Voice Based Email System for Visually Impaired people using NLP

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Abstract: Using natural language processing advancement in email process has been done in the proposed system. The users with disabilities or user who wants more advancement in automation can use such application to make email process automatic. To make hand free interaction between user and system this application has been designed which makes process of logging, sending email and reading email using voice commands. Special character recognition is used for logging and in other processes to make user-friendly authentication and smooth voice email process. Python libraries of speech recognition and natural language processing used in this application to make application more functional and interactive with user. Django framework is used for preparing frontend of the application.

Keywords: Speech recognition, Voice based email , Natural language processing , character recognition.

I.   Introduction

The purpose of this study is to propose voice based email technology for disabled as well as other persons who can only use text to speech technology for acquiring, composing and organizing their emails. Finally, the system's goal is to do away with the exterior hardware or call for outside help and ensure equal participation in the digital world.

Objectives of paper are

1. To design an understandable e-mail client with the abilities to create, send and read e-mails via voice commands.

2. To achieve fluent speech/voice interaction: by correctly implementing both the speech recognition, doing speech-to-text and text-to-speech conversion.

3. So it is not only friendly to visually impaired people, but also usable for people of other types of disabilities.

4. For added security with such factors as voice identification or face detection.

5. To capture the requirements for a system that can lighten the load of e-mail related tasks while not requiring keyboard and or mouse operation.

Email could be considered as the most effective tool of modern communication required in professional and academic life, as well as in personal activities. Much as people today are able to access general email platforms, specially the visually impaired are disadvantaged due to their use of assistive devices such as the screen readers and braille keyboards which are inherently very poor.

These shortcomings are overcome in voice based systems which employ speech recognition and text to speech conversion to provide voice operated email access. Several of the propose system will enable user to carry out basic email tasks such as composing, sending and receiving emails by using voice commands only. In addition removing the necessity of using significant input apparatuses the system also increases the accessibility of e-mailing. Addressing both the visually impaired and other users, the system is an indication of inclusive AS affordances in terms of efficiency and independence when using emails.

To improve on speaker adaptation in the speaker-adaptive speech synthesis the HTS-2007 system incorporated feature-space SAT for better speaker normalization, mixed gender modeling for efficient average voice synthesis and CSMAPLR with MAP adaptation for an improved synthesis. They improve upon the existing techniques, which leads to the production of realistic and much more superior fake voice.

[1] A novel voice based email system planned to promote independence and maintain privacy for visually impaired persons in respect to email solutions. Thanks to the application of the S2T and TTS, the system allows the user to read, write, and send e-mail as a result of voice

commands as well as all these processes are performed without the outside help.

[2] The authors' ideas included a voice based email system with an attachment option for a disabled audience, namely, users with impaired vision. This is a natural speech based working environment where the integration of speech to text and text to speech the user can be able to type, send and reply emails inclusive of handling attachments without the need for other accessory gadgets or help.

This innovation helps add increased accessibility and autonomy to visually impaired citizens in the world of digital communication needs. This paper seeks to understand the advancement of voice assistants from from relatively simple text to speech to conversational interfaces. It outlines main events and ideas, stressing on the transition from natural language processing to natural language understanding and natural, satisfying interactions. [3]

[4]The study [5] introduces a voice based email system for the visually impaired, special emphases on Speech Command Recognition and TTS. Efficient average voice creation and CSMAPLR with MAP adaptation to enhance synthesis quality. These advancements address limitations in prior methods, resulting in more natural and high-quality synthetic speech.

[3] This paper explores the evolution of voice assistants, detailing advancements from basic text-to-speech systems to conversational AI. It highlights key milestones and technologies, emphasizing the shift towards natural language understanding and intuitive, human-like interactions

[6] This research also presents the website Email Autometa Solutions, which uses voice recognition in managing and organizing emails. The system lets users create and work with emails using voice alone, and incorporates multiple technologies such as pyttsx3 and speech_recognition.

In the proposed voice-based email system the target is to address the limitations visually impaired people experience when interacting with standard e-mail clients that are based on the visual interface. By using voice commands and providing audio feedback the system helps users to independently work with emails, corresponding, organizing and controlling e-mail traffic, which increases availability and effectiveness of digital communication. [7]

II.   LITERATURE SURVEY

This paper presents a new open-source system HTS-2007 based on speaker-adaptive HMMs, CSMAPLR+MAP adaptation, feature-space adaptive training, mixed-gender data set and full covariance modeling. Evaluations based on subjective assessment of the results indicate that it performs better than speaker dependent systems with small data sets and as good as systems using large data sets in the training. No doubt, the system is quite robust mainly for generating intelligible speech from noisy data and for out of domain sentence. [1]

This paper highly recommends that a Voice-based Email System be implemented in an environment that will support the visually impaired so they can read their emails; send emails; perform tasks by voice. The system is easily accessible which does not require other hardware devices to be installed in the computers. It shows how totally blind users are capable of effectively interacting with their mailbox in a voice-only mode and hence acquire freedom to operate computers on their own. The emphasis is thus on broadening the coverage of acceptable modified formats mainly for the visually impaired.[2]

The issues highlighted in the current paper relate to the problems of the visually impaired in using email, including the inability to attach files. It suggests voice centric or voice first e-mail that will use s2t, t2s and face id for security. The system does not require the use of a keyboard, mouse or third party help to send an email or to attach a file and therefore the visually impaired candidates are also capable of performing this task. It is planned to meet the needs of ordinary users and people with very low levels of literacy. [3]

This paper will focus on the development of voice assistants starting from the simple text to speech up to the current conversational AI platforms. It outlines on important aspects such as the work that involved the application of machine learning and neural networks in order to understand the contest and to identify the intent of utterances.

A new level in the development of conversational agents is achieved here, changing voice tools into dialog-based and learning ones. The study focuses on the technology advancement narrative that underpins this transition, as it tells the story of easing towards natural and natural language interactions. [4]

As a contribution to the effective support of people with visual impairment this research is devoted to a Voice-Based Email system that allows people to interact with email system using voice and speech-to-text technologies. The system also enables users to read their emails, manage as well as compose new messages using voice. ASR captures words and transcribes them into composing the email body from words and a TTS reads the subject and the body of the email. The intention of the application is to provide better usability of the e-mail for people with impaired vision, so they do not always have to rely on someone else's help.[5]

In this paper with Streamlit is the Email Autometa Solutions website that sends emails on a voice command. It works both as a speech-to-text and text-to-speech interface with libraries such as speech recognition and Pyttsx3 respectively. New messages, subjects and messages, and attachments can be created using voice commands, and messages are sent with the help of Gmail's SMTP. The system includes audio signals which can confirm the execution of the particular task, so it can be considered as the convenient and simple tool for managing the e-mail correspondence. [6]

III. Proposed Method

Proposed system is made automation and following steps are included in proposed system ,

a) User signup or Registration
b) User Login via voice command
c) View Email
d) Reading Email
e) Sending Email

The complete automation process is mention in below block-diagram,

User Signup or Registration

↓

User Login by Voice

↓

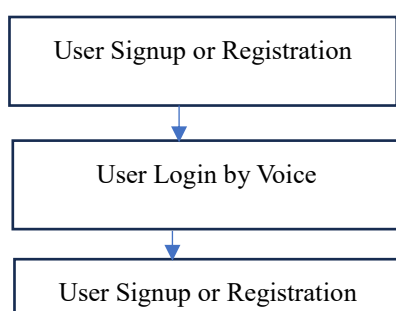User Signup or Registration

Fig. Block diagram of proposed method

3.1 User signup or Registration

User will be asked with email, password, gender , contact and address from HTML page. The obtained details are saved in MySql database. This database saves the user data in tabular format.

3.2 User Login via voice command

In this step by using gTTS (google text to speech) library system will ask the email as well as password to enter for user. Speech recognition by natural language processing (NLP) is used for identifying user response. Special characters are handled like underscore and dot for correct conversation.

3.3 View Email

From mysql database the email is fetched for user login. The email data is shown in short format on HTML page like sender , date , subject and message.
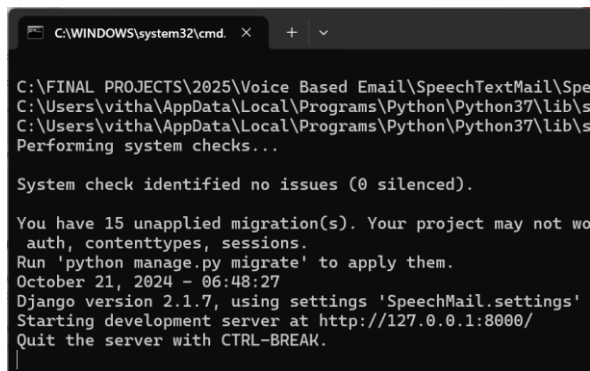
3.4 Reading Email

In mysql database already the emails are saved by using 'Readout' function from database we are going to retrieve sender , subject , message etc. Then using gTTS the obtained email details are converted to speech.

3.5 Sending Email

Sending email is not fully functional as we applied this sending part only for database user. If user is available in database , then email is valid for sending. In this application speech is used for email composition.

IV.   Results Analysis

Voice based email system using NLP technique has been successfully designed using python software and Django web application. Proposed system uses voice to text and text to voice generation process to make visually impaired people to use this service.

Fig. Django Server has been Started

Above image shows that the proposed system is running on local host computer using Django framework. Django framework gives the url for accessing from local host the services. This url can be pasted in any browser to start the application. Below is the main page when we enter this url in any browser.
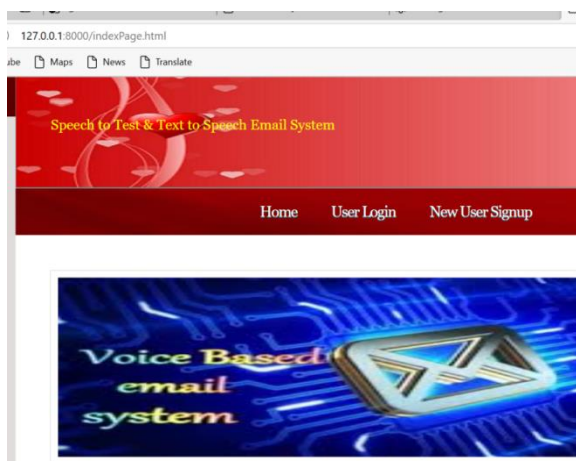

Fig. Main Page of the Application (index Page)

Above page is obtained as an index page (main page) when url is entered in any browser. This page has three options as 'Home', 'User Login' , 'New User Signup'. Home is the main page access option for this application. 'New User Signup' option gives user to register with the application by entering the details. 'User Login' option gives registered users to access the proposed application. These options are accessed by voice of the user.
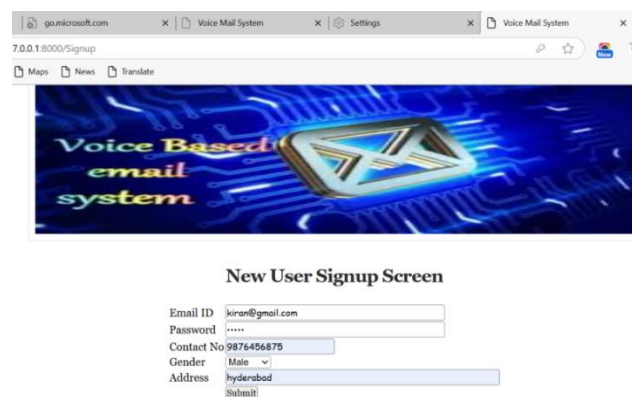

Fig. New User Signup Page

Above new user signup page takes user details such as email ID, Password , Contact number , gender and Adress from user and saves the details in MySql database. These details are verified while user login.
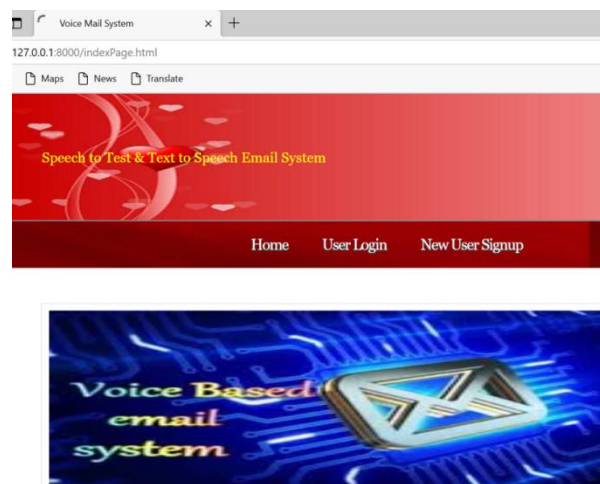

Fig. Click on User Login

In above page , application ask user details and the entered details will be checked with database. If credentials matched with database, then user will get below page,
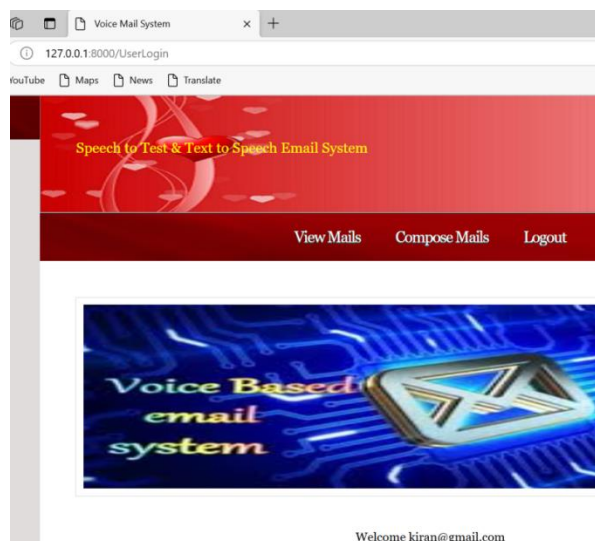
Fig. After Successful Login This Page Will Be Seen

After successful login of the user , user will get below options such as 'View mails', 'Compose Mail' and 'logout'. Using view mails , user can see all the recent emails obtained. Compose mails will give option for user to write an email.
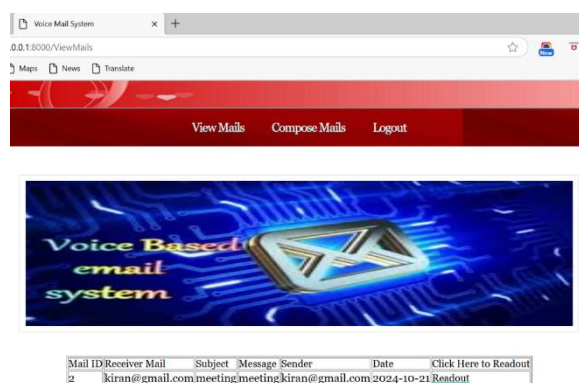

Fig. View Email

In view email option user can get details of sender email, subject, message, sender, sent date and Readout. The emails obtained are shown in this page. Using Readout button we can listen to the voice email. Similarly, physically handicap person also can use this application for both reading and compose.

V. Conclusion

In this application to implement front-end Django web framework is used. Using NLP library this application is designed to be more advance and user can easily access with voice. There is no need to use text editors for sending email. Advancement in technology helps physically handicapped people as well as high end organizations to make process automation to increase the speech of sending email process. To get improved user experience with advancement for email process in this application voice character recognition is used in different processes while logging and while using different services like sending email or reading email. This application gives user better experience and for physically handicapped people no need to depend on third party person to send an email. There is feedback collected from user for email, password etc. for correctness ensures that system is more accurate, user interactive and reliable.

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