Adjútor: An AI based Personal Assistant and Hindi Text Reader

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Abstract
In today's era world has become very tech-savvy, every person wants to live independently. As, in case of visually challenged people who face many social problems without any assistance. With the advancement in technology it is now possible to aid them. This project presents an android based application to assists its users by implementing the concepts of natural language processing and machine learning. The app is proficient enough to assist user needs by taking voice commands in both Hindi and English language. It allows the user to use their smart phone smartly by providing an app to access other functionalities and applications available in their smartphones. Additionally, it detects and speaks Hindi language, which makes it easy to interact, to read Hindi notes or writeups. The performance of proposed android app is comparable to other apps available in Play Store.

Keywords: API, Dialog Flow, Agents, Intent, Natural Language Processing..

1.Introduction
Nowadays mobile applications are growing to assists vivid requirements of users. It is very convenient for users to access these mobile applications and services anywhere any time. Some of these applications require internet connectivity whereas some runs in offline mode. They can be a part of system applications as well as user applications. Android, Apple, Windows, Blackberry, etc. are few commonly used mobile operating systems. These platforms provide plenty of applications and services to user. For an instance, a system application named Contacts is used to store the contact details of the user's contact and helps to connect a call or send an SMS to other person using the contents stored in this application. We can get similar types of application all around the world via Apple Store, Play Store, etc. The application with different working features give birth to various kinds of functionalities and/or sensors to be implemented on mobile devices.

Amazon Alexa, Google Assistant, Siri, Cortana etc. are some famous personal assistants which help users to communicate with mobile device through voice commands to do certain tasks. Prajyot Mane et.al. [1] proposed a smart personal assistant based on machine learning to provide better utilization of smartphones battery, the interrupt-based broadcast receiver approach, and integrated platform for various applications. [2] presents an android based personal assistant application for calling, messaging, help, and search by taking voice as input. Personal assistant uses voice inputs therefore in [3] Nisimura, R. et.al. developed Speech to Text input methods using java script for web pages, which allows users to access voice-enabled web pages without requiring special browsers. In [4] Anand Arokia Raj et.al. proposed an approach to address the issues of Font-to-Akshara mapping, pronunciation rules for Aksharas, text normalization in the context of building text-to-speech systems in Indian languages. Bayu Setiaji et.al. [5] proposed a chatbot, which identifies the sentences and decides the answer of a question based on the knowledge embedded in relational database management systems whereas [6] focuses on the development of chatbot for visually impaired people based on Dialog Flow API. Patankar et.al. [7] presents an application which has similar features like Siri and Google Voice Search, but do not require internet connectivity to utilize its functionality. The research presented in this paper focused on the development of mobile app for user assistance based on pattern matching, natural language processing and machine learning. The app provides text to speech functionality in Hindi and English language, it also provides an integrated access to E-mail, WhatsApp, Camera and other mobile applications installed on a smart phone.

The rest of the paper is organized as follows. Proposed embedding and extraction algorithms are explained in section 2. Results are presented in section 3. Finally, concluding remarks are given in section 4.

2.Proposed Algorithm
The mobile application presented in this paper fulfils the need of naïve user. A user can use application through voice commands. It comprises of three independent modules, first is Hindi Language Text to Speech, second is Speech to Text, which runs in offline mode, whereas third is Personal Assistant, which needs internet connectivity. Figure. 1 shows
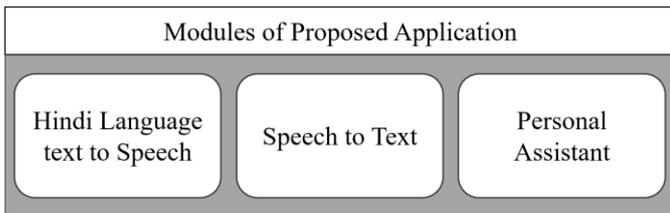
Figure 1. Block Diagram of Proposed Approach

the block diagram of proposed application. The detailed description of these modules is presented below:

Hindi Language Text to Speech

The Hindi Text to Speech module of this application gives the clear pronunciation of the text as compared to the other text to speech module that is made till now. This module is implemented by using TextToSpeech class provided by Android Studio. In order to use this class, an object of this class is instantiated and the 'initListener is specified. To make this event listener work the properties for the TextToSpeech objects, such as its language, pitch etc. should be specified by calling setLanguage() method, which takes a locale object as a parameter. After setting language, speak method of the class is called to read the given text. When initListener does not recognize the input, text written by the user in Hindi, it generates an error message.

This module is beneficial for the persons who generally know our mother tongue, Hindi. Although it can also be used to read English text. It works in an offline mode without any API assistance.

Speech to Text

This module takes the voice input from the end user and convert it into the text format with help of Intent recognizer. It uses the language model to recognize the voice input and set

the words in proper manner with the help of Natural Language Processing and then give the required output to the user. If the device does not support speech input functionality, then this module shows response as "Sorry! Your device does not support speech input" to the end user. This module is beneficial for deaf persons.

Personal Assistant

The name of the proposed personal assistant is Adjútor, which is a word of Latin language meaning helper. The required elements to build a Personal Assistant is Dialog flow API (api.ai). The Dialog flow API consists of the Agent which have the Intents defined by the developer. These intents consist of parameter and action by which the whole workflow get formulated in the right direction. In the Action Part of the intent, we can define the action whatever we wanted, and which is compatible with the parameter defined by the developer.

In the personal assistant module the working of the module starts from getting the input from the user, this input is in the form of the Voice command but when it goes through the application it will get converted into a written query with the help of speech to text and after that this text query is sent to the dialog flow API where it is matched with the parameter and actions defined by the developer and after matching of the intent it is sent to the code written by the developer in the application. After mapping the right intent with the right code, the dialog flow API gives the actionable data to the user on the screen. This Personal Assistant can also be connected to the external API so that its working can be increased inefficient manner. Figure.2 shows the workflow of proposed PA (Personal Assistant).
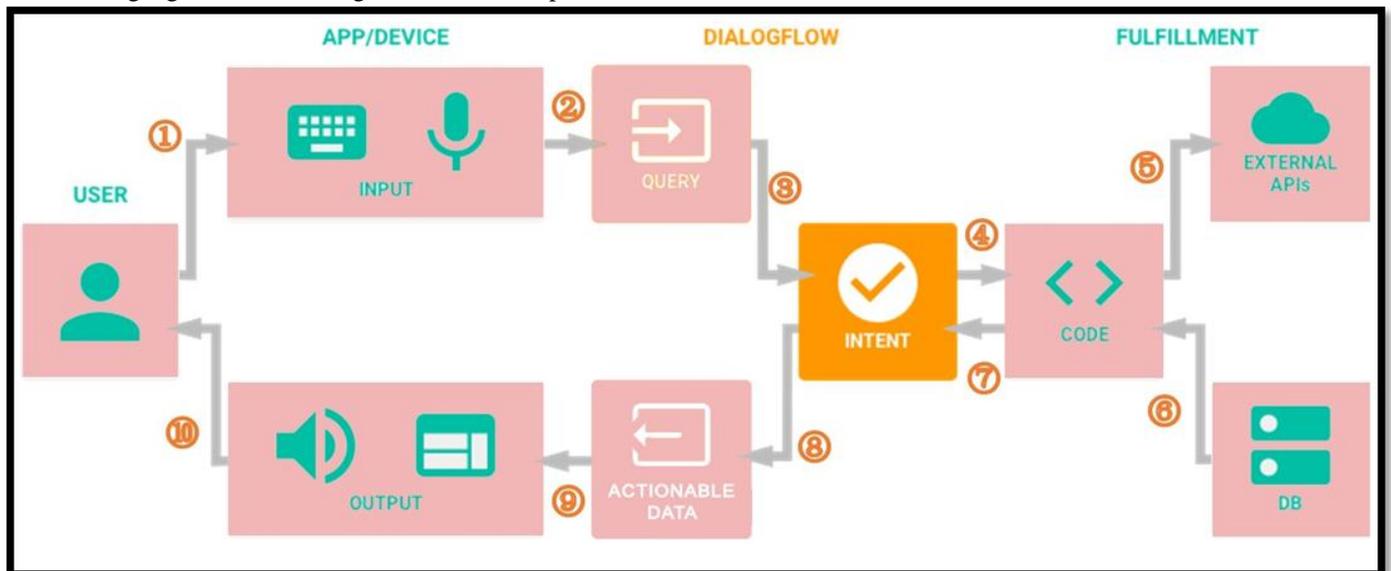
Figure 2. Working of Adjutor: Personal Assistant Module

This personal assistant app can set alarm, make a call, open WhatsApp, Camera, Gmail, Gallery and plays songs on YouTube applications. It can also play songs on the Music

Player and YouTube. Any of these operations are performed with the help of the voice commands given by the user.

3.Result

The proposed android application works on SDK Version 17 and above. Figure. 3 shows the screenshots of running android application on SDK version 24 and android version 7.0(Nougat).

(a)

(b)

(c)

(d)

Figure 3. (a) Adjútor Splash Screen **(b)** Speech to Text Module **(c)** Hindi Lnguage Text to Speech Module **(d)** Working of Personal Assistant

The proposed personal assistant app interface is shown in Figure. 3(a). The app screenshot shown in Figure. 3(b) takes voice command as input on pressing the mic area and convers the provided input in text. It does not require any internet connectivity or API support. Figure. 3(c) shows Hindi Language Text to Speech Module, which reads the text provided by the user in Hindi language and Figure. 3(d) represents the working of Personal Assistant, which takes

input in form of voice command on pressing the mic area. Here user gives command to open camera by providing any of these voice inputs as, 'Open Camera', 'Click a Picture', 'Capture Image'. This module converts the voice input into English text in form of a query. This query is forwarded to DialogFlow API. This API matches the query with its intents and parameters, which are predefined by the programmer in the agent section of DialogFlow API. If the input query matches with predefined parameters and intents than an action is raised by API. This action is executed on mobile app as shown in Figure. 3 (d) to show the actionable output with the help of android code written by developer (opens Camera in the device)

The performance of proposed app is compared with other play store applications with same working environment on Android 7.0. The comparative results show that the proposed app called as Adjútor outperforms several other applications available on play store for features like reading newspaper in hindi, and separate module for text to speech translations as shown in Table 1.

Table 1. Comparative analysis of proposed android app with other available applications on Play Store.

Comparative Study of Various Personal Assistants				
Features PA	Google Assistant	Siri App	Friday App*	Adjútor (Proposed)
Access Gmail	YES	YES	YES	YES
Access YouTube	YES	YES	YES	YES
Access Device Camera	YES	YES	YES	YES
Read Newspaper in Hindi	NO	NO	NO	YES
Speech to Text converter module	NO	NO	YES	YES
Text to Speech Converter module	NO	NO	NO	YES
Access WhatsApp	YES	YES	YES	YES
Open Dialer	YES	YES	YES	YES
Open Camera in Video Mode	YES	YES	YES	YES
Play Song on YouTube	YES	YES	NO	YES
Calling Feature	YES	YES	YES	NO

(* this app crashes frequently)

4.Conclusion

This paper presents a mobile application based on pattern matching, machine learning and natural language processing. The app removes language barrier by implementing Hindi Text to Speech Module, which is useful for blind persons as it can read notes, news, etc. and can be extended to address the robust needs of user. Speech to Text Module fulfil the need of deaf persons. Other personal assistant module takes commands through voice input and does the tasks as asked by the user. It saves time of the user by providing access of user as well as system applications.

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