A project report on

"ANDROID OCR APPLICATION"

submitted in partial fulfilment of the requirement for the award of

DIPLOMA IN
COMPUTER ENGINEERING

By

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Under the Guidance Of
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Academic Year 2020 – 2021

CERTIFICATE

This is to certify that the report on project entitled

"ANDROID OCR APPLICATION"

has been successfully completed and submitted by

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Shreyas Varadkar	82	120905
Shreyash Yadav	78	120901
Abhishek Shirsath	70	120893
Rohan Patil	80	120903

for the partial fulfilment of the requirement for the award of Diploma Course in Computer Engineering as laid down by **Maharashtra State Board of Technical Education** for the academic year **2020 – 2021.**

During the project they have maintained regular attendance and have worked sincerely.

(_____)	(_____)	(_____)
(Prof. D. Newalkar)	**(Prof. U. Patil)**	**(Prof. N. P. Vetale)**
PROJECT GUIDE	**HOD**	**PRINCIPAL**

(_____)	(_____)
INTERNAL EXAMINER	**EXTERNAL EXAMINER**

CERTIFICATE

This is to certify that Mr. / ~~Ms.~~ **Shreyas Varadkar, Shreyash Yadav, Abhishek Shirsath, Rohan Patil** from **Dr. D. Y. Patil School of Polytechnic, Nerul**. Institute having Enrollment No: **1905480026, 1905480024, 1905480014, 1905480022** has completed project of final year having title **Android OCR Application** during the academic year **2020- 2021**. The project completed by group consisting of **4** people under the guidance of the Faculty Guide.

Name Of Guide:- **Prof. Dhananjay Newalkar**

Signature of Guide: ……...……

Telephone:-….....

ACKNOWLEDGEMENT

After the completion of this work, words are not enough to express feelings about all those who helped us to reach the goals.

It is a great pleasure and moment to immense satisfaction for us to express our profound gratitude to our guide **Prof. Dhananjay Newalkar,** whose constant encouragement enabled us to work enthusiastically. His perpetual motivation, patience and excellent expertise in the discussion during progress of the project work have benefited us to an extent, which is beyondthe expression.

We would also like to give our sincere thanks to **Prof. Umesh Patil**, **Head of Department,** from Department Computer Engineering**,** Dr. D.Y. Patil Polytechnic, Nerul, Navi Mumbai for his guidance, encouragement and support during the seminar

We are also thankful to **Prof. N. P. Vetale, Principal**, for providing an outstanding academic environment and also for providing the adequate facilities.

Last but not the least; we would also like to thank all those who directly or indirectly helped us in completion of our work.

ABSTRACT

In today's fast-paced world, people like things in shortcut – quickest, fastest, easiest, least effort path paradigm – and typing out text is no exception. A trend can be observed, majorly in college students, of clicking pictures of whatever they want to look at again. These include pictures of book covers, phone numbers, paragraphs from text books, notice boards, or even a random piece of text they found interesting on a poster in the mall. 6/10 students would prefer clicking pictures instead of typing things out, which is great if you have lots of physical memory on your phone and don't mind searching through thousands of images to find the one picture you're looking for. But what if there was an app on your phone that let you click a picture – just as you normally would – and instead of simply storing the image, the app let you select a region of interest in the image and have it instantly converted to plain text? As a college student who has been strictly following the "click pictures of everything you want to save for later" policy, this app would be immensely helpful for me, in addition to a lot of other people. And that is my motivation for developing this app as my TY project..

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CHAPTER 1

INTRODUCTION

CHAPTER 1

INTRODUCTION

Mobile applications grew in less than two decades to achieve the status of the largest information repository in human history. By providing efficient fast content and authentic tools in the form of internet and mobile applications, information technology is penetrating human life and is play an important role in changing lives of so many people around the globe.

In the running world, there is growing demand for the software systems to recognize characters in computer system when information is scanned through paper documents as we know that we have number of newspapers and books which are in printed format related to different subjects. These days there is a huge demand in "storing the information available in these paper documents into a computer storage disk and then later reusing this information by searching process". One simple way to store information in these paper documents in to computer system is to first scan the documents and then store them as IMAGES. But to reuse this information it is very difficult to read the individual contents and searching the contents form these documents line by line and word-by-word. The reason for this difficulty is the font characteristics of the characters in paper documents are different to font of the characters in computer system. As a result, computer is unable to recognize the characters while reading them. This concept of storing the contents of paper documents in computer storage place and then reading and searching the content is called Document Processing Sometimes in this document processing we need to process the information that is related to languages other than the English in the world. For this document processing we need a software system called Character Recognition System This process is also called Document Image Analysis . Thus our need is to develop character recognition software system to perform Document Image Analysis which transforms documents in paper format to electronic format. For this process there are various techniques in the world. Among all those techniques we have chosen Optical Character Recognition as main fundamental technique to recognize characters.

CHAPTER 2

LITERATURE SURVEY

CHAPTER 2

LITERATURE SURVEY

The Shalin A. Chopra This paper tells about OCR system for offline handwritten character recognition. Preprocessing techniques used in document images as an initial step in character recognition systems were presented. The feature extraction step of optical character recognition is the most important. It can be used with existing OCR methods,especially for English text.

Dishank Rajesh Palan In this paper it presents an android application for accurate recognition and translation of text in varying environmental conditions, given an Android mobile having a camera

Line Eikvil This paper presents a review on OCR techniques. It also tells about the OCR process that converts text, present in digital image, to editable text and how it recognizes characters through optical mechanisms.

Pranob K Charles In this paper various approaches used for the design of OCR systems are discussed.It presents the techniques that are slow which provide better results in nature and also the fast techniques that provide inefficient results. In this it is found that the OCR techniques based on neural network provide more accurate results than other techniques.

Richa Goswami This paper presents detailed review in the field of Optical Character Recognition. Various techniques are determine that have been proposed to realize the center of character recognition in an optical character recognition system

CHAPTER 3

SCOPE OF THE PROJECT

CHAPTER 3

SCOPE OF THE PROJECT

The world, as we know, has gone digital in a jiffy. That means we are no longer the generation that depends on the good old computers and desktops for our information.

We want everything right at our fingertips and fast. This has resulted in the invention and development of smartphones.

Like all things with smartphones, functionality comes through apps, thus resulting in the need for them.

This is the case with OCR as well, to have your smartphone be OCR compatible, you need an app to gain the functionality and use it.

OCR for mobile has come a long way – from rudimentary apps to full-blown enterprise solutions that are available at a cost. Today, over 95% of the smartphone market consists of two operating systems – Android and iOS.

In future, the project/ app can be enhanced/extended by the following features such as:

- Automatically adding tags to images for quicker searches.
- Recognizing hand-written text.
- Text with messy backgrounds.
- Automatically recognizing and saving phone numbers to contacts
- Automatic detection of text regions in scene images.
- Improved accuracy and efficiency.

CHAPTER 4

METHODOLOGY

CHAPTER 4

METHODOLOGY

Actual Methodology of the App:

The Optical Character Recognition is a technology that allows a gadget to create text strings out of scanned images or, in our case, an image that is captured with a user's smart phone/tablet.

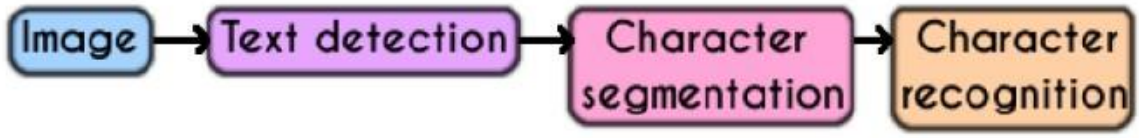
The objective of our application is to achieve modification or conversion of any form of text or text-containing documents such as printed or scanned text images, into an editable digital format for deeper and further processing.

Our Application will run according to three major steps:

1. Text Detection:- Firstly the app will go through the image and find the regions where there is text in an image.

2. Character Segmentation:- Secondly , given that the rectangle around the text region, we can do character segmentation where we segment the characters in the specified rectangle which is chosen by the user from the selected image .

3. Character Classification:- And finally, having segmented it out into individual characters, we can then run a classifier which looks at the images of the individual characters and tries to figure out the letters. And so on, till you find out what all the characters are and what the entire text is.



Hardware Requirements of Mobile Phone:

- Device : Android
- RAM : 1GB

- ROM : 2GB

Software Requirement:

- Android : Version 4.4 (Kitkat) Minimum
- Programming Language : Java
- Data Base / Vision API : Firebase ML

JAVA:

Java is a general purpose, object oriented programming language developed by Sun Microsystems of USA in 1991, which was originally called as ‘Oak’ by James Ghosling.

The important feature of the language is that it is a platform-neutral language. Java is the First Programming language, which is not tied to any particular hardware or operating system. Program developed in Java can be executed anywhere on a system.

ANDROID STUDIO:

Android Studio is the official integrated development environment (IDE) for Google's Android operating system, built on JetBrains' IntelliJ IDEA software and designed specifically for Android development. It is available for download on Windows, macOS and Linux based operating systems or as a subscription-based service in 2020. It is a replacement for the Eclipse Android Development Tools (E-ADT) as the primary IDE for native Android application development.

Android Studio supports all the same programming languages of IntelliJ (and CLion) e.g. Java, C++, and more with extensions, such as Go and Android Studio 3.0 or later supports Kotlin and "all Java 7 language features and a subset of Java 8 language features that vary by platform version." External projects backport some Java 9 features. While IntelliJ states that Android Studio supports all released Java versions, and Java 12, it's not clear to what level Android Studio supports Java versions up to Java 12 (the documentation mentions partial Java 8 support). At least some new language features up to Java 12 are usable in Android. Once an app has been compiled with Android Studio, it can be published on the Google Play Store. The application has to be in line with the Google Play Store developer content policy.

FIREBASE(MACHINE LEARNING KIT FOR MOBILE DEVELOPERS):

ML Kit brings Google’s machine learning expertise to mobile developers in a powerful and easy-to-use package. It is used to make your iOS and Android apps more engaging, personalized, and helpful with solutions that are optimized to run on device. ML Kit’s processing happens on-device. This makes it fast and unlocks real-time use cases like processing of camera input. It also works while offline and can be used for processing images and text that need to remain on the device. With ML Kit's text recognition APIs can recognize text in any Latin-based character set. They can also be used to automate data-entry tasks such as processing credit cards, receipts, and business cards.

CHAPTER 5

DETAILS OF DESIGNS, WORKING AND PROCESSES

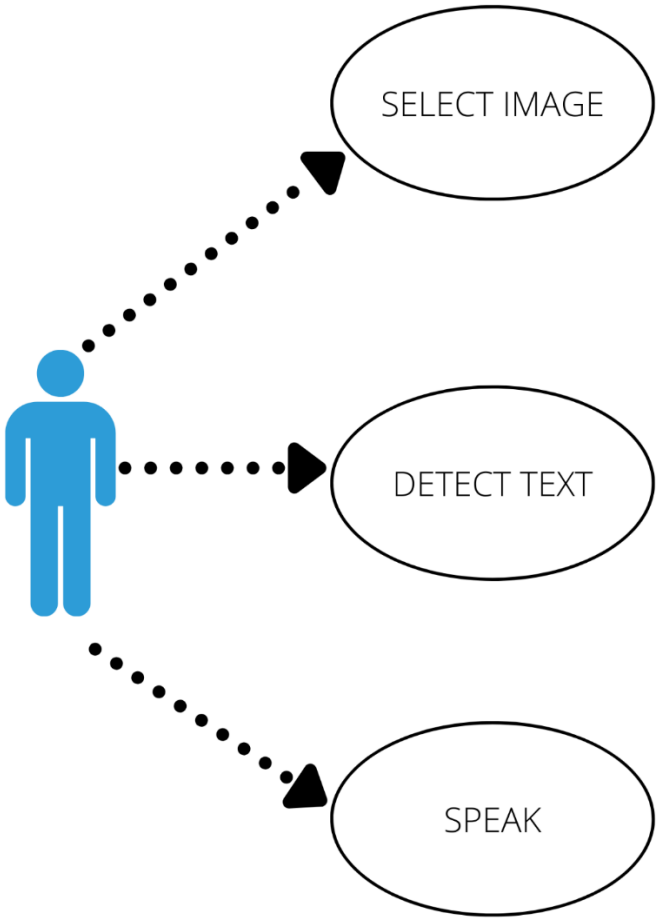
CHAPTER 5

DETAILS OF DESIGNS, WORKING AND PROCESSES

Functional Diagram:

Use Case Diagram:-

A use case diagram at its simplest representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved.



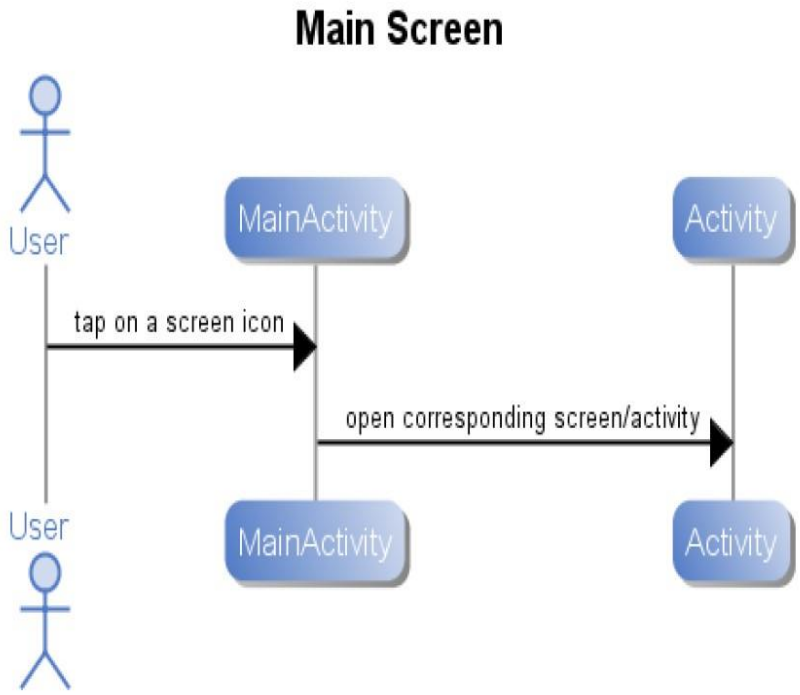
ER-Diagram:-

An entity relationship model describes interrelated things of interest in a specific domain of knowledge. A basic ER model is composed of entity types and specifies relationship that can exist between entities

Sequence Diagram :-

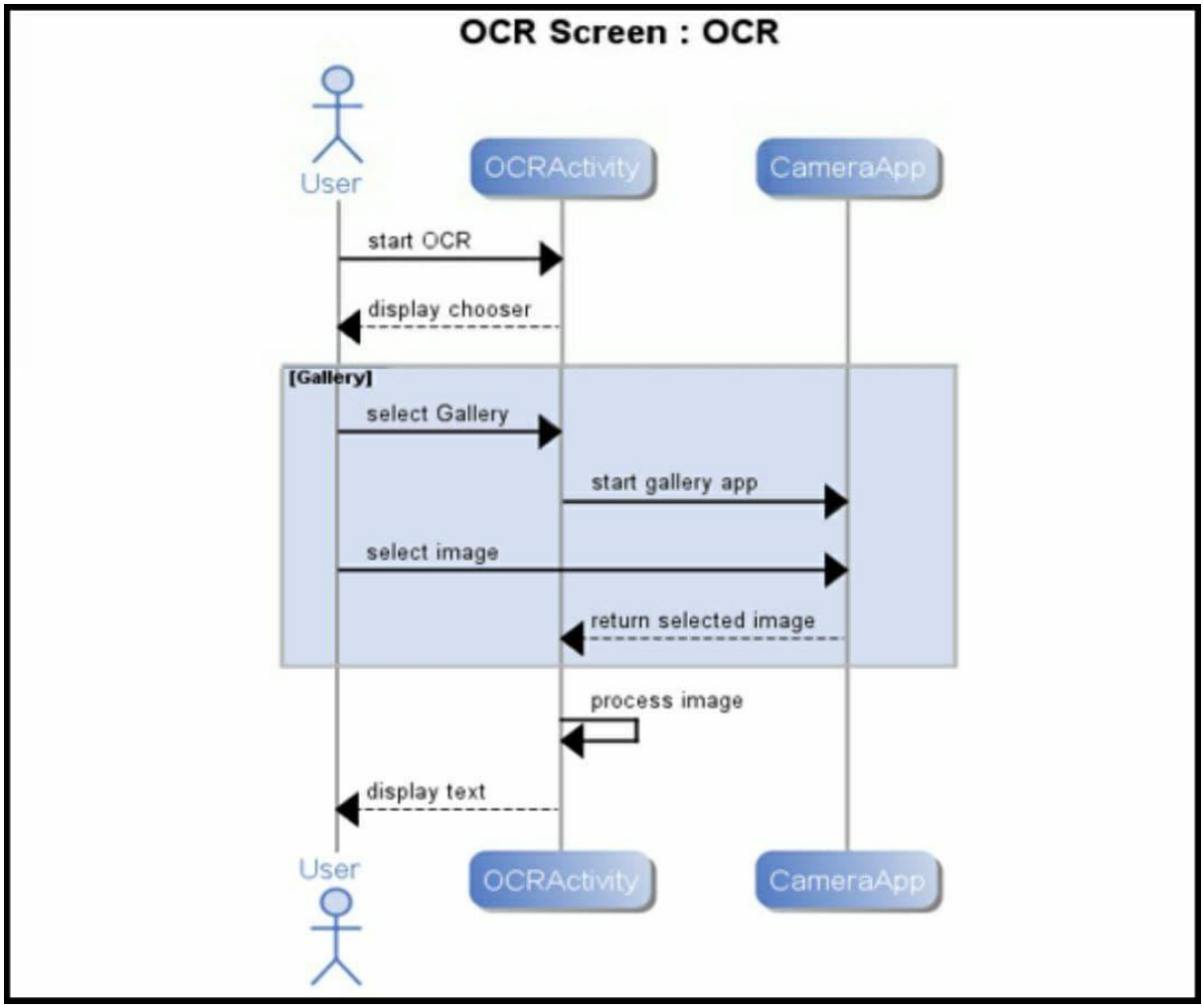
A sequence diagram shows object interactions arranged in time sequence. It depicts the object and classes involved in the scenario and the sequence of message exchanged between the object needed to carry out the functionality of the scenario.

First Sequence Diagram:



Second Sequence Diagram:

As the diagram is quite big it is been attached on the next page



Basic working of the App:

The basic needs and flow of the application are:

- User starts app.
- User clicks button to start OCR.
- User selects the image from gallery/google photos.
- App processes picture.
- Text is displayed to the user.
- The user can also use the text to speech feature to read the detected text and with this feature crosschecking becomes easier. This feature would prove helpful for the blind and visually impaired users.

The app will turn it into copy-able text you can then paste anywhere in your phone—a document editor, your note-taking app, Gmail, SMS, or anything else you could imagine.

To make the above possible, the following input => process => output layout is required.

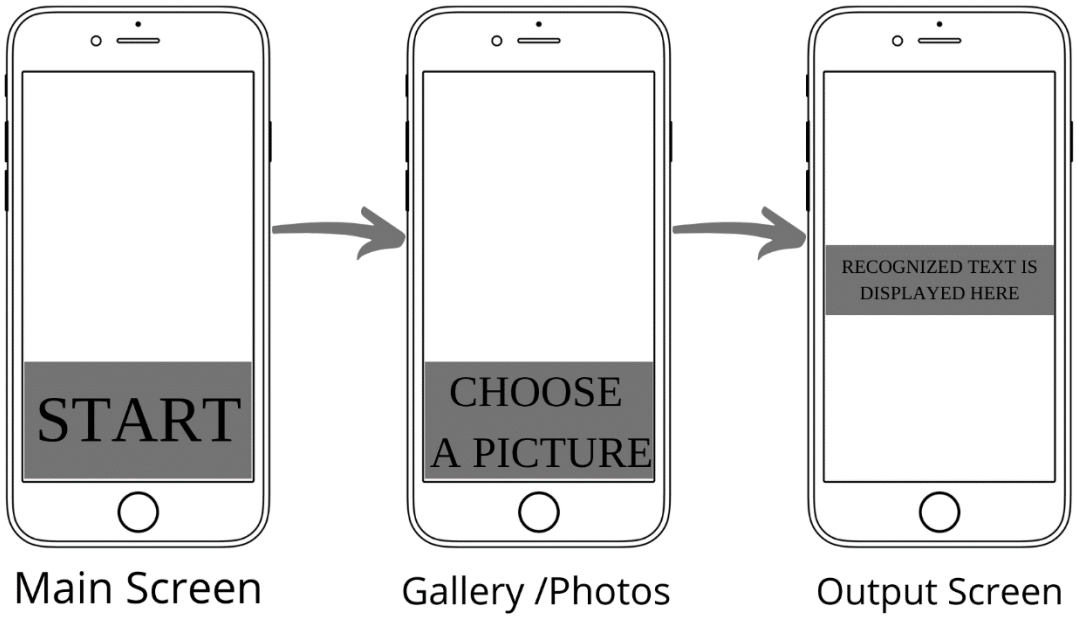
Input => The ability to click a picture from within the app.

Process => The actual text recognition module/use of vision API

Output => The recognized text.

Additionally, some pre-processing might be required to clean up noisy images for better accuracy.

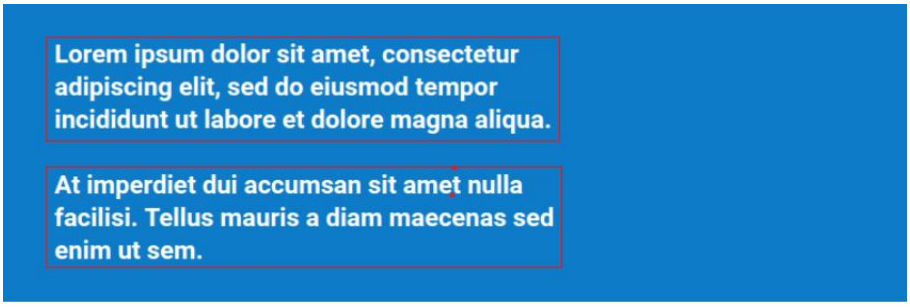
Minimal user interface requirements are demonstrated as follows:



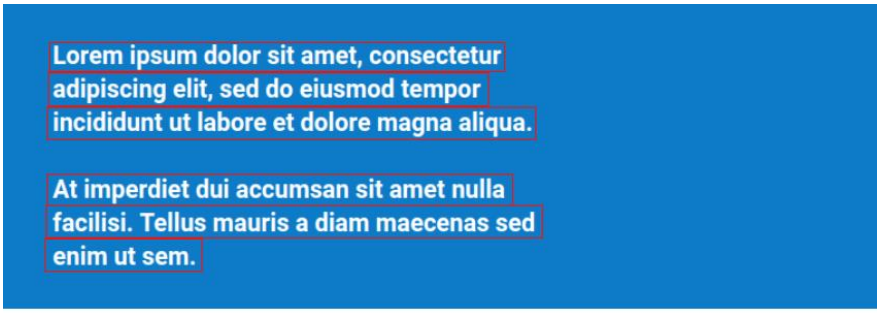
The API Text Detector segments text into blocks, lines, and elements.

- **Block** is a contiguous set of text lines, such as a paragraph or column.
- **Line** is a contiguous set of words on the same vertical axis.

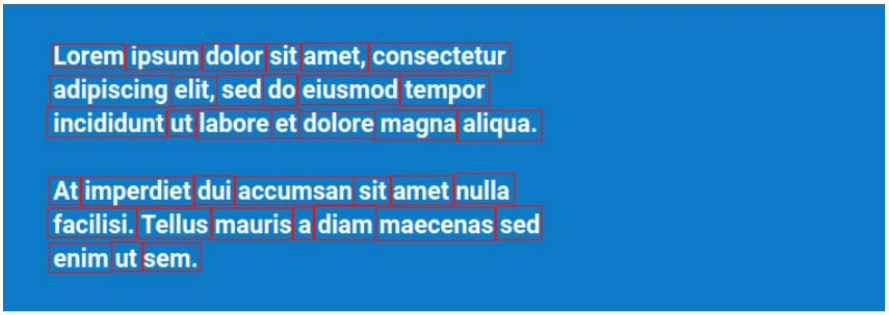
- **Element** is a contiguous set of alphanumeric characters on the same vertical axis.



Blocks

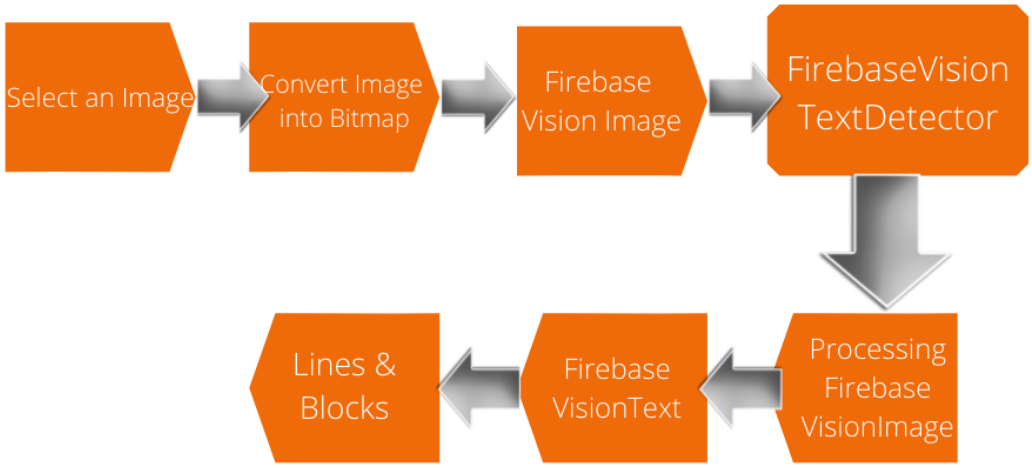


Lines



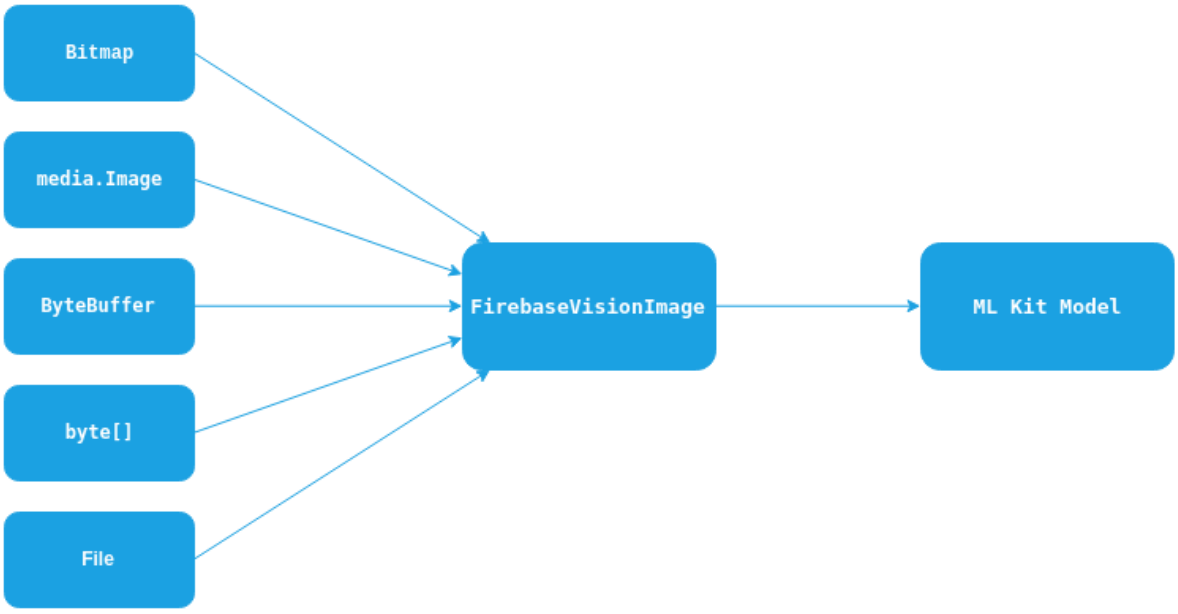
Elements

Text Detection Workflow:



FirebaseVisionText - textBlocks->line->element->text

FirebaseVisionCloudText - page->block->paragraph->symbol



In our case ,we have used bitmap as the source of input for the above process.

CHAPTER 6

MERITS AND DEMERITS

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MERITS AND DEMERITS

Merits :

- Information of OCR can be readable.
- Processing of OCR information is fast.
- This process is much faster as compared to the manual typing the information into the system.
- A paper based form are often became an electronic form which is straight forward to store or send by mail.
- It is cheaper than paying someone amount to manually enter great deal text data.
- Text to Speech feature which will prove helpful to the blind & visually impaired users.

Demerits :

- Not 100% accurate, there are likely to be some minor mistakes made during the process very rarely.
- Each word should be checked over carefully and if found wrong then manually corrected to avoid inconvenience in future.
- Handwritten notes may be difficult to detect texts in 100% accuracy
- Handwritten Image Text Detection depends on the neatness and cleanliness of the Handwriting.

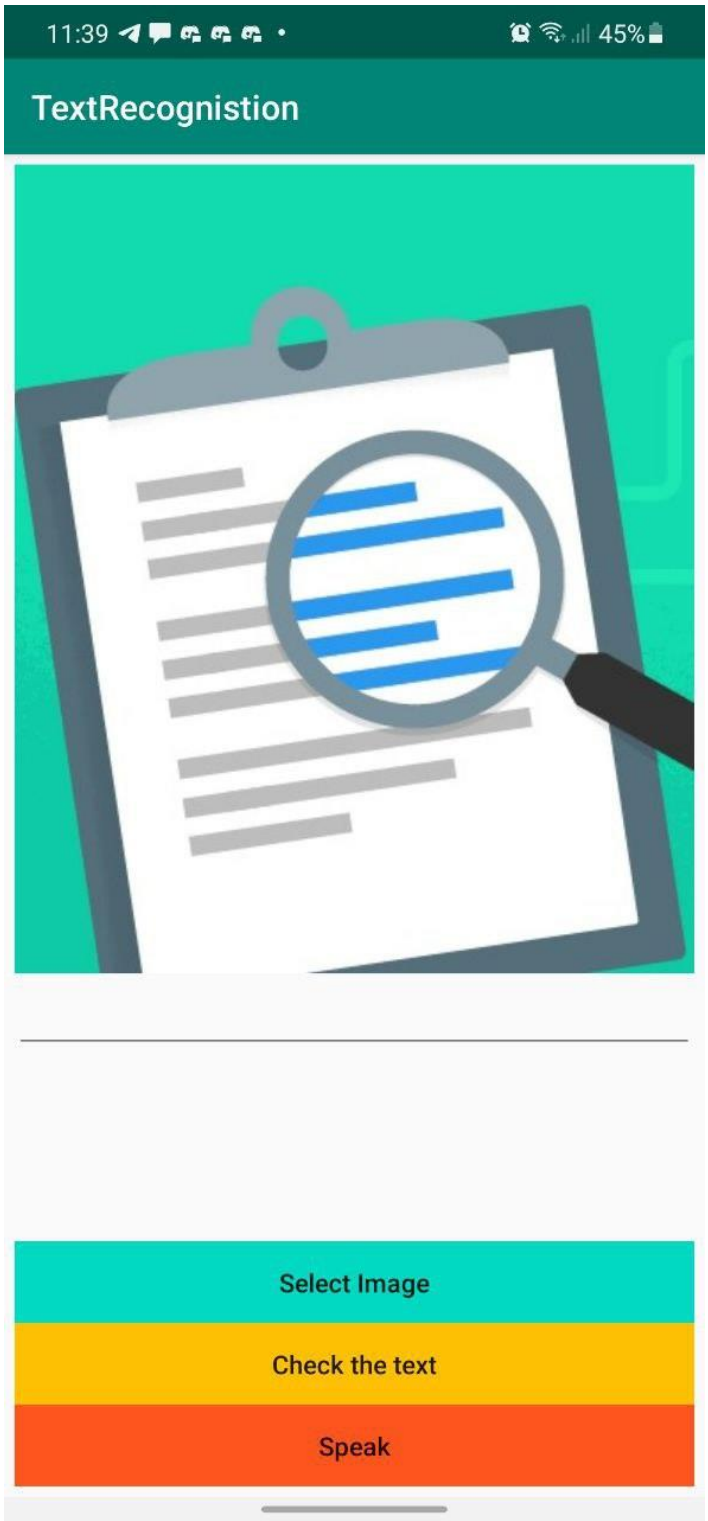
CHAPTER 7

RESULTS AND APPLICATION

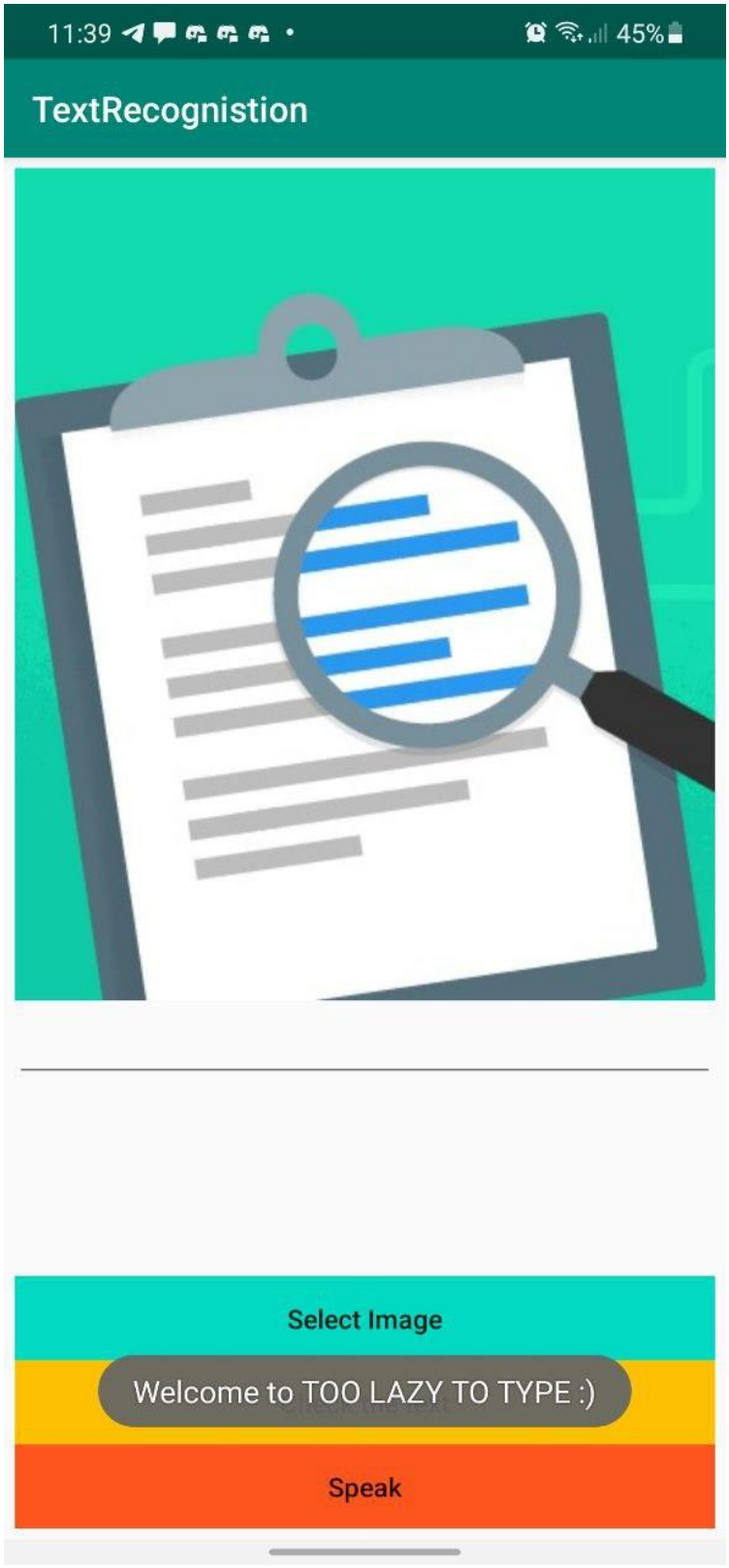
CHAPTER 7

RESULTS AND APPLICATION

Main UI of the App:

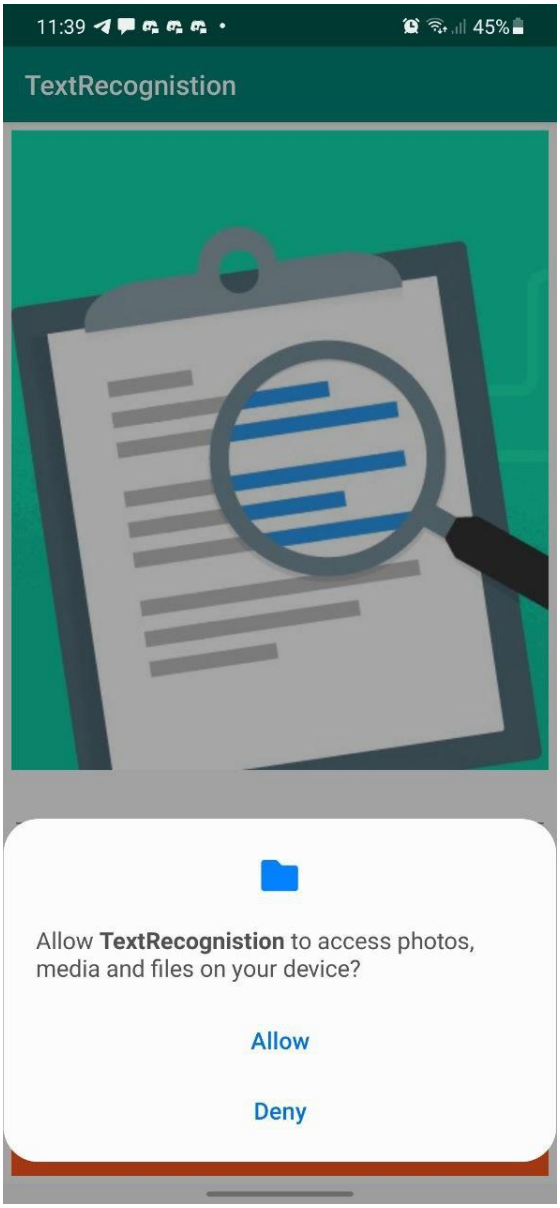


Opening of the app:



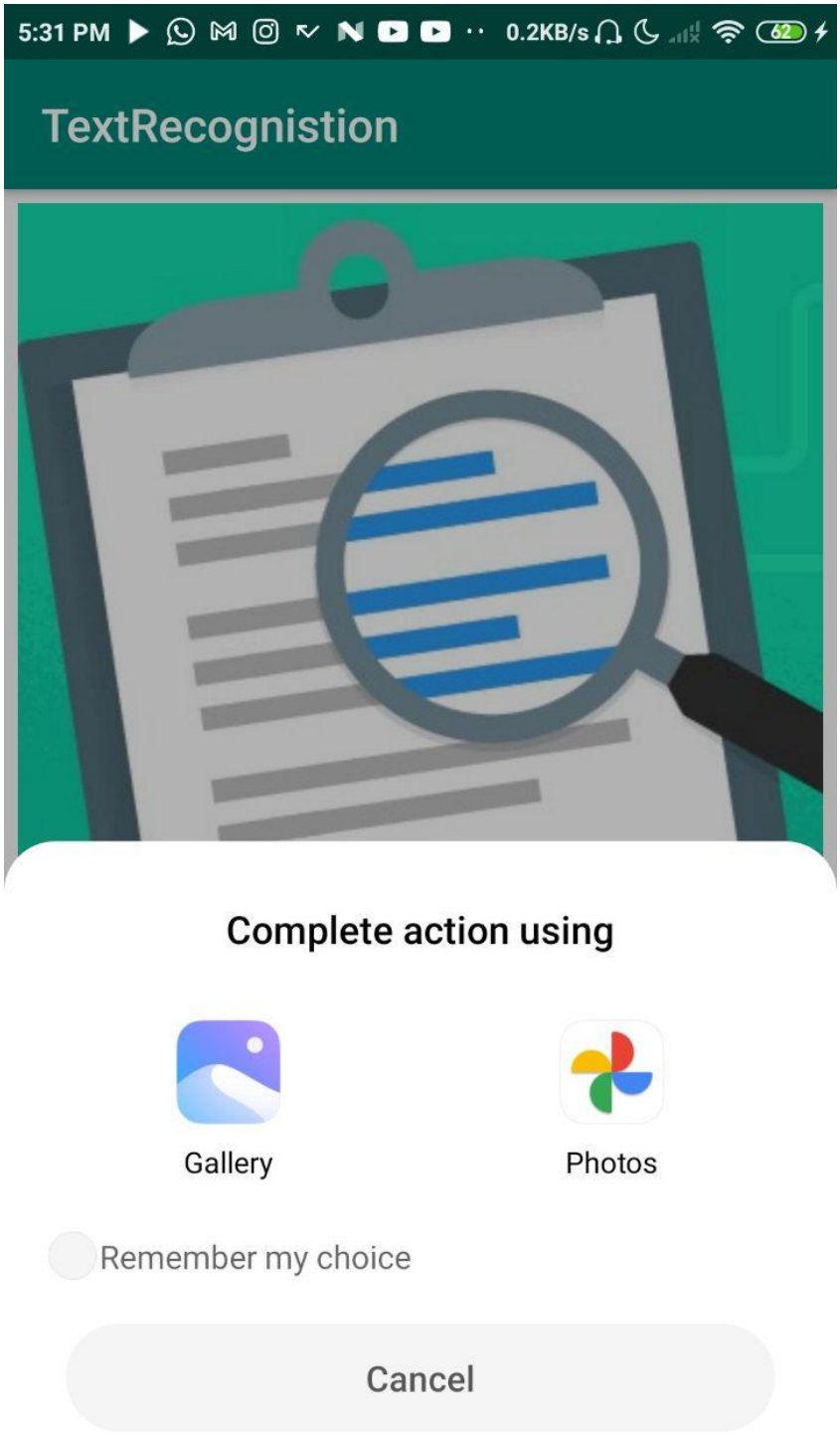
User is welcomed with the help of a Toast

App Permissions:

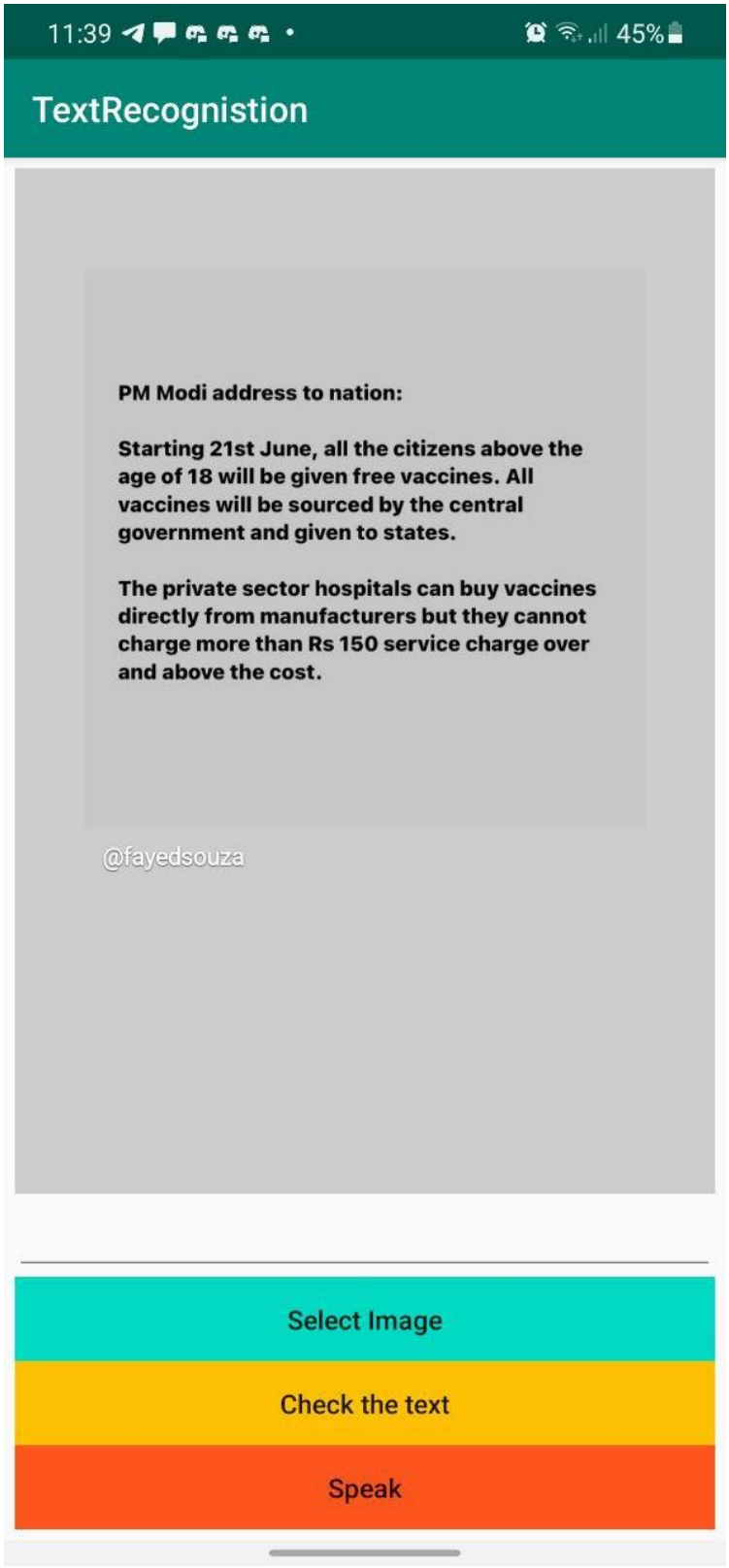


App asks for permission to access photos , media and files on user’s device:

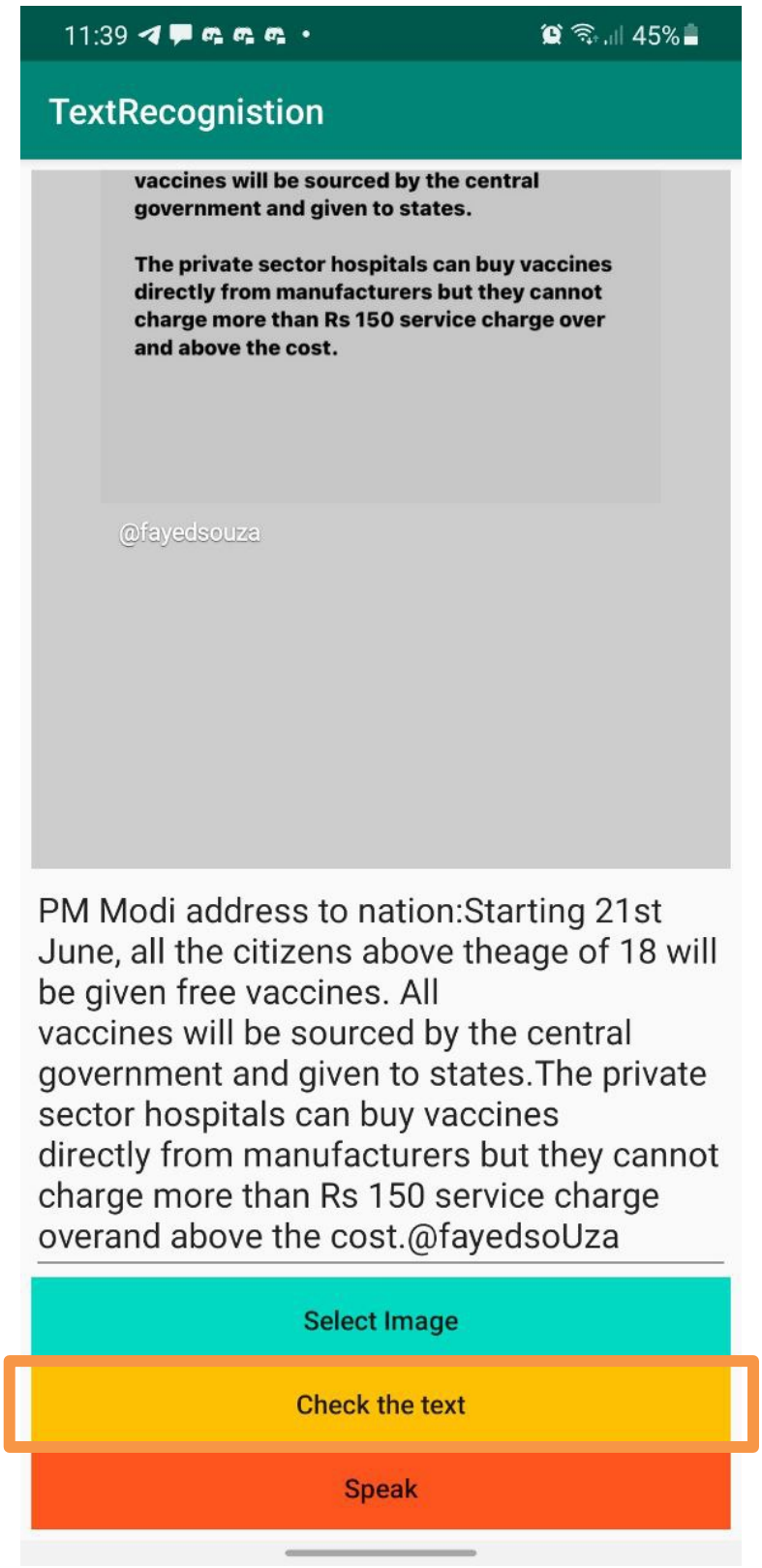
Image Selection:



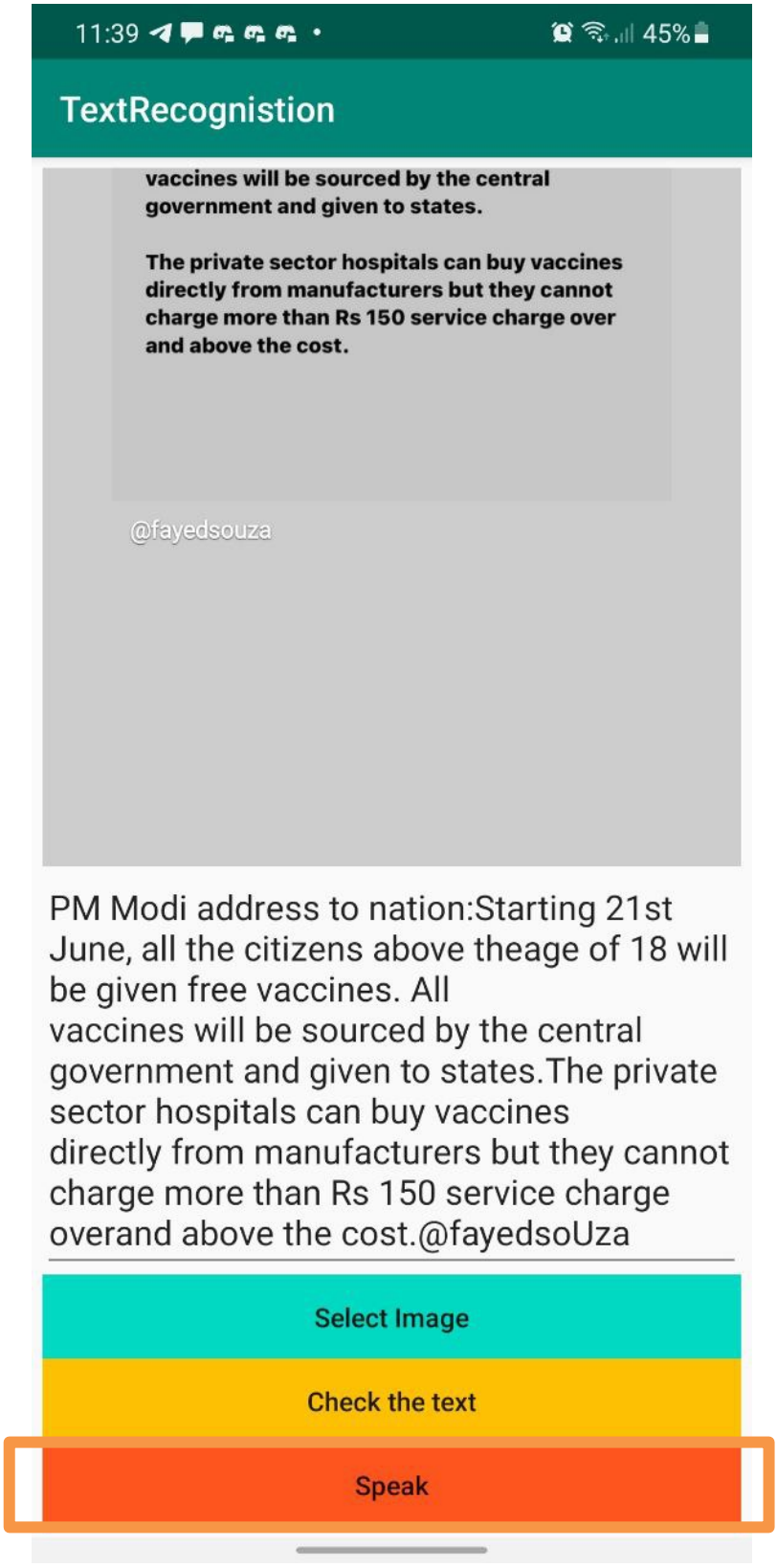
Selected image will be displayed on the screen to confirm if the user has selected his required image:



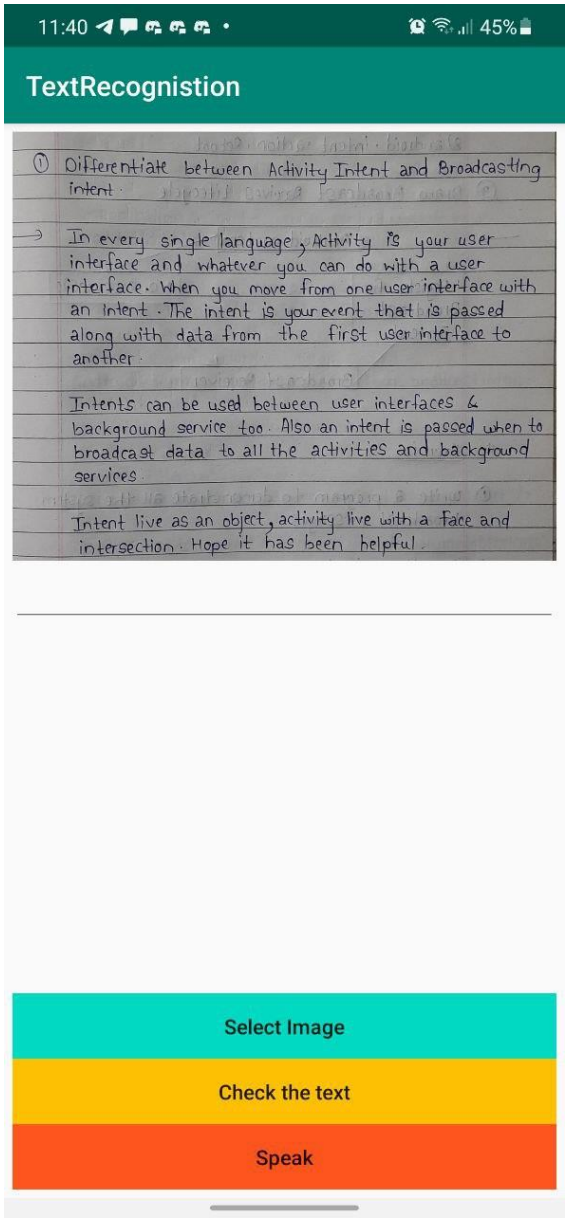
After clicking on Check the text the user will get the text detected in image:

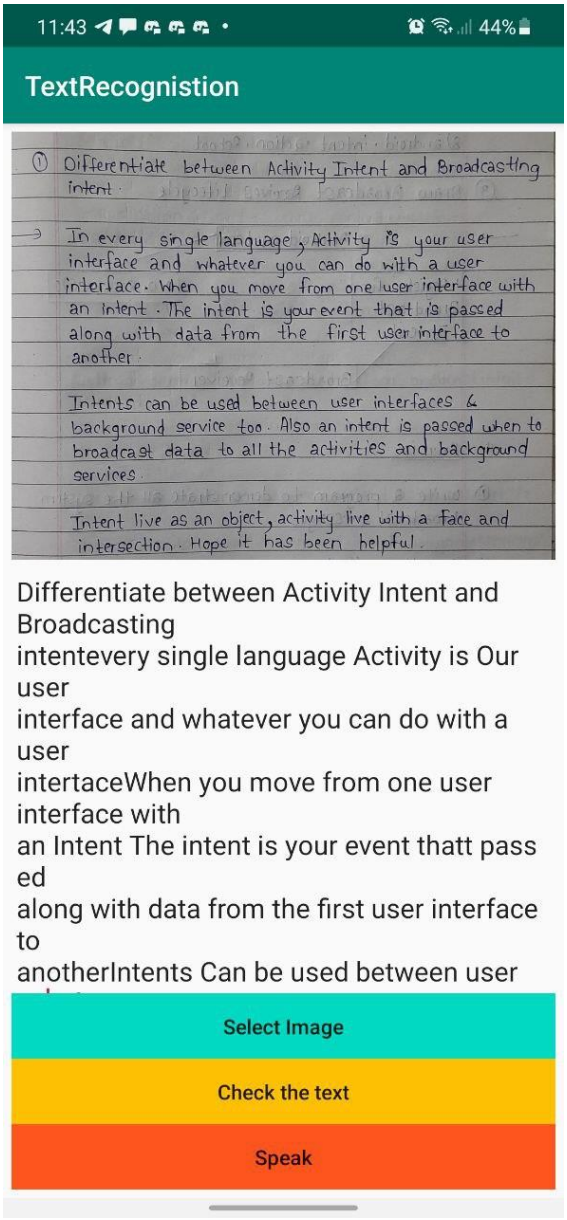


The detected text can be converted into speech by clicking on the speak button:



The above same steps can be used for handwritten text recognition:





Applications

OCR has various application some of them are listed below:

- RECEIPT IMAGING.
- LEGAL INDUSTRY.
- BANKING.
- HEALTHCARE.
- DATA ENTRY AUTOMATION.
- SCHOOLS AND OFFICES.
- Assistive technology for blind and visually impaired users

CHAPTER 8

CONCLUSION

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CONCLUSION

We Developed Android OCR applications in Java by making use of Android Studio and Machine Learning. This app is portable, efficient, and easily maintainable. This project provides a detailed discussion about offline image to text recognition through an android app. The image is loaded into the Android app. Then the image is processed by OCR technique to produce the converted text on screen. For Blind & Visually Impaired people Text to speech feature is also being added to boost the features of app which would prove beneficial for the users. The concepts involved can further be used to boost the future technology like handwriting recognition with 100% accuracy or recognition of many more languages and even for translation purpose.

CHAPTER 9

FUTURE SCOPE

CHAPTER 9

FUTURE SCOPE

What does the future hold for OCR? Given enough entrepreneurial designers and sufficient research and development dollars.OCR can become a powerful tool future entry applications. However, the limited availability of funds in a capital-short environment could restrict the growth of this technology. But, given the proper impetus and encouragement, a lot of benefits can be provided by the OCR system. They are:

- The automated entry of data by OCR is one of the most attractive, labour reducing technology.
- The recognition of new font characters by the system is very easy and quick.
- We can edit the information of the documents more conveniently and we can reuse the edited information as and when required.
- The extension to software other than editing and searching is topic for future works

Possible Future Enhancements:

In future, the project can be enhanced by the following points:

- Automatically adding tags to images for quicker searches.
- Recognizing hand-written text.
- Text with messy backgrounds.
- Automatically recognizing and saving phone numbers to contacts
- Automatic detection of text regions in scene images.
- Improved accuracy and efficiency.

CHAPTER 10

REFERENCES AND BIBLOGRAPHY

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- https://www.codeproject.com/Articles/1275580/Android-OCR-application-based-on-ml-vision/
- https://codinginfinite.com/android-ocr/

Evaluation Sheet for Internal Assessment

Name of Student:- **Shreyas Sandeep Varadkar**.

Name of Programme:- **Computer Engineering** Semester:- **Sixth**

Course Title:- **Capstone Project**: **Execution and Report Writing**

Course Code:- **22060**

Title of Capstone Project:- **Android OCR Application.**

a) PO's addressed by the capstone project.
   a) An ability to apply computer science and engineering knowledge.
   b) An understanding of professional and ethical responsibilities.
   c) An ability to function as individual or as a group in diverse environment.
   d) A knowledge of contemporary issues in computer science an engineering.

b) CO's addressed by the capstone project.
   a) Ensure quality in product.
   b) Assess the impact on project in real life.
   c) Communicate effectively and confidently as a concern member of the team
   d) Take appropriate decisions based on the collected information.

c) Other learning outcomes achieved through this project

1. Unit Outcomes:
   a) ……
   b) ……
   c) ……
   d) ……
2. Practical Outcomes:
   a) ……
   b) ……
   c) ……
   d) ……

3. Affective Domain Outcomes:
    a) ……
    b) …….
    c) …….
    d) …….

Evaluation Sheet for Internal Assessment

Name of Student:- **Shreyash Chandrika Yadav**

Name of Programme:- **Computer Engineering** Semester:- **Sixth**

Course Title:- **Capstone Project: Execution and Report Writing**

Course Code:- **22060**

Title of Capstone Project:- **Android OCR Application.**

A. PO's addressed by the capstone project.

a) An ability to apply computer science and engineering knowledge.
b) An understanding of professional and ethical responsibilities.
c) An ability to function as individual or as a group in diverse environment.
d) A knowledge of contemporary issues in computer science an engineering.

B.CO's addressed by the capstone project.

a) Ensure quality in product.
b) Assess the impact on project in real life.
c) Communicate effectively and confidently as a concern member of the team
d) Take appropriate decisions based on the collected information.

C.Other learning outcomes achieved through this project.

1. Unit Outcomes:
   a) ……..
   b) ……..
   c) ……...
   d) ……
2. Practical Outcomes:
   a) ……
   b) ……
   c) ……
   d) ……

3. Affective Domain Outcomes:
    a) ……
    b) ……
    c) ……
    d) ……

Evaluation Sheet for Internal Assessment

Name of Student:- **Abhishek Pravin Shirsath**

Name of Programme:- **Computer Engineering** Semester:- **Sixth**

Course Title:- **Capstone Project: Execution and Report Writing**

Course Code:- **22060**

Title of Capstone Project:- **Android OCR Application.**

A. PO's addressed by the capstone project.

a) An ability to apply computer science and engineering knowledge.
b) An understanding of professional and ethical responsibilities.
c) An ability to function as individual or as a group in diverse environment.
d) A knowledge of contemporary issues in computer science an engineering.

B. CO's addressed by the capstone project.

a) Ensure quality in product.
b) Assess the impact on project in real life.
c) Communicate effectively and confidently as a concern member of the team
d) Take appropriate decisions based on the collected information.

C. Other learning outcomes achieved through this project.

1. Unit Outcomes:
   a) ……
   b) ……
   c) ……
   d) ……
2. Practical Outcomes:
   a) ……..
   b)……...
   c)……
   d)……

3.Affective Domain Outcomes:

a) …….
b) …….
c) ……..
d) ……..

Evaluation Sheet for Internal Assessment

Name of Student:- **Rohan Rahul Patil**

Name of Programme:- **Computer Engineering** Semester:- **Sixth**

Course Title:- **Capstone Project: Execution and Report Writing**

Course Code:- **22060**

Title of Capstone Project:- **Android OCR Application**.

A. PO's addressed by the capstone project.
   a) An ability to apply computer science and engineering knowledge.
   b) An understanding of professional and ethical responsibilities.
   c) An ability to function as individual or as a group in diverse environment.
   d) A knowledge of contemporary issues in computer science an engineering.

B. CO's addressed by the capstone project.
   a) Ensure quality in product.
   b) Assess the impact on project in real life.
   c) Communicate effectively and confidently as a concern member of the team
   d) Take appropriate decisions based on the collected information.

C. Other learning outcomes achieved through this project.

1. Unit Outcomes:
   a) ……
   b) ……
   c) ……
   d) ……

2.Practical Outcomes:
   a) ……..
   b)……...
   c)……
   d)……

3. Affective Domain Outcomes:

a) …….
b) …….
c) …….
d) …….