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Voice Based Enquiry System Using Raspberry Pi

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ABSTRACT: Voice Based Enquiry System is the enquiry system which operates based on the voice input given by the user. There is no communication which is understood more appropriately than voice. This system too uses the voice commands and gives the required information in the form of voice. This project is developed using .Net technology using c# Programming language. This uses SQL server for storing the information to be provided to the user. This uses Raspberry Pi to detect the voice from the user and uses the speech control to deliver the voice output. Raspberry Pi would help convert the speech into text.

KEYWORDS: Raspberry Pi, Enquiry System, Speech to Text, Jasper, Voice based

I. INTRODUCTION

In modern civilized societies for communication between human speeches is one of the common methods. Different ideas formed in the mind of the speaker are communicated by speech in the form of words, phrases, and sentences by applying some proper grammatical rules. The speech is primary mode of communication among human being and also the most natural and efficient form of exchanging information among human in speech.

By classifying the speech with voiced, unvoiced and silence (VAS/S) and elementary acoustic segmentation of speech which is essential for speech can be considered. In succession to individual sounds called phonemes this technique can almost be identical to the sounds of each letter of the alphabet which makes the composition of human speech. Most of the Information in digital world is available to a few who can read or understand a scrupulous language. Language technologies can provide solutions in the form of ordinary interfaces so the digital content can reach to the masses and facilitate the exchange of information across different people speaking different languages. These technologies play a vital role in multi-lingual societies such as India which has about 1652 dialects/native languages. Speech to Text conversion take input from microphone in the form of speech & then it is converted into text form which is display on desktop.

II. RELATED WORK

Speech is an exceptionally attractive modality for human computer interaction: it is “hands free”; it requires only modest hardware for acquisition (a high-quality microphone or microphones); and it arrives at a very modest bit rate. Recognizing human speech, especially continuous (connected) speech, without burdensome training (speaker independent), for a vocabulary of sufficient complexity (60,000 words) is very hard. However, with modern processes, flow diagram, algorithms, and methods we can process speech signals easily and recognize the text which is talking by the talker. In this system, we are going to develop an on-line speech-to-text engine. The process for converting speech to text by using Raspberry pi and on the terminal of Raspbian image installed on raspberry pi.

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III. METHODOLOGY

3.1 User Requirements:

Command should be accepted in the form of voice. The system should recognize the voice command. The system shall process the voice command. The appropriate information shall be retrieved from the database. The retrieved information is read and the output is given in the form of voice. The relevant information also shall be displayed in the screen. User shall be able to move between the Previous and Next result for the same query.

3.2 System Requirements:

3.2.1 Hardware requirements:

- a. Raspberry Pi 2 (Model B)
- b. Monitor: SVGA
- c. Speaker
- d. Microphone
- e. Laptop

3.2.2 Software requirements:

- a. Microsoft .Net
- b. Visual studio 2015
- c. C#.Net
- d. Jasper

3.3 Functional Requirements:

- **Voice Commands:** The commands are given to the system are in the form of voice commands. The given commands are processed using voice processing.
- **Speech Recognition:** The given command is to process using speech recognition.
- **Search the Result:** The system shall search the appropriate result according to the given command.
- **Display Result:** The system shall display the retrieved result on the screen.
- **Manage Information:** The system shall provide option to add new information like route information and the timings at which the transport facility is available.
- **Browse through Result:** User shall be allowed to browse through the retrieved result. It shall allow the user to move to previous and next result through the voice commands.

IV. DESIGN OF THE SYSTEM

A software design is a description of the structure of the software to be implemented, the data which is part of the system, the interfaces between the system components and sometimes the algorithms used.

4.1 Architectural Design

Components included in the architecture are: Commands, Speech, Search and Administration.

- **Commands:** This is one of the major components of the current system which recognizes the commands given by the user. This component is responsible for recognizing the commands and interpreting the command and sending appropriate request to the Search component
- **Search:** Search components take the input as the request from the Command component and retrieve the appropriate result from the database. It gives back to the display component and the speech component.
- **Speech:** This component is used to deliver the result in the form of the voice using Microsoft speech control. This takes input from the Search component.
- **Administration:** Through this component the maintenance personnel can update the information and also the commands to the system.

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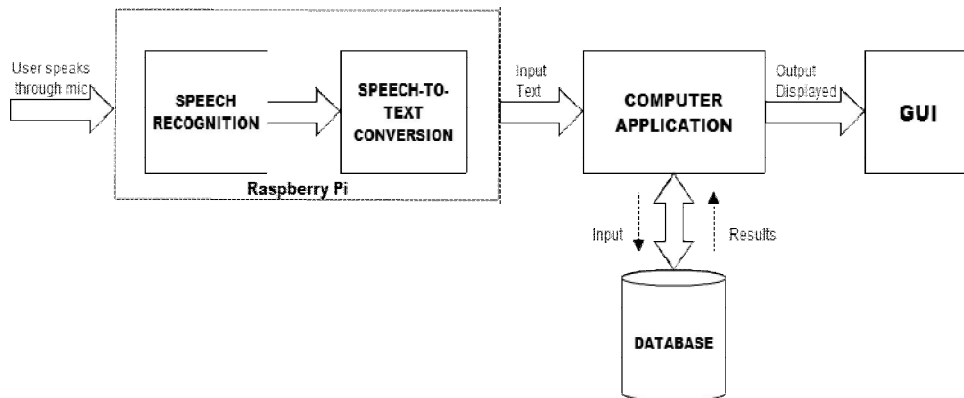


Figure 1: Block Diagram: The abovediagram shows the flow of information in the system. Raspberry Pi does the STT conversion and gives the output to the application to run it through the database. The final output is displayed on the screen.

V. IMPLEMENTATION

5.1 Implementation:

The Implementation process achieves speech to text by using Raspberry pi and Raspbian image installed on raspberry pi. This is the basic step to understand the commands of linux for converting speech to text conversion. The Raspberry Pi is an ultra-low-cost, deck-of-cards sized Linux computer. It is controlled by a modified version of Debian Linux optimized for the ARM architecture. It has two models model A and model B. The Model B has 512 MB RAM, BCM2385 ARM11, 700 MHz System on chip processor. It has 2 USB ports, HDMI out, audio output jack and Ethernet port for internet access and the USB sound card is neede8d to interface with pi model because it has only audio output jack and so by using sound card we can input voice data into pi.



Figure 2: Experimental setup: The above given setup shows the experimental model. Raspberry pi 1 has the Microphone connected on its A/V slot. Ethernet cable and power supply are plugged to it on their respective slots. SD card which has the Raspbian image written to it has also been fixed im its slot.

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5.2 Raspberry Pi:

The Raspberry Pi is based on the Broadcom BCM2835 system on a chip (SoC), which includes a 700 MHz ARM1176JZF-S processor, Video Core IV GPU and RAM. It has a Level 1 cache of 16 KB and a Level 2 cache of 128 KB. The Level 2 cache is used primarily by the GPU. The SoC is stacked underneath the RAM chip, so only its edge is visible. The Raspberry Pi 2 has 1 GB of RAM.

5.3 Jasper:

Jasper is an open source platform for developing always-on, voice-controlled applications. Use your voice to ask for information, update social networks, control your home, and more. Jasper is always on, always listening for commands, and you can speak from meters away. Build it yourself with off-the-shelf hardware, and use our documentation to write your own modules. Jasper is designed specifically for the Raspberry Pi (Model B) and requires some additional hardware like a wifi adapter and USB microphone.

5.4 C# and .Net:

C# (pronounced "see sharp") is a multi-paradigm programming language encompassing imperative, functional, generic, object-oriented (class-based), and component-oriented programming disciplines. It was developed by Microsoft within the .NET initiative and later approved as a standard by Ecma (ECMA-334) and ISO (ISO/IEC 23270). C# is one of the programming languages designed for the Common Language Infrastructure.

VI. CONCLUSION

The speech to text conversion may seem effective and efficient to its users if it produces natural speech and by making several modifications to it. Automatic speech recognition also gives implementation of speech to text conversion based on Raspberry pi. This system is useful for deaf and dumb people to interact since no interaction would be there with the human beings and there won't be any barrier for them to communicate and find the information they want. Speech synthesis has long been a vital assistive technology tool and its application in this area is significant and widespread. This project report gathers important references to literature related to the endogenous variations of the speech signal and their importance in automatic speech recognition also it gives implementation of speech to text conversion based on Raspberry pi.

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