IJNRD.ORG ISSN : 2456-4184
INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT (IJNRD) | IJNRD.ORG
An International Open Access, Peer-reviewed, Refereed Journal

MEDICINE ASSISTANCE APPLICATION FORVISUALLY IMPAIRED PEOPLE

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Abstract : Nowadays, the majority of jobs are based on visual textual information; yet, reading printed material can be difficult for those who are visually impaired. These days, smartphones are widely available and widely used. The aim of this project is to help older individuals who are visually impaired take their medications on time and correctly without needing assistance from others with smartphones. Using the app and the camera on their phone, users must snap images of the back of medication strips. With the use of optical character recognition (OCR) and text localization, the application will scan the text that is written on it and extract medical information from the medication's wrapper. Users of the app can additionally set prompts to take their medication as prescribed. The goal of this project is to provide voice assistance, image-to-text recognition, artificial intelligence, and machine learning to persons who are visually impaired.

IndexTerms - OCR (Optical Character Recognition), Text-to-Speech.

I.I NTRODUCTION

The Voice-Controlled pharmaceutical Assistance App uses a smartphone camera to read and record text from pharmaceutical labels in an effort to help blind people identify their medications. With the app's usage of voice commands, users may operate hands-free and easily start the text capture process. According to a World Health Organization (WHO) report, there are 152.238 million blind, poor vision, and visually impaired individuals in India. Our lives are significantly impacted by reading. Perusing Before taking our medication, it is crucial to read the label to make sure it is the right medication and has not expired. Due to the small type on medication wrappers, elderly and visually challenged persons find this chore challenging and may accidentally take the wrong medication. It is easy to take the incorrect medication while taking many at once. We are aware that certain drugs have unusual or incorrect names. The purpose of this application is to address this issue. This application that is being suggested uses cutting edge technology such as computer vision text to speech translation and Tesseract optical character recognition to try and help visually challenged persons understand language written on medicine packages better. Using the app and the camera on their phone, users must snap images of the back of medication strips. With the use of optical character recognition (OCR) and text localization algorithms, the program will scan the text printed on it, extract the name of the medication from the packaging, and use text to voice (TTS) conversion to read aloud to visually impaired individuals. Additionally, it will retrieve the expiration date and any other written information from the wrapper and provide information on the uses, ingredients, and side effects of the scanned medication .The two primary parts of this project are the speech output and the medicine scanner.

Key Features:

- The ability to recognize voice commands to start text capture.
- Text recognition with the camera of a smartphone.
- Text collected and medication information kept in the Firebase Realtime Database are compared.
- Details about medications are retrieved after a successful text match.
- Real-time feedback and error-handling support.

II. LITERATURE SURVEY

In [1], Authors proposed an application that recognizes handwritten prescriptions for visually impaired people. The System identifies the medicines' names and the doses for the collected data set with some pre-processing techniques like image subtraction, noise reduction, and image resizing. The proposed system tested on different real cases, and accuracy has reached 70% using (CNN) model. Drawback of such an application is that it does not allow patients to scan and read medicine which are not in prescription and also does not give essential details about medicines.

In [2], the author proposed a device which converts text to speech for visually impaired people using Raspberry Pi. The device has a camera to take pictures, processing unit and speaker for voice output. Drawback of this device is it needs to be purchased and has overhead of carrying and charging which is improved in this project by just installing an application in smartphones and there is no need to carry extra devices. In [3], the author proposed an application using smartphones which can scan text written on medicine products. It also has the option of reminding patients when to take medicine using voice output. The application just reads text written on medicine wrapper and does not give any information about drugs such as expiry date, composition and side effects etc. In [4], the author proposes an application where there is a need for sighted people to add a medicine list first to help visually challenged people. The sighted user will add a list of medicine and corresponding image which will be later used for identification. Application does not extract anything on the wrapper of medicine it just matches the medicine image from the already uploaded image which can be faulty sometimes.

[5] which reads out text embedded on a bar code after scanning it which is printed on medicine wrappers. But the drawback for such applications is that not all medicine has barcodes printed on it and visually impaired people can not identify those using such apps. In this project image processing techniques such as histogram equalization[6] used and necessary filters applied on images to make it easy to perform OCR. In [7] this paper the author proposed a wearable smart glass which is used to identify medicine with the help of a deep learning approach. The device uses deep learning, internet of things (IOT) and cloud technology. The drawback of the above approach is that the device needs an active internet connection and doesn't have voice output. Also the drug is recognized by taking pictures of pills which can be wrong when two pills look almost similar to overcome this text written on wrapper is used for recognition using LSTM and CNN model as paper [8]. In [9] the authors proposed a voice based medicine planner device consisting of two modules. First is the pill dispensing system which dispenses pills which need to be taken at a given time whereas the second module is a smart medicine box which interacts with users to remind users with voice output. Limitation of this proposed system to insert pills in such devices needs continuous assistance from other non visually impaired persons. In [10] authors proposed a smart pill sticker it uses unique combination of touch points on the screen of mobile phones to identify the drug and smart conductive ink sticker to be pasted on pill wrapper to give information about drug but implementation of such model is difficult as each medicine needs to pasted with conductive ink before hand. In [11] authors proposed an IOT based intelligent medication monitoring system which is used to check whether a patient is taking medicine timely and according to doctors prescription, it is capable of alerting time to take dosage. But the device does not check whether the patient is taking the correct drug or not.

III. PROPOSED SYSTEM

This research suggests an Android application paradigm to help visually impaired persons take their medications. The picture of the medication is used as input to gather information about it. First, as "Fig. 1" illustrates, the image is pre-processed to improve the scanned text and make it easier to read. A few of the pre-processing methods for images include skeletonization, noise reduction, binarization, and skew correction.Subsequently, the LSTM model-based Tesseract Python Library is used for optical character recognition. An open-source OCR system called Tesseract can recognize more than 100 different languages. The dataset used in this study is a collection of information that was scraped from over 30,000 different online medical websites. The JavaScript-based React Native framework from Meta Platforms is utilized for the front end of the Android application. React native serves as an intermediary between an application and the platform it is developed for any event or action is converted into an event type that Javascript can manage.It is applicable to the development of iOS, macOS, Android, etc. React Native has the advantage of allowing apps to be developed simultaneously for iOS and Android. It also provides live reloading, often known as hot reloading, which enables developers to see changes take effect instantly.

IV. SYSTEM ARCHITECTURE

The image you sent depicts a flowchart of a speech recognition system, also known as automatic speech recognition (ASR).ASR is a technology that enables computers to understand and translate spoken language into text.Here’s a breakdown of the speech recognition process illustrated in the flowchart:

- **Speech Input:** The system receives speech input from an application (app).
- **Preprocessing:** The speech input is preprocessed to remove background noise and enhance the clarity of the speech signal.
- **Feature Extraction**: Specific characteristics of the speech signal, such as pitch and loudness, are extracted.
- **Optical Character Recognition (OCR):** If the system encounters written text within the image, it’s converted into machine-readable text using OCR technology.
- **Speech Recognition:** The extracted features are then matched against a speech recognition model to convert the speech into text.
- **Text-to-Speech Conversion (Optional):** The recognized text can be converted back into speech for verification purposes.
- **Medicine Detail Extraction:** The extracted text, which may contain medical information, is then analyzed to identify relevant medical details.
- **Database:** The identified medical details are stored in a database for further use.

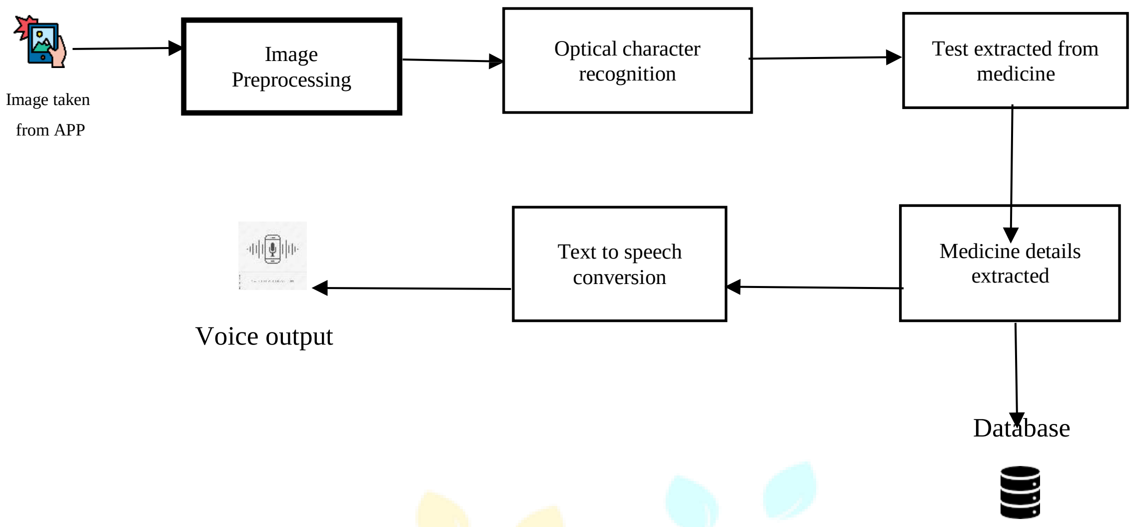

Fig 1 : System architecture

Image Preprocessing:

The first stage of the pipeline is called image preprocessing, during which the unprocessed input image is improved and altered to increase the precision of further processing stages like OCR. It includes a number of operations, including:

- **Image Enhancement:** Methods such as noise reduction, brightness correction, and contrast adjustment are used to raise the overall standard of the image.
- picture binarization is a technique that successfully separates text from background by converting a picture into binary format, which is black and white.
- **Deskewing:** Adjusting an image's skewness or tilt that results from the angle at which it was taken.
- **Normalization:** Changing an image's dimensions, resolution, and orientation to guarantee that all of the photos in the collection are identical.
- **Segmentation:** Breaking the image up into sections that make sense, such separating text from other unimportant images.

Optical character recognition:

OCR is the process of taking text out of pictures or scanned documents and turning it into text that can be edited and searched. The following steps are commonly involved in the OCR process:

- **Text Localization:** Employing methods such as edge detection or linked component analysis, this methodology locates the text-containing regions in the preprocessed image.
- **Text Detection:** Using pattern recognition techniques, identify specific characters or words within the localized text regions.
- **Character Segmentation:** To aid in precise recognition, individual characters or phrases are divided from one another.
- **Feature extraction:** Taking pertinent characteristics, such size, shape, and texture, out of the divided characters or words.
- **Classification:** Using machine learning or deep learning models trained on a dataset of label characters, labels (characters) are assigned to the extracted features.

Text-to-Speech (TTS) Conversion:

The technique of creating human-sounding speech from text input is known as TTS conversion. It entails applying a variety of strategies to convert written text into spoken words:

- Text Analysis: Examining the input text to find components such as emphasis, punctuation, and sentence structure.
- Text normalization involves transforming the incoming text into a consistent format that is appropriate for speech synthesis.
- Phonetic Analysis: Pronouncing words according to their phonetic constituents and context.
- Prosody Generation: Improving the synthesized voice's intonation, rhythm, and stress levels to produce speech that sounds natural.
- Speech Synthesis: Producing spoken audio from processed text through the use of a speech synthesis engine or algorithm.

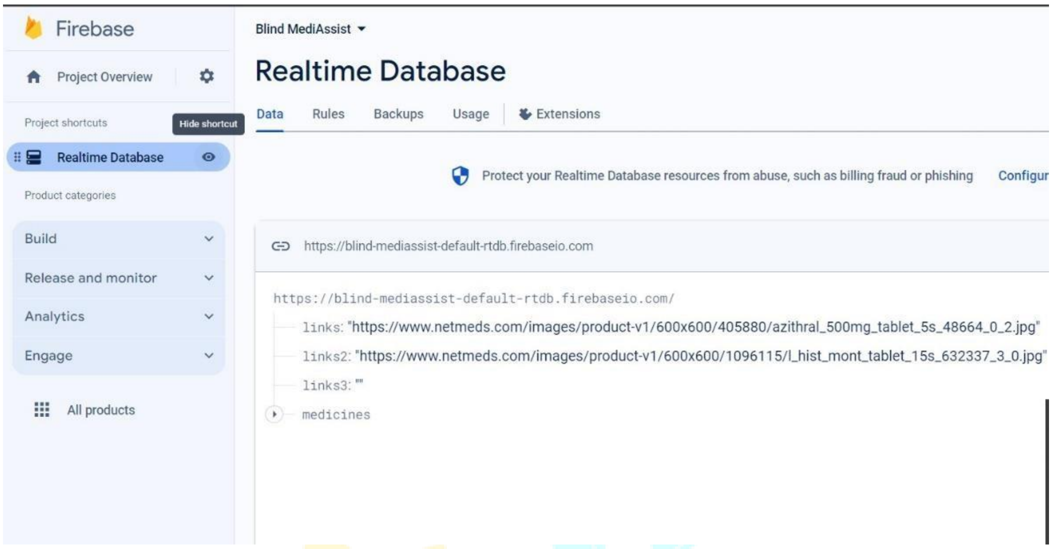

Fig 2 : Blind MediAssist Firebase

V. RESULTS AND DISCUSSION

Java and XML programming languages are used in Android Studio to create the application's front end. The user is first presented with a voice-activated welcome splash screen when they launch the application. Additionally, the user is given instructions pertaining to different gestures via speech output, and they are put to use. Users can swipe left or right on the home screen, as seen in screenshot Figure. Users can view and hear all of their medication reminders by swiping to the right of the app, or they can swipe left to open the camera and scan medications. The user can click an image of a medication to scan it when they swipe left on the home screen. Additionally, swiping to the right on the home screen allows the user to edit or remove existing reminders. Additionally, all reminder setups with voice output will be audible to users. Voice commands and gestures can also be used to make modifications.

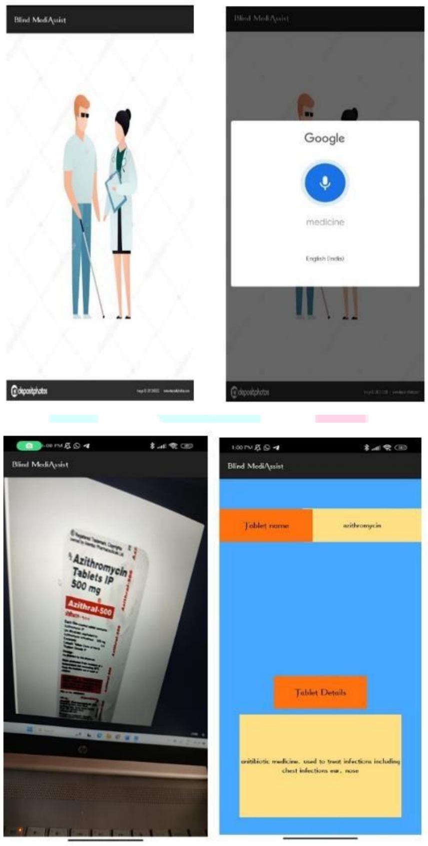

Fig 3 : Blind MediAssist

VI. CONCLUSION

Tested successfully on various pharmaceutical boxes and wrappers, the Android app for medical assistance which was created using digital image processing, neural networks, optical character recognition, and text-to-speech conversion—can scan medication details. Additionally, the app can provide voice output to users through text-to-speech conversion, enabling visually impaired individuals to receive critical information about the medications they are taking. Additionally, users of the app can easily inform with audio output and create reminders for scanned medications.

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