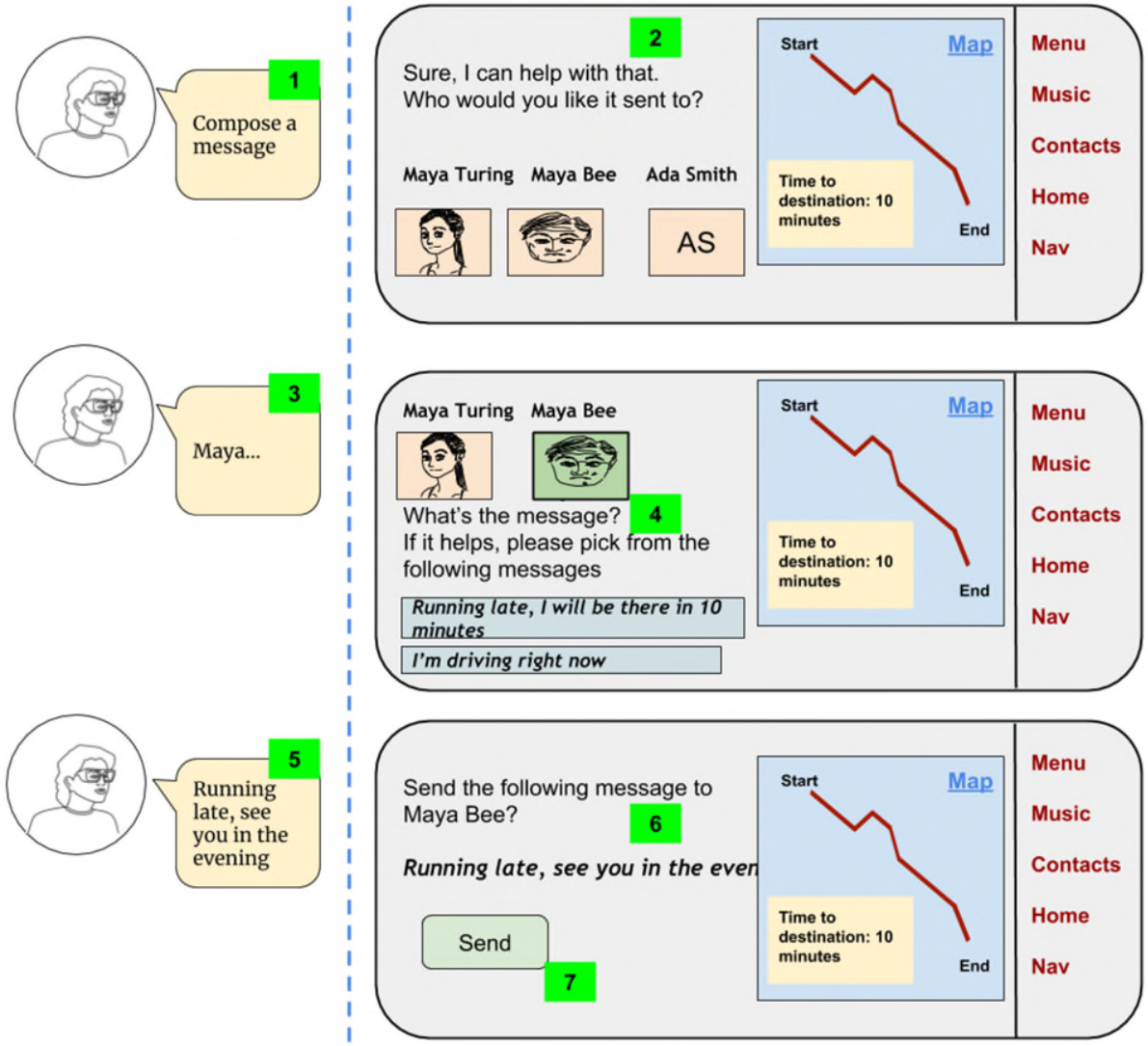

Fig. 1: Context information and device history based generation of communication options

Fig. 1 depicts an example dialog between a user who is driving and an in-vehicle virtual assistant, per techniques of this disclosure. In this illustrative example, the user intends to compose and send a message to a message recipient via their virtual assistant.

The user initiates a voice dialog (1 - “Compose a message”) with the virtual assistant. In response, the virtual assistant retrieves likely message recipients based on previous on-device user message activity and presents the message recipient options via a display (2 - “Who would you like…”) for user selection. To enable easy selection with minimal cognitive load, the options are displayed on the screen along with an image, e.g. avatar image, photo, as a large tap-target. The user may select a recipient from the screen or may further narrow down the choices via voice dialog.

In this illustrative example, the user starts to speak the name of the recipient (3 - “Maya...”). Displayed message recipients are filtered when the on-device system detects partial recognition of recipients based on voice input that matches the names of the recipients. For example, based on detection of the initial portion of the recipient names, non-matching recipients are removed from the display and only message recipients that are determined to match the user input are displayed (4 - “Ada Smith” is removed from the display). The matching can be based on any part of the user name, e.g., if the user in the example of Fig. 1 has a contact named “Jacob Maya” the contact would be retained after the word “Maya” is spoken.

Upon user selection of the specific message recipient, e.g., via voice or touch input, message body options are generated based on previously used messages and presented to the user (“Running late, I will be there in 10 minutes” and “I’m driving right now”). Contextual information such as a time to a destination (e.g., 10 minutes) or location information are obtained from available on-device information and included with the body of a message, where suitable.

The user can select a message body from the presented message body options via touch input or can provide a message body via voice input.

In this illustrative example, the user provides spoken input providing the message content (5 - “Running late, see you in the evening”). The message recipient and message body are displayed for final user confirmation (6 - “Send the following…”). Upon user confirmation, the message is transmitted (7- Send button).

While the example of Fig. 1 illustrates the user providing spoken input for the action (“compose a message”), recipient (“Maya…”), and message content (“running late…”), the virtual assistant can accept touch input, gesture input, or any other type of input at any stage. For example, the user may tap “Maya Bee” and then select from the suggested message content by tapping on the screen.

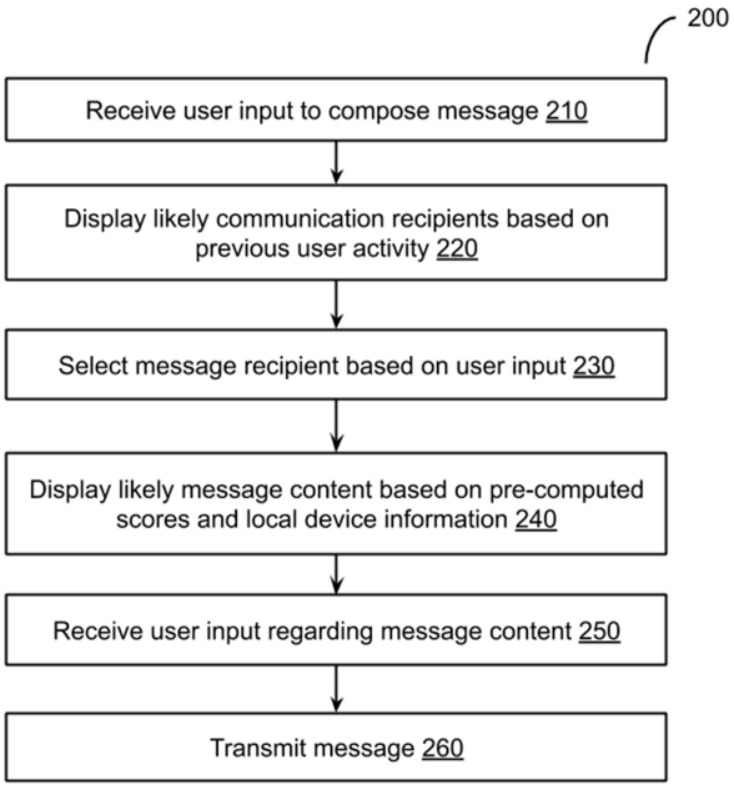

Fig. 2: Contextual on-device generation of communication parameters

Fig. 2 depicts an example workflow (200) for contextual on-device generation and selection of communication parameters, per techniques of this disclosure. The workflow commences with the receipt of user input, e.g. via a voice command, touch input, etc. to compose a message (210). Likely message or call recipients are displayed on a screen of the user device based on previous user history (220). As described with reference to Fig. 1, the display of likely recipients can include images and/or tap targets for easy selection by the user. A specific recipient is identified (230) based on user provided input, e.g., via a tap on the screen or by voice input. If user intent is to place a call, a call is placed to the intended recipient.

If the user intent is to send a message, based on the selected message recipient, candidate message body content (for example, “I'm driving right now," "I'll call you later," "Running late. Be there in <X> minutes," "Let me call you in <X> minutes," "I've got bad coverage. Let me call you later", etc.) are determined based on prior interaction history and other contextual factors, as permitted by the user.

The candidate content options are ranked and the top ranking candidates are presented (240) via the user interface of the virtual assistant. The scoring of candidate messages is based on a current user context. For example, messages such as "Running late. Be there in <X> minutes" or "Let me call you in <X> minutes" can be determined to have a high score when a navigation system is in active use. As another example, a message "I've got bad coverage. Let me call you later" can be determined to have a high score if the network strength is poor.

User provided input regarding an intended message is received (250), e.g., via voice or touch input. The requested user action, e.g., transmit a message, is performed (260) upon user confirmation.

Automatic generation of communication parameters and options by utilizing user-permitted local contextual information can provide accurate predictive options since these are based on the current context. The described techniques can be implemented in an on-device manner, without transmitting data to a server, thus ensuring privacy of user information. Further, such implementation also provides superior performance under conditions of poor network connectivity which can occur often while on the road.

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 contacts, message content, a user's current location, device context such as use of a navigation application), 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 for automatic generation and presentation of communication parameters via a virtual assistant dialog to a user that is engaged in another activity, e.g., driving a vehicle. The parameters are generated locally based on user-permitted contextual factors. Users can select from the presented options by using any combination of voice input, touch/gesture input, etc. The generated parameters can include, e.g., call/message

recipients, message content, etc. The recipients are suggested based on prior on-device activity. Upon user selection of a message recipient, message content options are provided based on ranking candidate messages based on the context. With user permission, appropriate contextual information, e.g.. a destination, current location, etc. is included in the body of the candidate message.

REFERENCES

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