

Technical Disclosure Commons

Defensive Publications Series

September 27, 2017

Automatic context-based customization of voicemail response

Alexandru Damian

Victor Carbune

Follow this and additional works at: http://www.tdcommons.org/dpubs_series

Recommended Citation

Damian, Alexandru and Carbune, Victor, "Automatic context-based customization of voicemail response", Technical Disclosure Commons, (September 27, 2017)
http://www.tdcommons.org/dpubs_series/692



This work is licensed under a [Creative Commons Attribution 4.0 License](https://creativecommons.org/licenses/by/4.0/).

This Article is brought to you for free and open access by Technical Disclosure Commons. It has been accepted for inclusion in Defensive Publications Series by an authorized administrator of Technical Disclosure Commons.

Automatic context-based customization of voicemail response

ABSTRACT

This disclosure describes a voicemail generator to provide automatic context-based custom voicemail responses, when users provide consent to access contextual data for generation of voicemail responses. The voicemail generator employs a prediction model that is configured to predict multiple factors, e.g., action type, user availability, and caller-specific customizations, that are used to automatically generate a customized voicemail response.

KEYWORDS

- voicemail
- user context
- prediction model
- personalization
- virtual assistant
- phone call

BACKGROUND

Use of voicemail responses is common when a user is unavailable to answer a call. For example, the voicemail response can be a system-generated default response, e.g., “This user is not reachable, leave a message,” or can be user-generated response, e.g., “You’ve reached Alex. Sorry, I can’t take your call right now. Please leave a message.” However, such fixed messages do not provide any contextual information that may be useful to the caller, e.g., an expected time when the called user may be available, etc.

DESCRIPTION

This disclosure describes techniques to provide automatic context-based custom voicemail responses. The techniques are implemented to automatically generate voicemail responses for users that provide consent to access contextual data for generation of voicemail responses. For users that do not provide consent, the default voicemail message is used. The techniques enable users to specify contextual factors or signals that are used. The user can selectively permit or deny access to such factors, and only those factors for which the user has provided permission are used. For example, based on user-specified settings, different voicemail responses are generated for different types of callers. The voicemail responses are customized based on user provided permissions and the user's relationship with each type of caller.

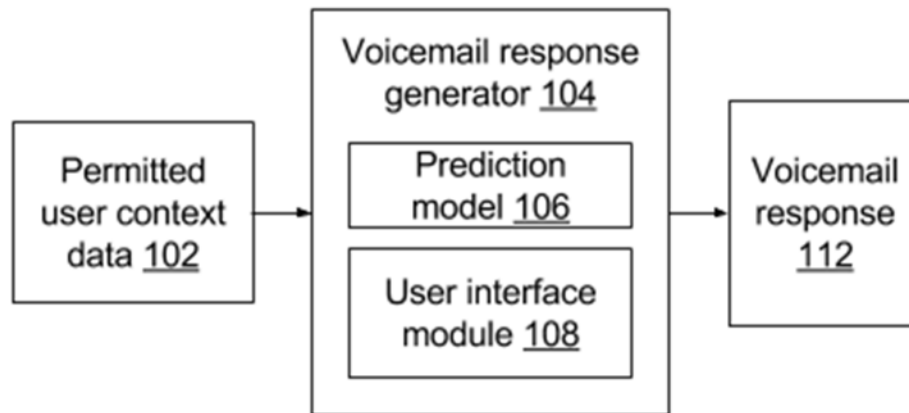


Fig. 1: Customized voicemail response generator

Fig. 1 illustrates a customized voicemail response generator (104). The voicemail generator (104) employs a prediction model (106) to analyze permitted user context data (102) to generate a context-based customization of voicemail response (112). The prediction model is configured to predict multiple factors that can be used to automatically generate a customized voicemail response. A first factor can be an action type based on the current context of the user,

e.g., “the user is driving,” “the user is on another call,” “the user is in a meeting,” etc. A second factor can be a prediction of when the user is likely to be available, e.g., “in two hours,” “in 10 minutes,” etc. A third factor can be a privacy level for the voicemail response that is determined based on the caller, e.g., “private,” “coworkers,” “friends and family,” etc. Other factors can also be used.

The prediction model uses a set of context specific signals. Only those signals that are permitted by the user for such use are utilized by the prediction model. Examples of context signals include user location, a current application in use (e.g., on the user’s phone), a user’s calendar/ e-mail, user’s address book, records of past interactions with the caller (e-mails, messages, chats, calls, etc.)

The prediction model can be implemented as disjoint small machine learning models that generate predictions for individual factors or a single machine learning model that predicts multiple factors. Standard machine learning models such as feed-forward neural networks and recurrent neural networks and pre-trained embeddings (for text sequences) are suitable for use as prediction models. Alternatively, a more complex combination of input networks that support reading of different types of context signals, e.g., convolution layers for images, etc. can be employed. In this case, after the different input signals are processed via different sub-networks, the signals are combined using a final classification layer that outputs the factors.

The prediction model is trained using user data that the users have permitted for use as training data. Training data can include aggregated logs of situations where users missed calls and permitted user context signals at the time of each missed call. Additionally, context signals such as a time at which a user returned missed calls, or was called back by the caller, are used to train predictors to determine user availability. Further, when users permit use of other actions

that are used to respond to callers, e.g., email, chat message, etc., they can be used to train predictors of the action type.

The output of the prediction model is used to generate a context-based voicemail response phrase. For example, the response phrase can be generated based on heuristics. Alternately, a recurrent neural network as part of a generative model can be used to generate more personalized sentences.

The voicemail response generator also includes a user interface module (108). The user interface module displays, e.g., via voice or on screen, the customized voicemail response that will be sent to a caller if the user doesn't answer an incoming call. For example, the message could say: "if you don't manage to pick-up, communicating to X that you're driving." The user interface module also enables users to provide permissions to include certain types of actions (e.g., "driving") in the customized voicemail response and to exclude some types of actions (e.g., "meeting"). The user interface module also enables users to specify privacy relationships with different types of callers that are used to generate the context-based voicemail response. The user interface module also permits the user to specify permissions for contextual signals that are used to generate the customized voicemail response, and to specify that contextual voicemail response be turned off. The techniques described can be implemented as part of a software assistant (e.g., on a user's mobile phone) or as a feature of a mobile operating system.

While the foregoing discussion describes use of machine learning modes, it is also possible to implement automatic customized voicemail responses by prompting a user to provide a message via a spoken interface (e.g., "would you like to leave a particular message for this person to call you later?"). Alternatively, a library of hard-coded messages can be used. Further,

instead of or in addition to machine learning based prediction models, multiple heuristics can be used to generated predictions.

Example of use

If a user Alice, who has provided permission to access context data, is unavailable to take a call while driving, based on her relationship with the caller, the voicemail message is automatically customized. For example, callers that are identified as friends or family receive the message: “Alice is currently driving and she will be able to call you back in about 1 hour, feel free to leave a message after the tone.” Other callers, e.g., those not in the address book receive a message such as: “Alice is unavailable, please her call after a few hours” or “Alice is unavailable; the best time to reach her is in the evening.”

Further, if the context indicates that Alice is on her way to a location associated with the caller, the voicemail response is “Alice is 15 minutes away from you, may be easier to just talk to her in person.” If Alice provides permissions to share contextual data with callers, e.g., family or friends, the voicemail response can include such information, e.g., “Alice is driving to Bellinzona, Switzerland and she’ll reach here in 5 hours.”

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 a voicemail generator to provide automatic context-based custom voicemail responses. The voicemail generator automatically generates customized voicemail responses based on user context, when users provide consent to access contextual data for generation of voicemail responses. The voicemail generator employs a prediction model that is configured to predict multiple factors, e.g., action type, user availability, and caller-specific customizations, that are used to automatically generate a customized voicemail response.