A HINDI LANGUAGE PERSONAL ASSISTANT FOR ANDROID

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ABSTRACT

The popularity of personal assistant artificial intelligences in the wake of Apple Inc.’s Siri for the iOS operating system and Microsoft Corporation’s Cortana for the Windows Phone operating system has increased to a great extent. However, such virtual personal assistants have not been available in any Indian languages. We, therefore, propose the creation of Vaani, an Android-based Hindi language based personal assistant, which will understand colloquial Hindi and provide the necessary response. The system will provide responses to questions posed, as well to commands issued, by the user verbally in Hindi. Vaani will recognize the verbal input using Google’s Speech To Text API, as well as parse the commands given by the user using a simplified method of parsing the simple instructions given in Hindi. This paper describes the architecture and features of Vaani.

Keywords: Voice Assistant, Hindi-language, Parser, Simplified, Parameters, Dialogue Manager

[1] INTRODUCTION

The popularity of personal assistant artificial intelligences in the wake of Apple Inc.’s Siri [1] for the iOS operating system and Microsoft Corporation’s Cortana [2] for the Windows Phone operating system has increased to a great extent. However, these implementations have not been without flaws.

After Apple unveiled Siri in 2011, it remained in beta until September 2013 and the launch of iOS 7. In this beta period, while initially derided as a gimmick by critics, it received a positive reception. It has, however, been criticised for issues in the recognition of distinct accents, and speed of operation, and supports, among Asian languages, only Korean, Cantonese and Mandarin Chinese.

Cortana, named after the character in Microsoft’s Halo video game series, is available for handsets running Windows Phone 8.1 and, as of September 2014, available and localized for the US, the UK and China (under the name Xiao Na), with users in India, Canada and Australia having access to the beta of the US version, and a projected global release of late 2014 to early 2015.
While Google Inc. has significantly integrated voice-based capabilities in their Android operating system, with usage in search and the auxiliary Google Now [3] feature, it has not created a true competitor to Siri and Cortana, and a cursory review of the prominent AI personal assistants on the Google Play Store yields highly unsatisfying results, with English-language systems possessing an overwhelming majority.

None of these systems, on any platform, provide support for the Hindi language. As Google accepts voice input in the Hindi language, we have decided to implement a Hindi-language Siri-style personal assistant. This paper describes a unique and simplified method of parsing Hindi text along with the architecture and working of different features of our proposed application, titled and henceforth referred to as Vaani.

[2] ARCHITECTURE OF VAANI

Vaani is a voice-based personal assistant which will accept voice-based input in the Hindi language, process said data as required, and provide appropriate responses in the Hindi language.

Figure: 1. Architecture of Vaani

The components of Vaani are:
1) User
The user will interact with the system by giving speech input in Hindi language. The system will process the input and will provide the appropriate response in Hindi language, if required. The response, if required will be given using Google’s Text To Speech API [4].
2) Application
The application is the vital part of the system. The user interacts with the system via application. The application is basically a software agent that collaborates with the user for performing tasks on user's behalf, at the same time hiding the task's complexity from the user. The application interacts with the RecognizerService, Parser, and Android System to perform the task required by the user.

3) RecognizerService

It is a SpeechRecognizer class of android.speech package [5] provided by the Android API. The application will send the speech input from the user in the form of recorded speech to the RecognizerService. The RecognizerService will transform the recorded speech in Hindi to Hindi text and send it to application.

4) Parser

The parser will receive the Hindi text from RecognizerService via application. The function of parser is to extract <object, action> from Hindi text. The Hindi text is basically in the form of commands. A single command can be of various forms. For example:

- वेदांत को कॉल करो
- कॉल करो वेदांत को
- करो वेदांत को कॉल
- करो कॉल वेदांत को

From the above sentences, parser will extract वेदांत as the object and कॉल as the action.

From the above sentences, it can be observed that the object वेदांत always occurs before को. This is the advantage of Hindi language and parser exploits this advantage. This allows us to parse approximately 75% of all possible instructions.

The parser will forward the <object, action > pair to the Dialog Manager.

5) Dialog Manager

Some commands may require additional parameters. For example, वेदांत को मैसेज भेजो की गुड नाईट.

In this sentence, वेदांत is the object, मैसेज is the action, and गुड नाईट (message body) is the additional parameter. The function of dialog manager is to check whether the required additional parameters for a particular command are present or not. If the required additional parameters are not present, then dialog manager will ask the user to provide additional parameters. Then, dialog manager will send <object, action, additional parameters> to the parser.

For example,
User's input - वेदांत को मैसेज भेजो

Now, message body (additional parameter) is absent. Therefore dialog manager will ask the user "क्या मैसेज भेजना है?". The user will provide the message (गुड नाईट) to be sent and the dialog manager will forward < वेदांत, मैसेज, गुड नाईट> to the parser. Thereby a primitive version of a discourse is maintained, for a single instruction in order to ensure all the information required is obtained.
6) Android System

The application receives <object, action> or <object, action, additional parameters> from the parser and depending upon the action, the application will call the Android system via system call. Android System is basically various applications like call, message, contact, GmMail, Hangouts etc which are present on the android phone. These applications will perform the desired task and will return the result to application. The application will give output to the user and also provide responses in Hindi language, if required.

[3] FEATURES OF VAANI

1) Open Application

The user specifies the application which he wants to open. If the app is present on the phone, the application is opened, else the application will be searched for on the Play Store.

![Activity diagram for app opening command]

2) Call

The user places the call command to the application. The application checks whether the contact name of the callee has been specified or not. If not, the application will ask for callee's contact name. Then application checks whether callee's contact name is present in contact list. If not present, “कॉन्टेक्ट मौजूद नहीं है” is displayed on the smart phone's screen. If present, the application checks whether the contact has single or multiple numbers associated with it. If single number present, call is placed to that single number. If multiple numbers are present, all the corresponding numbers are displayed and user selects the desired number and the call is placed to that number.
3) Message

The user places the message command to the application. The application checks if the contact name of the person (to whom the message is being sent) has been specified or not. If not, the application will ask for contact name. Then application checks whether contact name is present in contact list. If not present, "कांटेक्ट मौजूद नहीं है" is displayed on the smart phone's screen. If present, the application checks whether the contact has single or multiple numbers associated with it. If single number present, call is placed to that single number. If multiple numbers are present, all the corresponding numbers are displayed and user selects the desired number and the message is placed to that number. If the message body is not present, the application will ask "क्या मैसेज भेजना है?" and then the message will be sent to the user.
4) Add Contact

The user gives add contact command. If the contact name is not given, the application will ask for the contact name. Then application checks whether the contact number has been specified or not. If the contact number has not been specified, application asks for the contact number and then only the contact gets saved.

Figure: 4. Activity diagram for sending a message

Figure: 5. Activity diagram for saving a contact
5) Weather Information

Vaani provides the weather forecasts to the user by using OpenWeatherMap API [6]. It will provide current weather conditions, future weather forecasts and also historical weather data. The information being provided will be based on user's current location.

6) Context Aware Notifications

Vaani is capable of providing context to notifications based on the instructions provided to it earlier. This involves a greater integration between the system applications as well as Google applications. For example, if a contact is called on their birthday, a notification is displayed reminding the user to wish them.

7) Interests

Vaani notes the interests of the user based on the topics searched for, as well as any direct entries by the user. This will allow it to provide information and content links on the topics mentioned.

8) Daily Summary

Vaani, at a specific time, or when given the command “आज का दिन कैसा है?” or variations thereof, is capable of providing a summary of the day. This includes the weather, any reminders, appointments or events occurring on the day, as well as birthdays and anniversaries of contacts, among other data.

9) Predictions

Vaani is capable of making predictions of certain events, such as sporting events and elections. It does this by aggregating information from social media feeds, as well as an analysis of the two teams and comparisons between their players.

[4] CONCLUSION

This paper discusses about the technique of parsing of commands given in Hindi language; architecture and features of Vaani, an Android application. It is unique in the sense that it is the first personal assistant application to accept voice input and provide voice output where applicable in Hindi. All basic phone functionalities can be carried out by simply providing voice input, such as calling, messaging and opening applications. This application can be used by people who cannot use their phone normally and who are most fluent in Hindi. The applications also features an extremely simplified method of parsing most (approximately 75%) commands given in Hindi.

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