

Voice Based Email with Face Authentication

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Abstract: *The emergence of the Internet has caused substantial change in many industries. The internet, as a global computer network, has made people's life easier since they can often more quickly obtain any information they want. Communication is one of the primary areas that the internet has altered. Communication has become very simple as a result of the internet's integration of communication technology. Email is frequently regarded as the most secure means of transmitting or receiving sensitive data over the Internet. Because these gadgets need visual awareness, using them may be difficult for persons with visual impairments. A visually impaired person cannot use the current email software without the aid of others who send emails on their behalf. This, however, does not secure that person's protection and confidentiality. This lead to the creation of a voice-based email that requires minimal training. It employs speech recognition as well as mouse clicks. Facial recognition is used to improve user authentication, security, and privacy. Voice-mail allows users to easily send, receive, and delete emails. Each user activity is accompanied by an interactive speech response. It might be used by both visually impaired folks and ordinary people.*

Keywords: Blind, Face Recognition, Mail for Blind, Voice Mail, Haar-Cascade

I. INTRODUCTION

Developing a voice-based email system to assist persons who are blind and unfamiliar with computers with email services that is more effective and safer. This method is simple to use for users of all ages. It has a text-to-speech option and a speech reader with text-to-speech, making it simpler for those who are blind to navigate the system.

The bulk of postal services that we use on a daily basis are inaccessible to visually impaired people. Screen readers, automatic speech recognition software, voice to word and word to voice conversion are among the technologies accessible to visually impaired users to make these systems more user-friendly. Several of the technologies did not produce the appropriate response, as a conventional system would, and hence were not really useful to those people. This system's major purpose is to improve email accessibility and efficiency for users.

Everyone will be able to manage their mail accounts and do any mail-related procedures with the help of this application. Voice to word and word to voice converters are used to power the system. The user will reply to voice commands from the system that direct them to do specific actions.

It would be a web-based assistance for persons who are blind or have low vision that would employ an IVR to provide voice-only account administration for everyone's mail accounts as well as read, send, and do any other necessary activities. The system offers the user oral directions to execute particular activities, and as a consequence, the user follows the instructions accurately. The removal of the keyboard is the primary advantage of this method.

Speech and mouse clicks will be the only methods of user engagement. Also, the system will notify the user of which mouse click action will provide them with which operations, so they do not have to worry about which click to make in order to access a specific service.

II. METHODOLOGY

The process starts by gathering a dataset of emails and pictures of the user's face. The dataset need to be varied and accurate in terms of the user's usual speaking habits and expressions on their faces. The dataset is preprocessed to get rid of any extraneous data and make sure it is good enough to train machine learning models. Users' faces are supplied, and the module is trained to identify them. A training set and a testing set are created from the preprocessed dataset. The

testing set is used to assess the system's correctness, while the training set is utilized to train the machine learning models.

Machine learning methods are used to implement the facial recognition portion of the face authentication system. The training set of face image data is used to train the system, while the testing data is used to assess the system's correctness. Haar-Cascade Classifier algorithm is used for face recognition.

The Haar-Cascade Classifier is a popular feature-based object detection technique, commonly used for face recognition. Some of the key features of Haar-Cascade Classifier for face recognition are high accuracy, fast processing, robustness, easy to implement and scalability.

The Haar Cascade Classifier for face recognition works by using Haar-like features to detect regions of an image that are likely to contain faces, and then applying a sliding window approach and thresholding to classify those regions as either positive or negative instances. The Haar-Cascade works in four stages which are briefly described below:

Haar-feature selection: Dark and bright sections make up a Haar-like characteristic. By comparing the difference between the total of the intensities of the bright and dark zones, it yields a single value. It is carried out to extract beneficial components required for identifying an object.

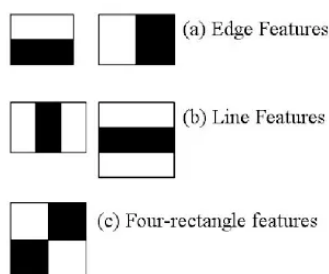


Figure 1: Types of Haar-Features.

Creation of integral images: In the integral picture, each pixel's left and rightmost neighbors are added together to get its value. Integral Pictures greatly shorten the time required to accomplish the operation of extracting Haar-like features, which requires computing the difference between rectangular dark and bright patches.

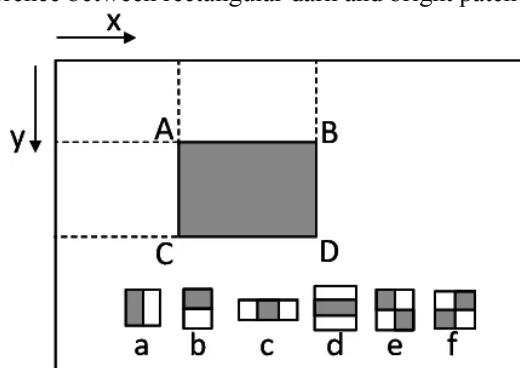


Figure 2: A sample integral image.

AdaBoost training: The best features are chosen by this algorithm out of all features. It creates a "strong classifier" by combining many "weak classifiers" (best characteristics). A "weak classifier" is a linear combination of all other "weak classifiers," and this is how the resulting "strong classifier" is created.

Cascade classifier: It is a technique for stacking ever-more complicated classifiers, like AdaBoost, that allows non-face input to be swiftly rejected while devoting more processing power to promising or positive face-like areas. It greatly shortens the computation time and improves the effectiveness of the procedure.

Voice based mail module mainly uses speech-to-text in order to compose and delete the mail and text-to-speech to read the inbox. Simply put, it uses natural language processing. Natural Language Processing (NLP) is a field of computer science and artificial intelligence that deals with the interaction between human language and computers. NLP involves developing algorithms and models that can understand, interpret, and generate natural language text or speech. The main goal of NLP is to enable computers to understand and process human language in a way that is similar to how humans

do it. This involves solving a number of challenging problems, such as speech recognition, language translation, sentiment analysis, text summarization, and question answering.

NLP involves a number of techniques and approaches, such as machine learning, deep learning, statistical modeling, and rule-based methods. These techniques are used to build models that can learn from data and perform tasks such as language classification, part-of-speech tagging, named entity recognition, and more. NLP has many practical applications, including chat-bots, virtual assistants, and sentiment analysis for social media, language translation, speech recognition, text summarization, and more. As the volume of natural language data continues to grow, NLP is becoming increasingly important in many fields, such as healthcare, finance, e-commerce, and more.

III. IMPLEMENTATION

This system allows a blind user to compose, send, delete and read the inbox messages. The user can select any option using the voice commands. Also, it provides the additional feature of face authentication which provides enhanced security and privacy to the user.

The model architecture of the proposed system consists of three main modules: User, Mailbox framework, and Face authentication framework.

3.1 User Authentication

Capture User Photo: Firstly, user can capture their photo by voice command through their System.

Face Detection & Pre-processing: Apply the Haar-Cascade Classifier for the face detection in images. Once face is detected then apply the pre-processing on input images like noise removal, normalization etc.

3.2 Mailbox Framework

Sign-Up: This module is used to register new user in application.

Sign-In: The existing user can sign-in in application by their face authentication. The user needs to capture their photo and then the system can authenticate the user.

Inbox: The user is notified of an email received and the application will allow the user to listen to the email.

Compose Mail: The user can compose an email just by speaking the content and the application will automatically convert it into text.

Delete: The user can delete unwanted emails and put it into the trash folder using this module.

3.3 Face Authentication

Using the Haar-Cascade Classifier for the face detection in images. Once face is detected then apply the pre-processing on input images like noise removal, normalization etc.

The working steps are briefly discussed below:

If the user is new, then his face images will be captured and the system is trained accordingly by providing the name of the user and a unique ID.

If the user is old user, then the system recognizes his face and redirects to the mailing page where the user has to login to his mail account by providing his email and password.

The user is alerted about the options by voice and the user can choose an option by providing voice command.

The user has four options:

Send/Compose mail: The command to "send/compose an email" must be spoken by the user. The recipient's email, subject, and message are then requested by the system. The system checks the message through before delivering it after the user provides them by voice. The system plays a voice message of confirmation after the mail has been sent.

Read inbox: User has to say the option "Read inbox" through voice. The system then reads all unread messages one by one. The user can stop this via "Stop" voice command.

Delete message: The user has to specify "Delete message" through voice. Then the system selects messages according to user preference and deletes the messages. It responds to the user through voice once the operation is completed.

Quit: The user has to provide "Quit" voice command to stop the system.

The control-flow diagram of the proposed system is as shown below.

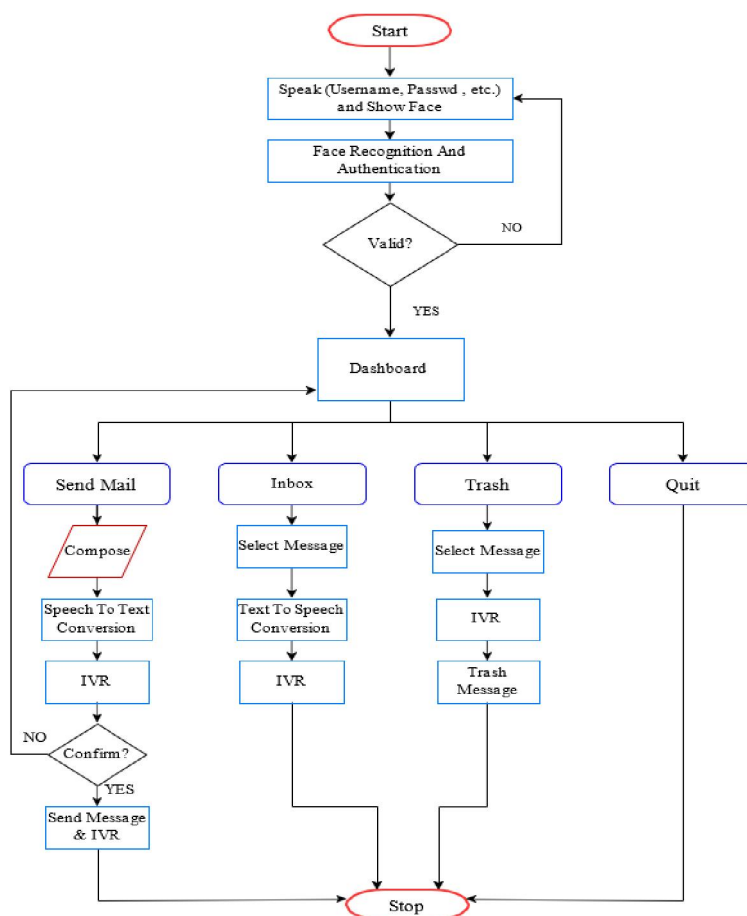


Figure 3: Control-flow diagram of the proposed system.

IV. RESULTS AND DISCUSSION

The proposed system for Voice-based Email with Face Authentication is designed to provide a convenient and secure way of sending and receiving emails using voice commands and facial recognition. The system is composed of two main components: the voice-based email component and the face authentication component. Both components are implemented using machine learning algorithms that are trained on preprocessed datasets of emails and facial images.

Speech recognition includes the technology and linguistic to identify the spoken words by the user and converts them into text. It helps the computer to understand the human language. The speech recognizer in python is used to convert the spoken words into text and make a query and reply them with the required functions. The proposed system utilizes this feature to hear the voice commands from the visually impaired people to get the inputs and does the needed function accordingly by checking the condition mentioned in the code. The speech input is done using the external microphone. The external microphone is configured and even Bluetooth devices can be used to take the input from the user. Since the environment around the user can be noisy, the program is allowed to adjust a second according to the threshold value of the external noise adjustments.

In our system, the voice commands of the user is directly listened from the microphone. The spoken commands of the user is collected with the help of listen command which takes the parameter of defined source which the microphone in our system. The voice is converted into text by recognize google command which converts the audio file to text. These function are available in Recognizer function from the speech recognition package from python.

V. CONCLUSION

This paper is the proposed Voice based Email system for visually impaired people, which is developed as an application which helps the blind and handicapped people to access mails easily and efficiently. It provides a voice based mailing service where the visually impaired person could read and send mail by their own without the help of others. It requires basic information about keyboard shortcuts. System has eliminated all these concepts and overcome all difficulties faced by the visually impaired. It uses a speech recognition application which provides an efficient voice input method for mailing devices for blind. It is also useful for handicapped and illiterate people. People who are physically disabled will be able to access the world with the aid of our system. Anyone may use this email system with ease, regardless of their age group. It contains features of speech to content as well as content to speech with discourse reader, making planned structure manageable for those who are externally disabled as well. Now, visually challenged individuals may send and receive mail with ease using only voice instructions and very little keyboard or mouse use. It has helped eliminate the challenges that blind people experience and transformed them into more typical persons. The main objective of the project is to establish email communication based on voice commands for blind people because of their inability to use internet and its functions. We achieved in receiving unseen mails giving senders mail id, subject, message in the form of voice as output.

In the future, this application may be improved and used for various services in addition to email, such as messaging, taking notes, and voice-operated operation of other applications. Furthermore, even the smallest amount of keyboard shortcuts may be removed with the help of high-tech tools. In the future, voice's capabilities could be expanded to include picture attachments and other features included in regular E-Mail, including indentation and font selection.

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