

Voice Based Mail System For Blind Person

Rupali Manmode , Rhutuja Dongare, Anita Palade , Pranita Ghatol

Computer Science And Engineering Rashtrasant Tukdoji Maharaj Nagpur University Nagpur,India

Abstract— In Today's World Communication Has Become So Easy Due To Integration Of Communication Technologies With Internet. However The Visually Challenged People Find It Very Difficult To Utilize This Technology Because Of The Fact That Using Them Requires Visual Perception. Even Though Many New Advancements Have Been Implemented To Help Them Use The Computers Efficiently No Naïve User Who Is Visually Challenged Can Use This Technology As Efficiently As A Normal Naïve User Can Do That Is Unlike Normal Users They Require Some Practice For Using The Available Technologies.

This Paper Aims At Developing An Email System That Will Help Even A Naïve Visually Impaired Person To Use The Services For Communication Without Previous Training. The System Will Not Let The User Make Use Of Keyboard Instead Will Work Only On Mouse Operation And Speech Conversion To Text. Also This System Can Be Used By Any Normal Person Also For Example The One Who Is Not Able To Read. The System Is Completely Based On Interactive Voice Response Which Will Make It User Friendly And Efficient To Use.

Keywords: Voice Assistant, Low Cost, Speech Recognition, Internet ,Speed Synthesis, Blind, Visually Challenged.

I. Introduction

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it learn for themselves. Machine learning is a type of artificial intelligence (AI) that allows software applications to become more accurate in predicting outcomes without being explicitly programmed.

Artificial intelligence (AI) or Natural Language Processing is a technique where machine can become more human and thereby reducing the distance between human being and the machine. Therefore in simple sense AI makes human to communicate with the machine easily. The basic premise of machine learning is to build algorithms that can receive input data and use statistical analysis to predict an output value within an acceptable range. Machine Learning APIs make it easy for developers to develop predictive applications.

II. Literature Review

Bulk of information is available on technological advances for visually impaired people. This includes development of text to Braille systems, screen magnifiers and screen readers. Recently, attempts have been made in order to develop tools and technologies to help blind people to access internet technologies. Among the early attempts, voice input for surfing was adopted for the Blind people. A sight-blessed person can interact with the computer with the help of different input/output devices, while a visually impaired person is somehow forced to use specially designed devices or programs to interact with computers. The visually impaired person uses different types of equipments and programs that enable him/her to enter data into computers or control them.

In the year 2010 a system was proposed by Rudan Bettelheim, David Steele in which the speech recognition application continually samples the audio input adjusting for varying background noise conditions.[1]

Kuldeep Kumar, R.K.Aggarwal used Hidden Markov Model Toolkit (HTK) in the year 2011. In this paper, the speech recognition system for Hindi language is developed. This system recognizes the isolated words using acoustic word model.[2]

In the year 2012 Nelson Morgan projected some of the methods developed over the last decade that incorporate multiple layers of computation to either provide large gains for noisy speech on small-vocabulary tasks or modest but significant gains for high-SNR speech on large-vocabulary tasks.[3]

FPGA was developed by Dhananjay Laghate in the year 2013 which resembled the Braille system for Text or Speech Conversion. Komal Chauhan & Kamal Kant have proposed a system wherein the user will be able to

type text on computer by providing a voice input through his mobile phone. They used customized grammar rule based on Locale for voice transmission. Blind people are an integral part of the society.[4]

Bhavna, Dr.Dinesh Kumar takes a tour of speech recognition system which includes it's basic working, expectations of user from it, techniques involved in speech recognition and difficulties faced during the speech recognition process.[5]

III. Implementation

The algorithm works in the way that the system detects the most appropriate word when user spells it and then matches the word that is guessed with the actual word that is pronounced by the user. If both of them is found to be same then the word is selected from the dictionary and typed by the system without giving any burden to the user

Similarly the entire text is typed while the user simply spells it by the system itself so that the blind user need not use the keyboard or mouse for this purpose. That is how the algorithm is implemented to convert speech to text and text to speech.

A. System Design And Specification:

ER Diagram :



Fig: ER Diagram

Data Flow Diagram:

When user will visit our site he would first have to register in our website through registration form. User will be very well guided with the help of voice commands, while registrating all the necessary fields to be filled will be read by site, by clicking on that box he would have to fill in them. For eg. If cursor moves over register icon it would sound “register button” , after clicking on register button it would sound like “you are on registration page”.

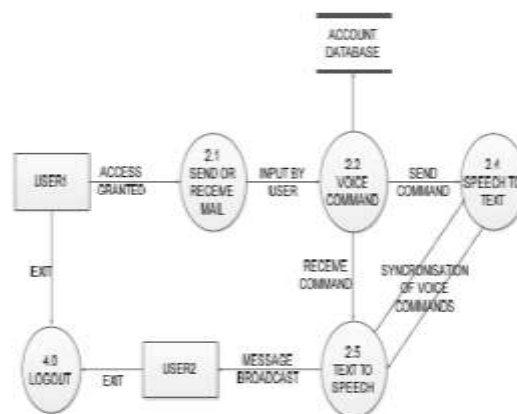


Fig: Data Flow Diagram

While filling up the necessary fields, speech would be recorded in database. Very frequently used words will be present i.e., when user would speak it would get typed automatically. Also the voice would be recorded in the database. Because after registration, user has to go to login page and type user id & password which would get recognized through database enabling the correct user to get access to his/her account.

B. Methodologies Used:

Viterbi Algorithm :

This algorithm is a programming algorithm that is used for finding the most likely sequence of hidden states – called the Viterbi path – that results in a sequence of observed events, especially in the context of Markov information sources and hidden Markov models.

The algorithm has found universal application in decoding the convolutional codes.. It is now also commonly used in speech recognition and speech synthesis in identifying the most appropriate word. For example, in speech-to-text (speech recognition), the acoustic signal is treated as the observed sequence of events, and a string of text is considered to be the "hidden cause" of the acoustic signal. This algorithm finds the most suitable string of text as predicted by the user.

Algorithm Implementation :

Suppose we are given a Hidden Markov Model(HMM) with state space S, initial probabilities π_i of being in a state i and then the transition probabilities of transitioning from state i to state j. Say we observe outputs y_1, \dots, y_T . The most likely state sequence x_1, \dots, x_T that produces the observations is given by the recurrence relations:

$$V_{1,k} = P(y_1 | k) \cdot \pi_k$$

$$V_{t,k} = \max_{x \in S} (P(y_t, k) \cdot a_{x,k} \cdot V_{t-1,x})$$

1. Here $V_{t,k}$ is the probability of the most probable state sequence responsible for the first t observations that has k as its final state.
2. The Viterbi path can be retrieved by saving back pointers that remember which state was used in the second
3. Equation. Let $\text{Ptr}(k,t)$ be the function that returns the value of x used to compute $V_{t,k}$ if $t > 1$, or k if $t=1$.

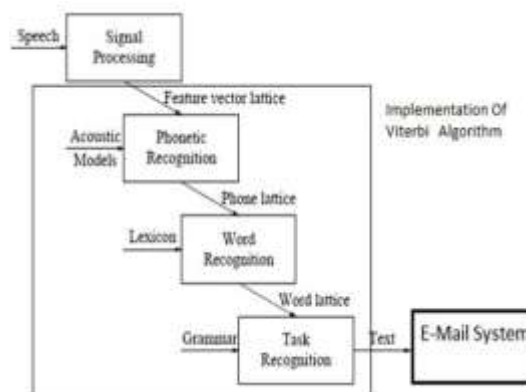


fig. 1. block diagram implementation of speech based email system

IV. System Specification

I. Hardware Specification :

- | | | |
|-------------|---|---------------------------|
| ✓ PROCESSOR | - | PENTIUM –IV |
| ✓ Speed | - | 1.1 GHz |
| ✓ RAM | - | 256 MB(min) |
| ✓ Hard Disk | - | 20 GB |
| ✓ Key Board | - | Standard Windows Keyboard |
| ✓ Mouse | - | Two or Three Button Mouse |
| ✓ Monitor | - | SVGA |

II. Software Specification :

- | | |
|------------------------|--------------|
| ✓ Operating System | : Windows XP |
| ✓ Programming Language | : JAVA |
| ✓ Data Base | : Oracle11g |

V. Modules & Their Working

1. AUTHENTICATION MODULE

1.1 REGISTRATION

This is the first module of the system. Any user who wishes to use the system should first register to obtain username and password. This module will collect complete information of the user by prompting the user as to what details needs to be entered. The user will need to speak up the details to which the system will again confirm by prompting alphabetically. If the information is not correct user can re-enter else the prompt will specify the operation to be performed to confirm.



The screenshot shows a web browser window with a registration form. The form has the following fields and values:

Field	Value
Name	vaishali
Gender	Female
Email Address	vaishali@gmail.com
Email password	vaishali123
Mobile number	9876543210

Buttons: REGISTER, CANCEL

Fig.1.1 Registration

1.2 LOGIN:

Once the registration is done the user can login to the system. This module will ask the user to provide the username and password. This will be accepted in speech. Speech conversion will be done to text and user will be told to validate whether the details are entered correctly or not. Once the entry is done correctly database will be checked for entry. If the user is authorized it will be directed to homepage.



The screenshot shows a web browser window with a login form. The form has the following fields and values:

Field	Value
Username	vaishali@gmail.com
Password	vaishali123

Buttons: LOGIN, Cancel

Fig 1.2 Login

2. FORGOT PASSWORD:

In case where an authorized user forgets the password and thus is not able to login he/she can select forgot password module. In this module the user will be first told to enter n username. According to username the security question will be searched in database. This is the question provided at time of registration. The question will be spoken out by the computer. The user should in turn specify the answer that was provided by him/her during registration. If both get matched, user is given option to change password.

3. HOME PAGE:

The user is redirected to this page once log in done successfully. From this page now the user can perform operations that the user wishes to perform. The options available are:

1. INBOX

2. COMPOSE MAIL

3. SENT MAIL

Prompting will provide the mouse click operation that needs to be performed for the required service. The double right click event is specifically reserved to log out of the system at any time the user wants to. This will be specified by the prompt right at the beginning after login.

VI. Conclusion

In this paper we have proposed a system which will help the visually impaired people to access email services efficiently. This system will help in overcoming some drawbacks that were earlier faced by the blind people in accessing emails. We have eliminated the concept of using keyboard shortcuts along with screen readers which will help reducing the cognitive load of remembering keyboard shortcuts. Also any naive user who does not know the location of keys on the keyboard need not worry as keyboard usage is eliminated. The user only needs to follow the instructions given by the IVR and use mouse clicks accordingly to get the respective services offered. Other than this the user might need to feed in information voice inputs when specified.

This e-mail system can be used by any user of any age group with ease of access. It has feature of speech to text as well as text to speech with speech reader which makes designed system to be handled by visually impaired person as well as blind person.

VII. Future Scope

For people who can see, e-mailing is not a big deal, but for people who are not blessed with gift of vision it postures a key concern because of its intersection with many vocational responsibilities. This voice based email system has great application as it is used by blind people as they can understand where they are. E.g. whenever cursor moves to any icon on the website say Register it will sound like "Register Button". There are many screen readers available. But people had to remember mouse clicks. Rather, this project will reduce this problem as mouse pointer would read out where he/she lies. This system focuses more on user friendliness of all types of persons including regular persons, visually compromised people as well as illiterate

References

- [1]. Rudan Bettelheim, David Steele, "Speech and Command Recognition", Free Scale White Paper, 2010.
- [2]. Kuldeep Kumar, R.K.Aggarwal, "Hindi Speech Recognition System using HTK", International Journal of computing and Business Research, 2011.
- [3]. Nelson Morgan, "Deep and Wide: Multiple Layers in Automatic Speech Recognition", IEEE Transactions on Audio, Speech & Language Processing, Vol. 20, No. 1, January 2012.
- [4]. Bhavna, Dr.Dinesh Kumar, "A Review on Free Model Speech Recognition System Using MFCC Model", International Journal of computing and Business Research,
- [5]. M.R.. "Voice Based System in Desktop and Mobile Devices for Blind People". In International Journal of Emerging Technology and Advanced Engineering (IJETA), 2014 on Pages 404-407(Volume 4, issue 2).
- [6]. Ummuhanyisa U.,Nizar Banu P K , "Voice Based Search Engine and Web page Reader". In International Journal of Computational Engineering Research (IJCER). Pages 1-5.
- [7]. G. Shoba, G. Anusha, V. Jeevitha, R. Shanmathi. "AN Interactive Email for Visually Impaired". In International Journal of Advanced Research in Computer and Communication Engineering (IJARCCE), 2014 on Pages 5089-5092.(Volume 3, Issue 1).