Real-Time Assistance for Dyslexic People

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Abstract: **Dyslexic Reader is a real-time reading assistant app for dyslexic people. Dyslexia, otherwise called reading disorder and it is portrayed by issue with perusing capacity. Diverse individuals are influenced to fluctuating degrees. Issues may incorporate troubles in spelling words, perusing at rapid, thinking of certain words, sounding out words in the head, articulating words when perusing so anyone might hear and understanding what one peruses. Some cases run in families. OpenDyslexic is a free typeface/font designed to maintain a strategic distance from a portion of the regular perusing mistakes brought about by dyslexia. The font that includes regular, bold, italic, bold-italic, and monospaced font styles. This application is developed in English language using multisensory approach and it is an appropriate and suitable learning ecosystem for dyslexic children. Previous studies shows that many application that are developed in Malay and Spanish language .And this applications that only recognize some of the alphabetic. But in our application we work with all the alphabetic using OCR. The main objective of the proposed system that uses Google's mobile vision API & OCR and it provide real-time facility. The detected text is then displayed to the user in OpenDyslexic font. Mobile vision API is regarded as the best real time OCR API for mobile devices. It provides good detection accuracy and real time detection capability. Thou it does not feature real time detection, it has higher accuracy than mobile vision API. The mobile vision API is used for real time OCR and extracting text from small text areas such as sign boards etc. We extend image-to-text retrieval in to video-to-text retrieval. It can be performed by extracting the frames of videos, retrieving the text from the video and displayed it in the OpenDyslexic font. The performance can be improved by using threads in multitasking. The performance degradation is avoided by using multiple threads.**

Keywords: OpenDyslexic, OCR, Mobile Vision, Dyslexia

I. INTRODUCTION

Dyslexic reader is a real-time reading assistant app for dyslexic people. It is developed on the basis of Android and Core Java. It used to scan and convert text in to OpenDyslexic font. The app that include four buttons Real time button, Image to text button, PDF to text and Video to text button. The Mobile Vision API gives discovering objects in photographs and video. The structure that incorporates locators, which find and portray visual items in pictures or video and an occasion driven API that tracks the situation of those articles in video.

Optical character recognition (OCR) is the electronic conversion of pictures of composed, transcribed or printed content into machine-encoded content, regardless of whether from a checked archive, a photograph of a report, a scene-photograph or from caption content superimposed on a picture. It is a typical technique for digitizing printed messages with the goal that they can be altered electrically, sought, put away more minimally, showed on-line, and utilized in machine procedures, for example, machine interpretation, content to-discourse, key information and content or data mining. OCR is a field of research in pattern recognition, artificial intelligence and computer vision, sometimes in neural network.

Youngsters with Dyslexia are having language learning issue and makes them troublesome acing the expertise to peruse, spell and compose. In spite of the fact that their psychological ability is sufficient, they confronted trouble in figuring out how to peruse by means of ordinary guidance approach. The treatment of the Dyslexia Disorder expects patients to be taught and have a great deal of perusing practice so they can achieve a dimension of familiarity and exactness like individuals not determined to have this issue. For this people we provide an android application as assistance for them. The paper named dyslexic reader is a reading assistant app for dyslexic people. It is developed on the basis of Android and Core Java. It used to scan and convert text in to OpenDyslexic font. The treatment of the Dyslexia Disorder expects patients to be taught and have a great deal of perusing practice so they can achieve a dimension of familiarity and exactness like individuals not determined to have this issue. Because of expense or accessibility of wellbeing experts, patients are not capable, as a rule, to pursue the treatment appropriately keeping a consistent participation. Plus, these days there are very few accessible devices to help wellbeing experts towards dyslexia analysis. Here we portray an application produced for cell phones, through which dyslexic clients can rehearse their perusing abilities, turning the treatment open just as helping wellbeing experts as a helper instrument to analyze their patients. This apparatus can be connected to help dyslexia analysis and to help individuals previously determined to have this issue preparing perusing. The main objective of the proposed system that uses Google's mobile vision API & OCR. The detected text is then displayed to the user in Open Dyslexic font. Mobile vision API is regarded as the best real time OCR API for mobile devices. It provides good detection accuracy and real time detection capability. Thou it does not feature real time detection, it has higher accuracy than mobile vision API. The mobile vision API is used for real time OCR and extracting text from small text areas such as sign boards etc.

We extend image-to-text retrieval in to video-to-text retrieval. It can be performed by extracting the frames of videos, retrieving the text from the video and displayed it in the OpenDyslexic font. The performance can be improved by using threads in multitasking. The performance degradation is avoided by using multiple threads.

II. OVERVIEW OF EXISTING APPLICATIONS

As indicated by the advancement of the iLearnRW framework, we led a survey of existing perusers utilized on tablets and telephones. The exploration gave both a vital diagram of as of now accessible programming and regular highlights yet in addition uncovered which highlights were absent.

Huge numbers of the most regularly utilized perusers have an exceptionally constrained list of capabilities and highlights that are available are as often as possible just in part executed. For example, numerous perusers (counting Google Play Books) contain content to-discourse however no simple method to explore back and forth amid playback. There were additionally visit bugs in the execution, for example, route and featuring leaving sync with the voice. Additionally, numerous perusers don't permit full control of content presentation, for example, the decision of textual style, text dimension or content/foundation shading blend. Another finding was that the interface for getting to highlights and changing settings is likewise conflicting crosswise over perusers and frequently just exhibited in long content based records hard to explore for clients with difficult to understand classifications. This makes an emphasis on ease of use basic. Settings ought to be introduced in coherent segments with graphical representations. Be that as it may, these usage essentially roll a bar crosswise over content in a manner that would be confounding to a peruser with psychological control issues. The audit additionally recognized two well known Open Source ventures (FB Reader and Cool Reader) growing free peruser applications for the Android stage. Both of these applications are the most component complete of the entire set. Be that as it may, they both need interface clean and spotlight on highlights over ease of use. No less than two different perusers concentrated on the uncommon needs network (GoReader and IDEAL Group Reader) depend on code from these Open Source ventures. Be that as it may, even these experience the ill effects of very fundamental ease of use and openness issues.

III. PROPOSED SYSTEM

A. Dyslexia

Dyslexia is accepted to be brought about by both hereditary and natural factors.[4] Some cases keep running in families. It frequently happens in individuals with consideration deficiency hyperactivity issue (ADHD) and is related with comparative challenges with numbers.[6] It might start in adulthood as the consequence of awful mind damage, stroke, or dementia or some other side effects identified with cerebrum .[2] The fundamental components of dyslexia are issues inside the cerebrum's language handling. Dyslexia is analyzed through a progression of trial of memory, spelling, vision, and perusing abilities and once in a while composing aptitudes are incorporated. Dyslexia is independent from perusing troubles brought about by hearing or vision issues or by deficient teaching.[4] Treatment includes modifying instructing strategies to meet the individual's needs.[2] While not restoring the basic issue, it might diminish the level of side effects and furthermore increment the capacity to peruse. Medicines focusing on vision are not compelling. Dyslexia is the most well-known learning inability and happens in every aspect of the world.[4] It influences 3– 7% of the population;[4] notwithstanding, up to 20% may have some level of side effects. While dyslexia is all the more regularly analyzed in men, it has been proposed that might be it influences people similarly. Some trust that dyslexia ought to be the best considered as an alternate method for learning, with the two positives and negatives. Dyslexia is thought to have two kinds of cause, one identified with language handling and another to visual preparing. It is viewed as a psychological issue, not an issue with insight. The last generally spread an assortment of perusing abilities, composing and deficiencies, and troubles with unmistakable causes instead of a solitary condition. The British Dyslexia Association define describes dyslexia as "a learning difficulty that primarily affects the skills involved in accurate and fluent word reading and spelling" and it is characterized by "difficulties in phonological awareness, verbal memory and verbal processing speed".

Analysts have been attempting to locate the neurobiological premise of dyslexia since the condition was first recognized in mid 1881. For instance, some have attempted to relate the basic issue among dyslexics of not having the capacity to see letters unmistakably to irregular improvement of their visual nerve cells and their mind. Present day strategies, for example, practical attractive reverberation imaging (fMRI) and positron outflow tomography (PET) have demonstrated a connection between's both utilitarian and basic contrasts in the cerebrums of kids with perusing challenges extraordinarily influenced on dyslexia.
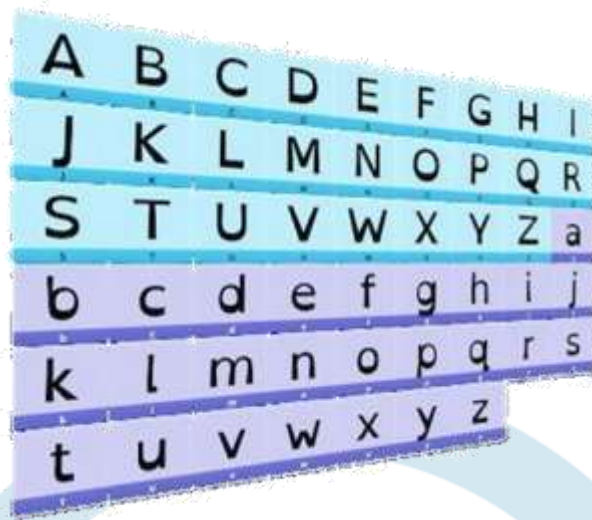
Fig. 1: OpenDyslexic Font

Some dyslexics that show less electrical activation in parts of the left hemisphere of the brain involved with reading, such as the inferior frontal gyrus, inferior parietal lobule, and the middle and ventral temporal cortex and some other important parts of the brain. Over the previous years, cerebrum actuation thinks about utilizing PET to examine language have created a leap forward in the comprehension of the neural premise of language. Neural bases for the visual dictionary and for sound-related verbal transient memory parts have been proposed, with some ramifications that the watched neural sign of formative dyslexia is something identified with undertaking explicit. fMRIs in dyslexics have given essential information which point to the intuitive job of the cerebellum and cerebral cortex just as other mind structures.
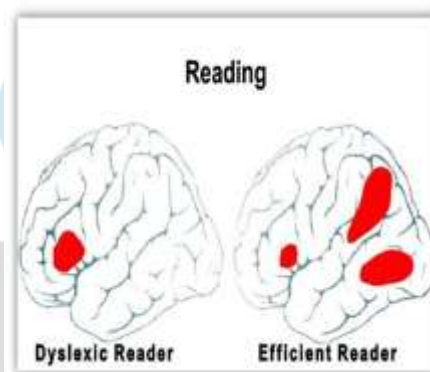

Fig. 2: Dyslexia Brain

B. Dyslexic Reader

Text recognition in pictures and recordings is an examination territory which endeavors to build a computer framework with the capacity to consequently peruse the content from pictures.. Nowadays there is a gigantic interest in putting away the data accessible in paper records position in to a computer storage disk and afterward reusing this data via seeking process. One straightforward approach to store data from these paper reports in to PC framework is to initially check the archives and afterward store them as pictures. In any case, to reuse this data it is exceptionally hard to peruse the individual substance and looking through the substance structure the reports line-by-line and word-by-word. The difficulties engaged with this the textual style attributes of the characters in paper archives and nature of pictures. Because of these difficulties, PC is unfit to perceive the characters while understanding them. Subsequently there is a need of character acknowledgment instruments to perform Document Image Analysis (DIA) which changes reports in paper arrangement to electronic organization. In our application we give a Real-time facility.

C. OCR and Mobile Vision API

OCR is procedure of arrangement of optical examples contained in a computerized picture and in recordings. The character acknowledgment is accomplished through division, include extraction and arrangement and preprocessing. This segment begins with a concise foundation and history of OCR frameworks. At that point the diverse strategies of OCR frameworks, for example, optical filtering, picture obtaining, area division, pre-preparing, division, portrayal, include extraction, preparing and acknowledgment and post-handling. The distinctive uses of OCR frameworks are featured by the present status of the OCR frameworks. At long last, the fate of the OCR frameworks is exhibited in our application. Optical character recognition (OCR) is procedure of arrangement of optical examples contained in an advanced picture comparing to alphanumeric or different characters. The character acknowledgment is accomplished through essential strides of division, include extraction and characterization. OCR

has increased expanding consideration in both scholastic research and in industry. It has been man's old dream to create machines which duplicate human capacities. One such replication of human capacities is perusing of archives enveloping diverse types of content. Throughout the most recent couple of years machine perusing has developed from dream to reality through the advancement of adequate Optical character acknowledgment (OCR) frameworks. OCR innovation empowers us to change over various sorts of archives, for example, examined paper records, pdf documents or pictures caught by a computerized camera into editable and accessible information. OCR frameworks have turned out to be a standout amongst the best utilizations of innovation in example acknowledgment and man-made reasoning fields. Despite the fact that numerous business frameworks for performing OCR exist for a wide assortment of utilizations, the accessible machines are as yet not ready to rival human perusing capacities with wanted exactness levels. The field of information science the information researchers help address this test. As of late, acknowledgment of content from characteristic picture and video outline has expanded consideration among the specialists because of its different complexities and difficulties. As a result of lower goals, obscuring impact, complex foundation, distinctive textual styles, shading and variation arrangement of content inside pictures and video outlines, and so on., content acknowledgment in such situation is troublesome. A large portion of the present methodologies for the most part apply a binarization calculation to change over them into paired pictures and next OCR is connected to get the most adequate acknowledgment result. Here, we present a novel methodology dependent on shading channel choice for content acknowledgment from scene pictures and video outlines. In the methodology, at initial, a shading channel is consequently chosen and afterward chosen shading channel is viewed as line-by-line for content acknowledgment. Our content acknowledgment system depends on Hidden Markov Model (HMM) which utilizes Pyramidal Histogram of Oriented Gradient highlights separated from chosen shading channel that are avoided our eyes. From each sliding window of a shading channel our shading channel determination approach breaks down the picture properties from the sliding window and after that utilizing a Support Vector Machine (SVM) classifier is connected to choose the shading channel that will give the best acknowledgment results in the sliding window as we required.

API or Google Earth API. Usage of some of the APIs requires authentication and authorization using the OAuth 2.0 protocol for authorized accessing. OAuth 2.0 is a simple protocol. To start, it is necessary to obtain credentials from the Developers Console with their permission. After that the client app can request an access token from the Google Authorization Server, and uses that token for authorization when accessing a Google API service.

D. Real-Time Activity

In Real-Time activity we just focus the camera to which we want to read. In our application the corresponding text is converted in to OpenDyslexic font.
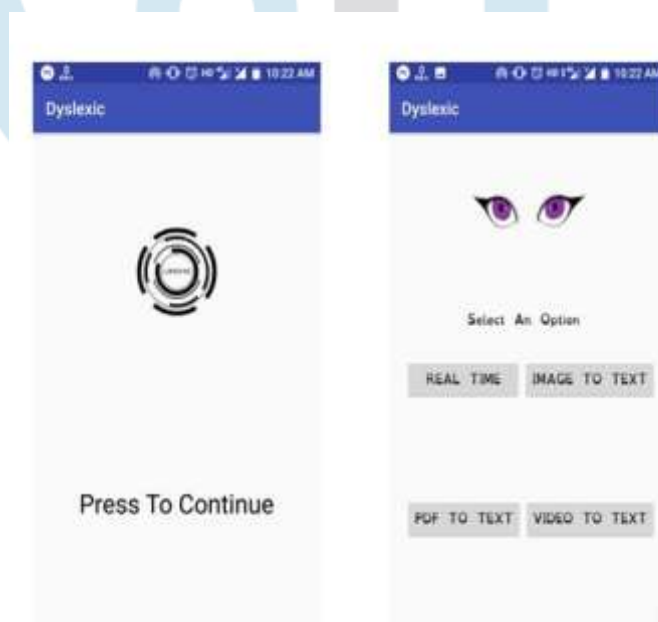

Fig. 3: Interface of the application

Google APIs is a set of application programming interfaces (APIs) in computer networks developed by Google which allow communication with Google Services and their integration to other services. Examples of these include Search, Gmail, Translate or Google Maps or Social Medias. Third-party apps can use these APIs to take advantage of or extend the functionality of the existing services that provide the facility to know about the application deeply. The APIs provide functionality like analytics, machine learning as a service or access to user data when permission to read the data is given. Another important example is an embedded Google map on a website, which can be achieved using the Static maps API, Places and GPS.
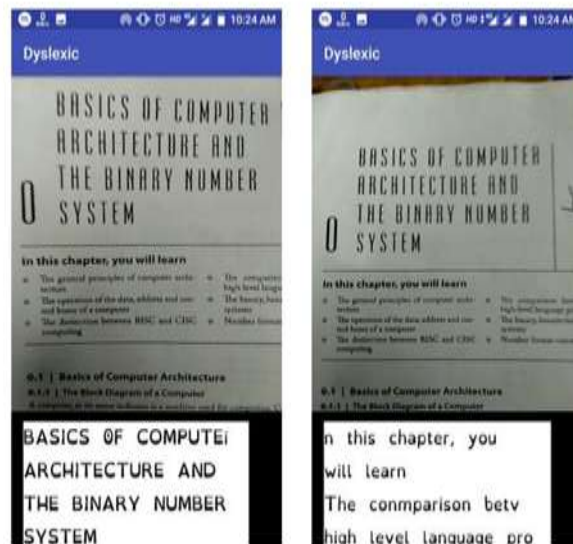
Fig. 4: Real-time Activity

E. Image to text

The need to convert scanned image to the corresponding text arises from the fact that scans are neither text searchable nor editable. This is a problem in settings such as offices that have to deal with high volume scanning and large batches of documents. While using OCR databases of files for specific data you can convert scanned image to text with to render it text searchable. OCR, which stands for optical character recognition, is a software tool that can recognize the text from a scan image or video and then convert the file into a text file. Once OCR has been performed on the scans we can use the search function to quickly locate the information, saving time and resources.

In our application OCR is used to extract text from images, and this text is displayed to the user in OpenDysexic font. As soon as the text is retrieved an additional option is given to the user which enables them to get the text to be read out loudly. The main issue by using OCR alone is that, it only process the image as it is loaded. But there exist chances that the text in the image can be in a different angle or the image can be taken with the camera placed in a different angle. In any of these cases the image needs to be rotated. So in our application we included the process of rotating image in all possible combinations and retrieving every possible text from it. To improve the performance we used multithreading which enabled us to keep one thread focused completely in rotating and placing each images in a queue while another thread pops out an image and performs the optical character recognition.

Fig. 5: Image-to-Text

F. PDF to Text

Another area where an assistance can be given to the dyslexic people is on the visualization of pdf documents. Our application provides a simple interface which enables the user to select a pdf file from the storage. The document s then processed and the text

from the file is retrieved. The retrieved text is then displayed to the user in OpenDyslexic font. Also the entire text is read out clearly which enables the user to understand or recognize certain parts which they feel difficult to understand even in dyslexic font.

Fig. 6: PDF-to-Text

G. Video to Text

In the field of computer vision, text detection and recognition have gained plenty of attentions in recent years. The reason for such interest is due to easy availability of large amount of digital information from videos and scene images which contain very useful information like street name, location's address, traffic warning etc. Therefore, text extraction and recognition from this digital information are very effective and important in different text-based application like data mining, retrieval of images/videos from the large database etc. So we extended the extraction of text from images to extraction of text from videos. In our application we first extract all possible frames and then place them in a queue. The images from these queue is popped out and is later used for optical character recognition which enables the extraction of text from video. But to display the text along with video being played, the above mentioned method produces too much delay. To overcome this performance degradation multithreading is used. One thread is used to retrieve all possible frames and push them onto the queue while another thread pops each image from the queue and perform optical character recognition.
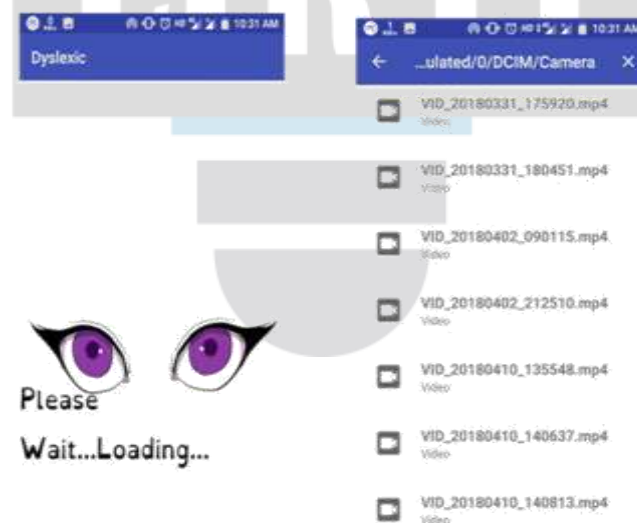

Fig. 7: Video-to-Text

IV.   CONCLUSION AND FUTURE WORK

The main objective of the proposed system that uses Google's mobile vision API & OCR. The detected text is then displayed to the user in Open Dyslexic font. Mobile vision API is regarded as the best real time OCR API for mobile devices. It provides good detection accuracy and real time detection capability. Though it does not feature real time detection, it has higher accuracy than mobile vision API. The mobile vision API is used for real time OCR and extracting text from small text areas such as sign boards etc. We extend image-to-text retrieval in to video-to-text retrieval. It can be performed by extracting the frames of videos, retrieving the text from the video and displayed it in the OpenDyslexic font. The performance can be improved by using threads in multitasking. The performance degradation is avoided by using multiple threads.

DYSLEXIC READER is a reading assistant app for dyslexic people. Dyslexia, also known as reading disorder, is characterized by trouble with reading despite normal intelligence. Different people are affected to varying degrees. Problems may include difficulties in spelling words, reading quickly, writing words, pronouncing words when reading aloud and understanding what one reads. Dyslexia is believed to be caused by both genetic and environmental factors. Some cases run in families. OpenDyslexic is a free typeface/font designed to mitigate some of the common reading errors caused by dyslexia. The typeface was created by Abelardo Gonzalez, who released it through an open-source license. Like many dyslexia-intervention typefaces, most notably Dyslexic, OpenDyslexic adds to dyslexia research and is a reading aid, but it is not a cure for dyslexia. The typeface includes regular, bold, italic, bold-italic, and monospaced font styles.

We believe that by providing DPI Enhancement, De-skewing and Edge detection the pre-processing can be improved to more accurate level. Instead of using the provided trained data the accuracy of tesseract can be further improved by training new data. We can increase the overall performance of the app by implementing tesseract using NDK.

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