Voice –Based E-Mail (V-Mail) for blind

Hari Priya S L, Karthigasree S, Revathi K

Department of Computer Science and Engineering, Dhanalakshmi College of Engineering, Chennai , Tamilnadu, India

ABSTRACT

Currently, visually challenged people are not able to use computers on their own mainly because keyboards are not user-friendly to them. With advancement in technology, these people find themselves technologically more challenged. This is true especially in the case of social networking, which these people cannot do without external help. Voice-Mail architecture helps blind people to access e-mail and other multimedia functions. Nowadays, the advancement made in computer technology has opened platforms for visually impaired people across the world. Here, we describe the voice based e-mail architecture which can be used by the blind people to access E-mail and multimedia functions easily and efficiently. It will help   to reduce the cognitive load taken by the blind to remember and type characters using the keyboard. In this context, we have proposed a voice based e-mail system which will definitely help them communicate over e-mails comfortably on their own, based on artificial intelligence.

Keywords: Voicemail, HMM (Hidden Markov model), Algorithm-Viterbi

I.   INTRODUCTION

Today in the information age computer has become an integral part of every body's life. We use a computer to hear songs, read something, accessing information from the internet. We use computer everywhere. But the information access and computer handling has to be done with the mouse and keyboard and by reading all the things present on the screen and then deciding what to do making it a visual process means we need eye sight to handle the information on the computer i.e. if we want to read news from the internet we have to first open a browser and then open a website to read news and then follow the links to read specific news. The decision making depends upon the eye sight and by reading everything that appears on the screen. So the computer and information age is not for the blind. The blind people cannot read the information and cannot view the mouse cursor to give command to the computer. They cannot access their mail and cannot send a mail. Thus the computer becomes an impractical thing for the blind people and information retrieval is a tedious job. We are going to develop an information retrieval toolkit for the blind and then transform the information into a voice so that they can hear the message and access the mail easily. We are searching for without a browser and how we are going to access the mail without the use of keyboard or mouse.

II. METHODS AND MATERIAL

A. Related work

There are some previous studies about voice mail but not voice based email. In the existing system there is no service that provided to the blind to send email. So it big drawback for the blind people to communicate through the internet like mail Voicemail is an existing system that makes use of keyboard and mouse. There are lot of difficulties for the blind to use the voice mail because it is not fully voice based in nature. Voicemail involves steps like attaching a microphone and opening the sound recorder with the help of mouse or keyboard and then recording the voice and clicking on the stop button and then saving it by giving a name to it which requires typing with the hand and then sending it to the appropriate person. The voice mail may be easy to use for the normal people but it is not the same with the case of visually challenged people and blind. This is because it is time consuming process for the visually challenged people and quite difficult.

In the existing system there is no service that provided to the blind to send email. So it is a big drawback for the blind people to communicate through the internet like mail .And it is difficult task to send the mail for the blind people in the technology world. The blind people cannot read the information and cannot view the mouse cursor to give command to the computer. They cannot access their mail and cannot send a mail. Thus the computer becomes difficult to use things for the blind people and information retrieval a tedious job.

B. Proposed Work

The proposed system is a desktop application that allows sending and receiving of mails via the internet. We use artificial intelligence to benefit the blind to make use of the advanced technology for their growth and improvement. The proposed system is a desktop application which makes use of artificial intelligence that makes it cost-effective and easy to maintain. The proposed system makes use of the Viterbi algorithm for voice detection and conversion.

It overcomes the disadvantages of the existing system in that it is fully voice based and gives no work to the mouse or keyboard. Since it uses voices, it provides an intuitive, as well as interactive and easy to use GUI that can be used by a blind user even if they are not computer literate. The idea is to create a class in .Net with .Net SMTP option.

Voice Authentication is enabled using a simple melfcc features. The dictation mode is activated and events are generated when the user tells the number respective to the commands like send compose and read. The speech is typed into text in text box editor. When the number corresponding to "send" is said the mail is sent and when number corresponding to "read" is said the mail is read.
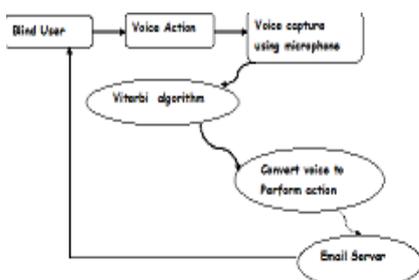

Figure 1: Overview of proposed system

C. 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 $y_i,\ldots,y_T$. The most likely state sequence $x_i,\ldots,x_T$ that produces the observations is given by the recurrence relations:

$$V_{1,k}=P(y_1|k).\pi_k$$
$$V_{t,k}=\max(x\epsilon S)(P(y_t,k).a_{x,k}.V_{t-1,x}$$

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 x was used in the second
Equation. Let Ptr(k,t) be the function that returns the value of x used to compute $V_{t,k}$ if /

3 t>1, or k if t=1. then:
$$x_T = \arg\max_{x \in S}(V_{T,x})$$
$$x_{t-1} = \mathrm{Ptr}(x_t,t)$$

4 Here we're using the standard definition of arg max.
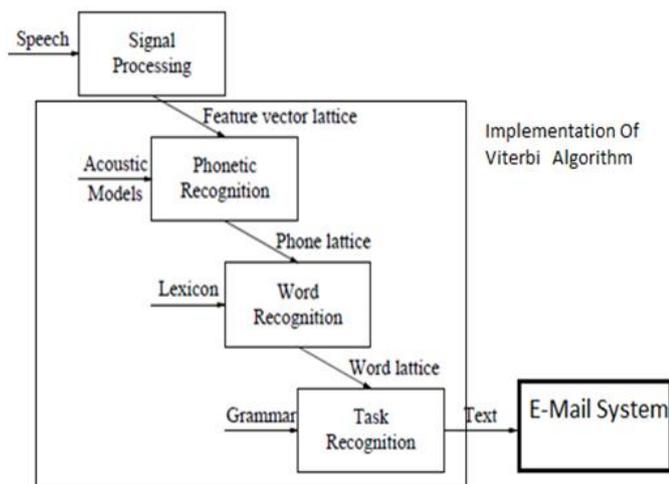The complexity of this algorithm is $O(T \times |S|^2)$.

Figure 2: Implementation of voice based e-mail system

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.

III. RESULTS AND DISCUSSION

A. Voice Based Email Implementation

This mailing system is developed using artificial intelligence. The proposed system is implemented by using the following hardware and software. They are as follows
Hardware:
    Pentium IV processor
    512 MB RAM
    Microphone
Software:
    Front End: ASP .Net
    Back End: MS SQL Server 2000
The proposed system has 4 stages of implementation namely
1. System and mailing server
2. Traditional mailing system
    2.1. Mail composes and Send
3. Voice based command detection
    3.1. Implementation of the Viterbi algorithm
4. Voice based mailing system
    4.1 Mail composes and sends
    4.2 Read mail

Each level is implemented using .net in the front end and Ms Sql at the backend.

Figure 3: Flow chart of voice based email

B. System and Mailing Server

A System is an application that accesses a service made available by a server. To send the request to the server, the users have to be registered in the server. A mail server is similar to a post man who receives the letters and sends it to the appropriate recipient. Similarly the mail is sent to the Server from where it is sent to the recipient using Pop3 protocol, SMTP etc..

Although it may seem like a message is sent instantly-zipping from one PC to another in the blink of an eye - the reality is that a complex series of transfers takes place.

C. Traditional Mailing System

Initially a traditional mailing system is developed which makes use of the keyboard and mouse. It does two basic operations namely mail compose and sending the mail.

D. Voice Based Command Detection

A voice command based on ground truth collection system that uses grammar based commands from residents to start and end activities. It makes use of the Viterbi algorithm.

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 are found to be same then the word is selected from the dictionary and typed by the system without giving any burden to the user

E. Voice Based Mailing System

Here the main purpose of proposed system is implemented.

a) Mail Compose and Send

In this we compose the mail through the voice based detection method where the speech is converted to text and the commands are saved in the server. Thus the mail is composed   using text to speech conversion method. Based on the command the voice is recognized and it will be converted into the text and understood by the application and then the mail is sent through the mail server to the specified recipient.

b) Read Mail

When viewing a list of conversations in your Inbox or, you can open a particular mail to read its messages. A mail is opened and read according to the user's convenience and mostly priority is given to the unread mails. When a user chooses a mail by telling the number of the mail it opens and the text in it is converted into voice and the mail is read. All these activities take place without the use of keyboard

F. The contributions of this paper are summarized as follows

We point out that Voice based email is an initiative of introducing the mailing system that entirely concentrates on the benefits and comfort of the visually challenged and blind people. However, by taking advantage of the voice mail a detailed version of mailing system has been developed to benefit the blind. To the best of our knowledge, this paper is an early feasible work on Voice based email for blind. We propose desktop application that can be accessible from elsewhere any this application is platform independent and it is supported by windows of any versions ranging from windows Xp to windows 8.1. The proposed method benefits from platforms, and it is easy to implement.

We establish the dynamic feature of notification that is entirely based on voice to enhance the performance of the proposed system. The research based analysis and experiments conclude that it is possible to add more features to the mailing system.

IV. FUTURE ENHANCEMENTS

Future enhancements include adding more features to the developed mailing system like attaching audio and rar files. The proposed system includes only features like mail compose, sending a mail and receiving a mail through voice based detection which are basic features. So further features can also be added according to the need of the user in the forthcoming years.

V. CONCLUSION

Voice based architecture helps blind people to access e-mail with no difficulty. The proposed system entirely focuses on the benefit of the blind in making use of advanced technology for their growth and improvement. This design will also reduce cognitive load taken by blind to remember and type characters using keyboard. It also helps handicapped and illiterate people. This project will be very much useful for today's generation either blind or physically challenged to move a step forward in their way in an easy manner to achieve their desire.

VI. ACKNOWLEDGEMENT

VII.   REFERENCES

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