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VOICE BASED EMAIL SYSTEM FOR BLIND USING ML

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ABSTRACT

Voice-activated email is a big step forward for people with visual impairments since it lets them use voice commands to check their inbox, send and receive emails, and manage their accounts. The platform combines state-of-the-art machine learning and speech recognition technologies with an easy-to-use interface to provide safe authentication, email reading, and smooth interaction using only voice commands. This invention empowers visually impaired persons to fully engage in digital communication with ease and confidence, improving accessibility and productivity while also promoting independence and inclusivity.

Keyword: Text-to-speech (TTS), Machine learning algorithms, Voice-based email system.

1. INTRODUCTION

Creation of a voice-based email system presents a novel and revolutionary approach to the long-standing accessibility issues visually impaired people encounter while coordinating email correspondence. Designed with this population in mind, this innovative software enables blind users to engage with their email accounts through simple voice commands. Fundamentally, the system employs state-of-the-art machine learning algorithms along with powerful text-to-speech technologies. This combination makes it possible to turn text-based emails into spoken messages, giving users the impression that they are conversing verbally with one another. The technology uses advanced machine learning models to effectively recognize and comprehend voice instructions, in addition to its basic ability to read emails aloud. For users who are visually challenged, this method offers a fluid substitute for conventional text-based interactions that improves accessibility and usability. Because the system enables users to safely verify themselves by verbally supplying their email address and password, security is also of the utmost importance in its design. The platform ensures a simplified and efficient user experience by being instantaneously available to receive and execute voice instructions once authenticated.

In addition to improving accessibility, the voice-based email system empowers and encourages independence in those with visual impairments. More independence in handling personal and business interactions is made possible by the technology, which does away with the need for visual interfaces and allows for natural spoken language engagement. Additionally, because of its user-friendly design, which accommodates a variety of user demands and preferences, it promotes inclusion and helps close the digital divide for people who are visually impaired. By utilizing speech recognition and artificial intelligence, this creative solution essentially redefines how visually impaired people interact with email communication, marking a huge development

in assistive technology. The voice-based email system is a ground-breaking strategy for digital inclusion by providing a strong yet user-friendly interface that puts accessibility, security, and efficiency first, guaranteeing that all users may engage completely and successfully in the digital sphere.

2. RELATED WORK

1. The "Voice Based System in Desktop and Mobile Devices for Blind People" is described in Paper [1]. Voice message engineering helps the visually impaired access email and other functional framework components with interactive media. Furthermore, the architecture of a mobile application has the ability to read SMS. Currently, advancements in PC technology have created opportunities for those with visual impairments all around the world. It has been observed that India accounts for over 60% of the world's visually impaired population. Here, authors describe how blind people use voice message designs to efficiently and productively access media and email components of working frameworks.

The authors of article [2] create a web index that fully allows machine-human cooperation as speech. A new voice-based search engine and a web page reader were introduced that allows users to command and manage the web browser with their voice. The modern search engines respond to client requests for material by retrieving relevant data from the server and displaying them as content. Even though modern web browsers are capable of playing music and recordings, users still need to submit content in the search content box before they can use Graphical User Interfaces (GUI) to play the videos they are interested in.

The "Social Robot Maggie" has a voice-activated interface [3] that may be expanded to include signal-based information and yield techniques, converting it into an aloud reader. This A multitude of factors, such as voice speed, pitch, volume, and so on, can affect voice recognition and synthesis. The Loquendo (Emotional Text-To-Speech) ETTS program is responsible for this. Additionally, the robot uses a signal that is dependent on geostationary to communicate its mental state. The removal of noise can increase the accuracy of speech recognition. Broad media annals employ an HMM based on Principle Component Analysis (PCA) for their visual philosophy.

Principle Component Analysis (PCA) [4] and Probabilistic Design (PDF) Density Evaluation). Outlines a method for handling discourse acknowledgment that ignores disturbance rather than identifying and eliminating it through fluffy displays and basic initiative. Instead of using precise audio characteristics, the discourse spectrogram is replaced with a fuzzy semantic demarcation.

[5] The current version is focused on features that are usable in bright light, as well as apps and features that include tutorials and the ability to use smartphones as a visual aid for blindness and visual impairment.

This has been a significant turning point in the creation of the most recent mobile technology, which incorporates touch screen access and computer technology linked to electronic information[6].

Voice messaging technology promotes blind individuals to access other framework functionalities, emails, and other interactive media elements. Here, the author demonstrates how to create a voice message that blind users can use to access emails and media elements inside a productive and successful framework.[7] edits using the Google Web Kite interface. This tool is made to make writing emails easier for everyone, not only those who are blind or visually challenged.

As a result, the extra abilities needed to type will no longer be necessary. The goal of the proposed program is to create a system that can read emails by turning text into speech and speech into text[8].

An app designed to improve vision for those who are blind or visually challenged. The application is tailored to make it enjoyable for users and is made with a friendly audience in mind. Furthermore, advancement as an adult voice recognition system to reduce challenges. [9].

This aids in the comprehension of a variety of technologies, including speech-to-text and text-to-speech converters, braille touches, free text input, and comparisons with various kinds of existing accessible applications. These access apps assist with medication identification, drive, text entry, and message access. Feel Because screen phones lack a portable key and have inadequate accessibility features, they are not usable by visually impaired individuals.[10]

3.METHDOLOGY

The technique used to build and develop the voice-based email system is described in this methodology section. It emphasizes technology integration, usability testing, security precautions, and continuous improvement procedures to increase accessibility and user experience for those with visual impairments. In order to guarantee reliable operation, accessibility, and user-friendliness, a number of essential technological components are integrated into the creation of the voice-based email system for visually impaired users.

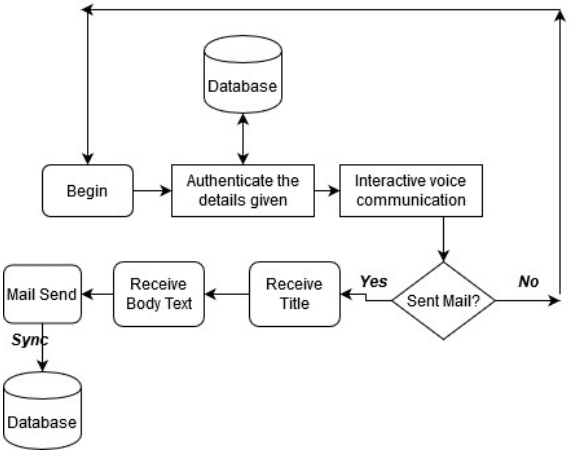

Figure 1: process of email system

The stages and technologies covered by the methodology are as follows:

I. **Text-to-Speech Technology:** The system translates text-based email content into spoken words by using sophisticated text-to-speech (TTS) technology. This entails applying natural language processing algorithms to precisely decipher email messages and produce comprehensible speech output that is user-friendly.

II. Machine Learning Algorithms: To improve the system's recognition and response to voice instructions, sophisticated machine learning algorithms are included. This involves using previous data and user preferences to train models for speech recognition, command interpretation, and customized user interactions.

II. **User Interface Design:** To produce a user-friendly and accessible interface, a user-centric design approach is used. To ensure usability for visually impaired people, this involves providing tactile feedback alternatives, voice-guided navigation, and clear aural cues where appropriate.

IV. Authentication and Security:

To protect user credentials and data privacy, strong security measures are put in place. By vocalizing their email address and password—which are processed through encryption algorithms to prevent illegal access—users safely authenticate themselves.

V. Real-Time Interaction:

With natural voice commands, users can compose emails, browse through their mailbox, and adjust settings with ease because to the system's optimization for real-time interaction. Reliability and responsiveness are guaranteed by cloud-based infrastructure and effective data processing.

VI. User Testing and Feedback:

Throughout the development process, a large number of visually impaired people participate in extensive user testing. In order to make sure that the system satisfies the unique requirements and preferences of its intended users, feedback is gathered and used to iteratively improve the system's performance, user interface, and accessibility features.

3.1 Dataset Used

Different datasets were utilized to create and test our technology for this paper on a voice-operated email system for visually impaired users. Initially, we generated our own dataset by capturing the voice commands used by visually impaired people to engage with emails. This assisted us in teaching our system to comprehend and appropriately execute these commands. We also made use of speech datasets that were made accessible to the public, such as VoxCeleb and LibriSpeech, which included transcriptions of spoken word recordings. With the aid of these datasets, we were able to train our speech recognition algorithms to recognize a variety of voices. We also integrated email collections to evaluate our system's ability to read and manage emails by simulating actual email interactions.

3.2 Data Pre-processing

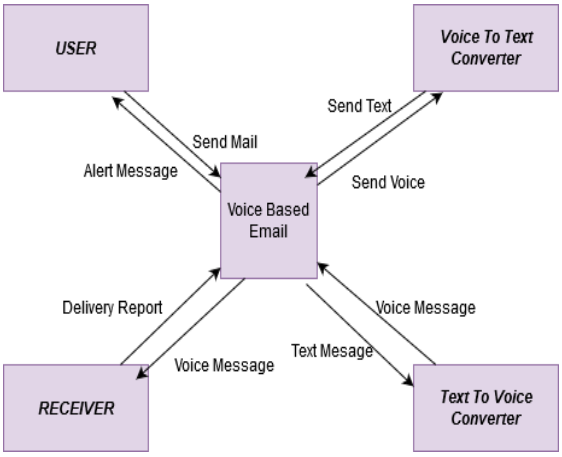

Figure 2: data flow diagram

Several data pretreatment techniques were used in the development of our voice-based email system for visually impaired customers to ensure accurate and effective performance. At first, we concentrated on audio preprocessing, which entailed sanitizing and adjusting the audio clips gathered from both our proprietary dataset and freely accessible speech datasets like VoxCeleb and LibriSpeech. The objective of this stage was to improve the audio data's quality and consistency so that our system would receive comprehensible speech input. After that, we handled the transcriptions of the audio recordings and email content using text preparation techniques. This comprised normalization, which standardized text formats, tokenization, which divided text into smaller pieces called tokens, and maybe lemmatization or stemming, which reduced words to their most basic forms for easier recognition. Furthermore, we applied methods for managing noisy or imperfect data, like eliminating

unnecessary background noise and correcting transcription mistakes to enhance the precision of speech recognition and text-to-speech conversion procedures. We want to improve the voice-based email system's usability and accessibility for visually impaired people by carefully preparing our data. This would ultimately improve the user experience and accessibility for these people when it comes to handling their email correspondence.

3.3 Algorithm Used

Because they can handle sequential data well, Long Short-Term Memory (LSTM) neural networks are widely utilized in voice-based email systems. Recurrent neural networks (RNNs), of which LSTMs are one kind, are made to recognize long-term dependencies in data sequences. This makes them especially well-suited for jobs like natural language processing (NLP) and speech recognition, which are crucial for handling email content and understanding voice instructions.

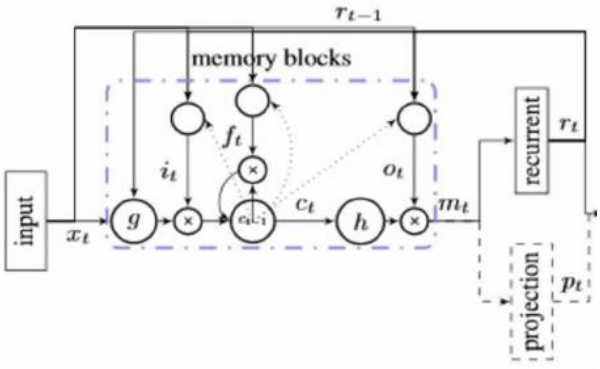

Figure 3.3 : LSTM Speech Recognition

LSTM neural networks interpret spoken commands and respond to them, enabling blind users to connect with voice-based email systems. The LSTM network processes the voice of a blind user to accurately translate it into text, even taking into account variations in speech patterns, when the user talks into the system, for example, asking to read their most recent email. The meaning of the command, such as whether to read, delete, or reply to an email, is then understood by it. When an action is requested, such as having text-to-speech technology read an email aloud, the LSTM directs the system to carry it out. As time passes, the LSTM picks up knowledge from these exchanges, enhancing its comprehension of the user's voice and preferences. This technological connection improves accessibility by allowing blind individuals to freely control their emails using natural voice commands.

4. RESULT AND DISCUSSION

For visually handicapped users, the voice-based email system has proven beneficial. It has lessened their need on text-based techniques by enhancing their capacity to handle emails autonomously through voice instructions. Users have reported that chores like reading and writing emails are completed more quickly and easily. They value the system's safe login options and crystal-clear speech output. Developers are attempting to address the sporadic issues with correctly comprehending voice instructions, though. All things considered, the technology has significantly improved the efficiency and accessibility of email communication management for people with visual impairments.

4.1 GRAPH

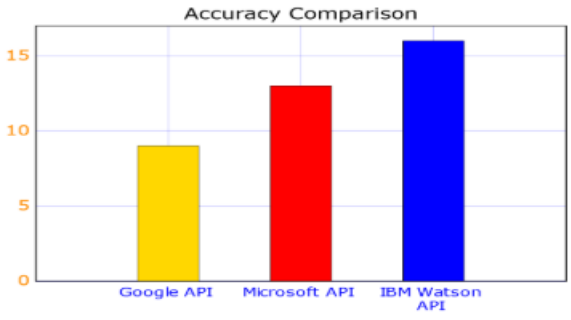

Figure 4.1: Comparison Between Three Systems

5.CONCLUSION

Conclusively, the voice-activated email system is a revolutionary development in the field of accessibility technology, designed to enable those with visual impairments to handle their email correspondence with unparalleled simplicity and effectiveness. The system improves accessibility and usability by using powerful text-to-speech and machine learning technology to enable intuitive interaction through voice commands. Data security is ensured by secure authentication, and a variety of user needs are met by real-time responsiveness and customized functionality. The system's commitment to inclusivity and continual progress is demonstrated by its user-friendly interface and continuing upgrades that are motivated by user feedback. Ultimately, the voice-based email system confirms its critical role in promoting equitable participation in the digital age by bridging accessibility gaps and fostering independence, productivity, and a smooth digital experience for visually impaired users.

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