Technical Disclosure Commons

February 21, 2018

Polite mode for a virtual assistant

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Polite mode for a virtual assistant

ABSTRACT

The use of imperative statements and commands for a voice-activated virtual assistant can set an inappropriate example to children and can potentially lead them to imitate such language in normal conversation. However, current voice-activated virtual assistants are not configured to recognize polite language which can lead to unintended responses. This disclosure describes a virtual assistant that can be configured in a polite mode. The disclosed techniques may be utilized to configure a virtual assistant such that it is responsive only to polite queries. Polite mode is enabled by use of voice stress analysis, sentiment analysis module and natural language understanding (NLU) techniques that are utilized to annotate words/phrases from a query and to determine whether the query is polite.

KEYWORDS

- Voice assistant

- Digital assistant

- Voice stress analysis

- Sentiment analysis

- Natural language understanding

- Polite mode

- Smart speaker

BACKGROUND

Virtual assistants, e.g., activated via text or voice command, are configured to recognize imperative statements, e.g., "Turn on the lights!" to be instructions from users. While such commands enable efficient interaction between users and virtual assistants, the conversation

often sounds abrupt or coarse, in contrast to human conversations that typically are not abrupt or coarse. For example, humans often instruct each other to perform certain tasks, e.g., with a request such as "could you pass the butter, please?"

The use of imperative statements and commands for a voice-activated virtual assistant can set an inappropriate example to children and can potentially lead them to imitate such language in normal conversation. However, current voice-activated virtual assistants are not configured to recognize polite language which can lead to unintended responses. For example, a request such as "Can you find me a nearby supermarket, please?" can result in the voice-activated virtual assistant providing a response such as: "Sorry, I could not find a place called *supermarket please*." In this instance, the voice-activated virtual assistant interprets the "please" to be part of the name of a supermarket and is therefore unable to provide an appropriate response.

DESCRIPTION

In many contexts, e.g., when a voice-activated virtual assistant is used in a home setting with children present, it is useful to implement virtual assistants that only respond to polite queries and reject commands, instructions and queries that are framed in an imperative and/or impolite tone. This disclosure describes a voice-activated virtual assistant with a polite mode of operation.

When the polite mode is enabled, the virtual assistant is responsive only to requests or queries that are worded in a polite manner, as appropriate for the language and culture. For example, such queries can include: "Could you please turn on the lights?" and "Turn on the lights, please." Polite queries differ from imperative queries by their use of words such as

"please" and "thank you" or by their use of conditional statements instead of imperative statements.

With user permission and express consent, a user query is parsed to identify whether the query meets politeness criteria, e.g., includes polite words/phrases, and is in a form/tone that reflects politeness. Further, a polite query is distinguished from an impolite request using, e.g., voice stress and sentiment analysis to determine whether the voice tone used for the query also indicates politeness.
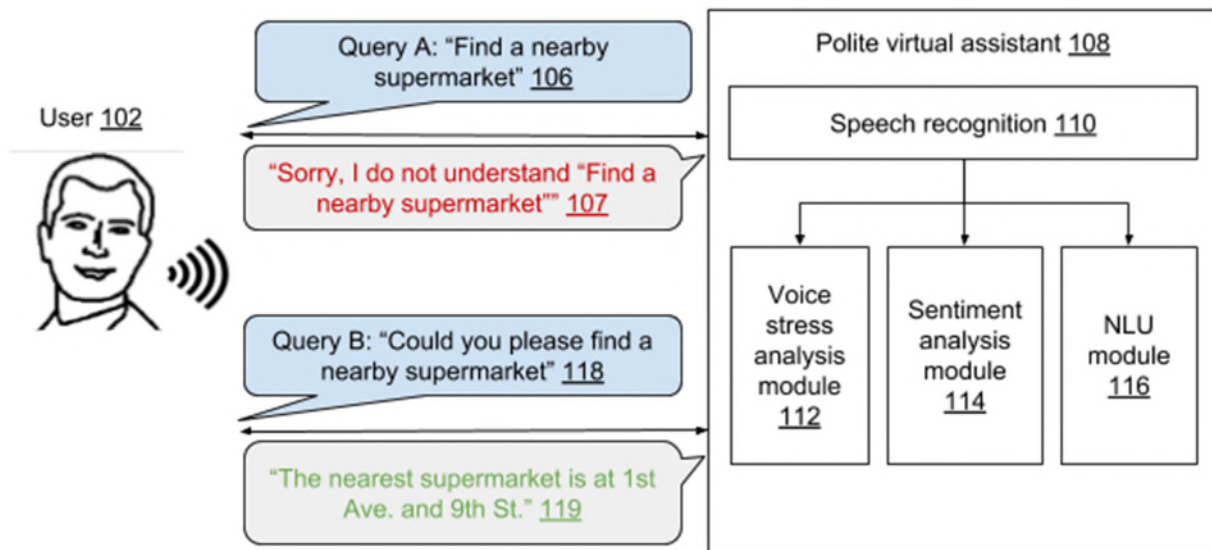
Fig. 1: Example operation of a virtual assistant in polite mode

Fig. 1 illustrates communication between a user (102) and a virtual assistant operating in a polite mode (108). The virtual assistant includes a voice stress analysis module (112), a sentiment analysis and politeness scoring module (114), and a natural language understanding (NLU) module (116). When an impolite command or query, e.g. Query A: "Find a nearby supermarket" (106) is issued by the user, the polite virtual assistant responds expressing inability to provide an answer, e.g., "Sorry, I do not understand *Find a nearby supermarket*" (107). Alternatively, the assistant can provide a helpful response expressing inability to respond due to

a particular reason, e.g., "could you please rephrase that as a question?" When a similar query is issued in a polite manner, e.g., as illustrated in Query B (118), the polite virtual assistant provides a correct answer (119).

The voice stress analysis module is integrated with speech recognition (110) and annotates recognized speech with the stress on words and the tone of a voice, e.g., kind, neutral, annoyed, loud, commanding, etc. The module can be built separately from the speech recognition engine or trained in combination with the speech recognition engine to annotate recognized words. A database of speech annotated with multiple relevant voice tone categories is used to build and train the voice stress analysis module.

The sentiment analysis module includes a natural language processing (NLP) component that takes as input transcribed words from a speech recognition engine and annotates the words with the sentiment and politeness measure of a user query. Voice tone categories from the voice stress analysis module are also used as inputs to improve the accuracy of the sentiment analysis. A database of user instructions/queries along with corresponding annotations of sentiment and politeness scores is used to build and train the sentiment analysis and politeness scoring module.

The NLU module takes as inputs the output of speech recognition, voice stress analysis and sentiment analysis, and politeness scoring modules to determine the purpose of a query. The NLU module separates the content of the query from the tone (e.g., polite or other). The query content (excluding words or phrases that denote politeness, and are unrelated to the content) is then utilized to determine an appropriate response, e.g., using a search engine. For example, the module removes "please" from the phrase "supermarket please" before processing the query. The various modules of the polite virtual assistant can be implemented by employing feed-forward neural networks and recurrent neural networks.

The described techniques provide an alternative mode of operation for a virtual assistant that configures the virtual assistant to provide useful responses only when a query is worded and spoken in a polite manner. For example, this mode is useful while interacting with a virtual assistant in the presence of family members such as children.

The polite mode utilizes techniques to assess the politeness of the query based on the user voice and tone of the query apart from the words in the query. The polite assistant mode is configured to distinguish a phrase that may not be polite, but still contains a word such as "please". The polite assistant mode enables a virtual assistant to handle different types of user queries with varying levels of politeness.

In situations in which certain implementations discussed herein may collect or use personal information about users (e.g., user data, information about a user's social network, user's location and time at the location, user's biometric information, user's activities and demographic information), users are provided with one or more opportunities to control whether information is collected, whether the personal information is stored, whether the personal information is used, and how the information is collected about the user, stored and used. That is, the techniques discussed herein collect, store and/or use user personal information specifically upon receiving explicit authorization from the relevant users to do so.

For example, a user is provided with control over whether programs or features collect user information about that particular user or other users relevant to the program or feature. Each user for which personal information is to be collected is presented with one or more options to allow control over the information collection relevant to that user, to provide permission or authorization as to whether the information is collected and as to which portions of the information are to be collected. For example, users can be provided with one or more such

control options over a communication network. 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. As one example, a user's identity may be treated so that no personally identifiable information can be determined. As another example, a user's geographic location may be generalized to a larger region so that the user's particular location cannot be determined.

CONCLUSION

This disclosure describes a virtual assistant that can be configured in a polite mode. The disclosed techniques may be utilized to configure a virtual assistant such that it is responsive only to polite queries. Polite mode is enabled by use of voice stress analysis, sentiment analysis module and natural language understanding (NLU) techniques that are utilized to annotate words/phrases from a query and to determine whether the query is polite.