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TEXT BASED RECOGNITION SYSTEM

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Abstract

This research paper revolves around a system that is based on text extraction which is developed by using Android Studio, Google Firebase, and Java technology. Nowadays, Android Studio is among the leading technologies that is used to develop an application and its compilation. Along with it, Google Firebase which is an API used to scan text, QR code, and bar code. Java Technology is used to write the necessary code for running the application. This application is a boon for plagiarism checkers, data extraction, text sentiment analysis, and spam checker.

1. Introduction

In the digital era today, we see large chunks of data. Data mainly comprises text, audio, and images [1]. Now the question arises as to how to extract the text from different images so as to perform various text analyses. There are various effective techniques for the extraction of text namely Region-based technique, CC based technique, Edge-based technique, Texture-based method, and Morphological based method. Text Extraction is the process of extracting the text from images after scanning the image. It scans

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the text mainly from images, QR code, and Barcode.

The process of text extraction includes various phases namely

(i) Input Image

(ii) Pre-processing

(iii) Text detection and localization

(iv) Text Extraction and Enhancement

(v) Text Recognition

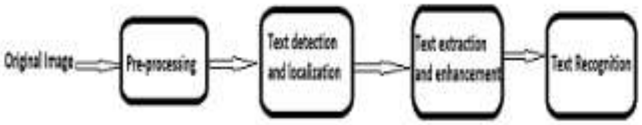

Original Image
Pre-processing
Text detection and localization
Text extraction and enhancement
Text Recognition

Figure 1.

Text Extraction System receives an input in the form of an image that contains some textual information. The output of this system is in electronic format i.e. text information in an image is stored in computer-readable form. Basically, this is a system that works around three basic modules namely pre-processing, text recognition, and post-processing.

In the pre-processing module, we scan an input image and perform normalization and noise removal to produce a filtered image. The aim of pre-processing an image is to get an improved and enhanced image free from distortions and enhance some image features which are important for further processing.

In the Text-recognition module, we do segmentation, extraction, and classification of an image to get an identified text from an image. It is a process of detecting and identifying text in images and recognizing the text. Once the text is detected, the recognizer identifies the actual text in each block and segments it into lines and words.

In the post-processing module, we store the data in textual format. The post-processing of images is performed with a new digital adaptive filter, whose parameters are set per those, used in the process of compression resulting in the quality of the image being significantly improved.

A text recognition system is basically a system that learns whatever is helpful to increase the accuracy in the dataset on which it is trained on. It also trains itself to learn feature which we human also find useful for reading and which generalizes to a much wider range of text system. A system is provided with diverse data to ensure that the system really learns text features correctly and efficiently.

A. Motivation and Objective

In this application we can do all the things like extracting the data from images, barcode reading and QR code reading that all will be present in a single application. During the data extraction from the image we can copy the data and at the same time we can enable that data along with google that will be useful to search the content related to that copied data. This makes things very easy and combines three features in a single application: text recognition, QR code reader and Barcode reader. This paper is divided into different sections such as section I containing the introduction and motivation. Section II describes the proposed methodology and flow process. Section IV represents the experimental results. And Section IV represents the conclusion.

2. Proposed Methodology

This is the home page of our Application. We can see the text from an image. It has three fundamental functionalities to scan text namely QR code scanner, camera, and Barcode Reader.

CAMERA: It scans the image as an input and extracts the text from an image, and displays it as a result. It displays the content of an image separately from an actual image.

a. BAR CODE

Barcodes become a very essential tool in the market. It has wide usage in the current scenario and has increased exponentially in recent decades. It is contactless and easily identifiable data.

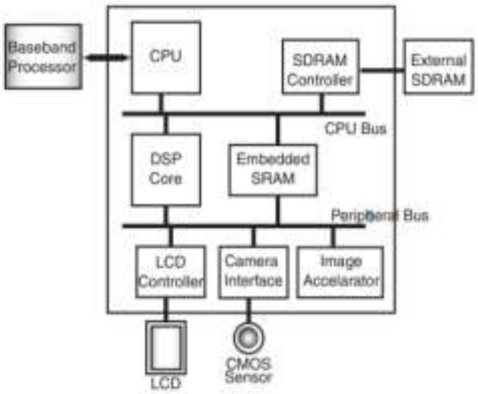


Figure 2. An example architecture of application processor for mobile phone [6].

Uses:

- For order process of items
- To track package in warehouse
- On invoices to assist in accounting
- Library Management
- Ticket Verification
- To automatically read product information during checkout

Mobile must consist of Camera, Application processor, Digital signal processor (DSP), and display device.

Note that the image will be captured from the embedded camera of the mobile phone.

Types of Barcode [5]

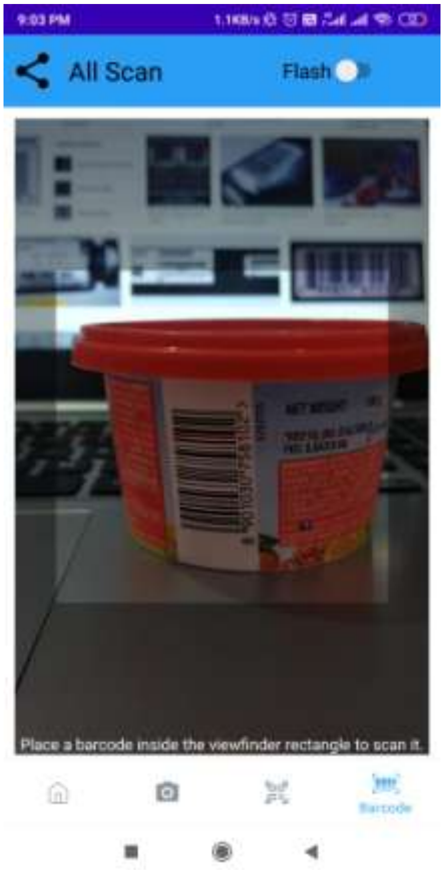
- Code 128 (FORMAT_CODE_128)
- Code 39 (FORMAT_CODE_39)
- Code 93 (FORMAT_CODE_93)
- Codabar (FORMAT_CODABAR)

- EAN-13 (FORMAT_EAN_13)
- EAN-8 (FORMAT_EAN_8)
- ITF (FORMAT_ITF)
- UPC-A (FORMAT_UPC_A)
- UPC-E (FORMAT_UPC_E)
- QR Code (FORMAT_QR_CODE)
- PDF417 (FORMAT_PDF417)
- Aztec (FORMAT_AZTEC)
- Data Matrix (FORMAT_DATA_MATRIX)

Code Snippet:

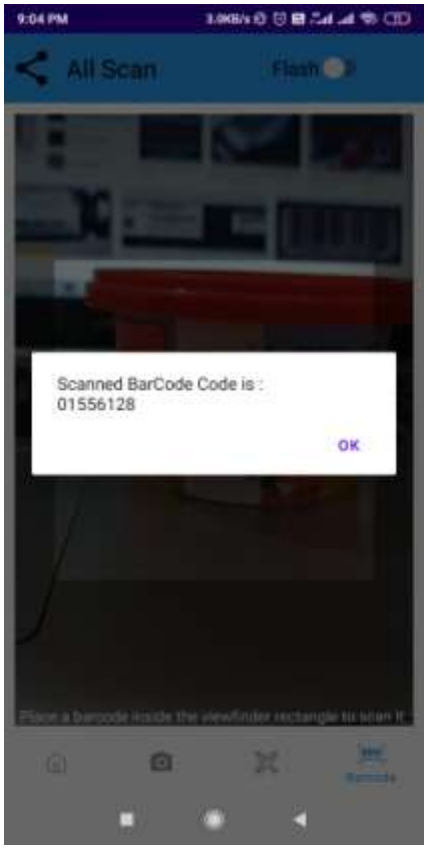
```
FirebaseVisionBarcodeDetectorOptions options = new
FirebaseVisionBarcodeDetectorOptions.Builder().setBarcodeFormats(
FirebaseVisionBarcode.FORMAT_QR_CODE,
FirebaseVisionBarcode.FORMAT_EAN_13)
.build();
```

The main functionality of this application is to get scanned QR codes. We can scan any Barcode by placing a Barcode inside the viewfinder rectangle to scan it. After successfully scanning an image of the Bar Code, it provides a Scanned Barcode as an Output.



Place a barcode inside the viewfinder rectangle to scan it.

Figure 3. Represent how to take input.



Scanned BarCode Code is :
01556128

Place a barcode inside the viewfinder rectangle to scan it

Figure 4. This image demonstrates the output.

b. QR Code

QR stands for Quick Response. QR Code is 2D barcode. As the full form suggests, it has high speed scanning capability, large information stored and small printout size. QR CODE has 40 versions, 4 levels of error detections.

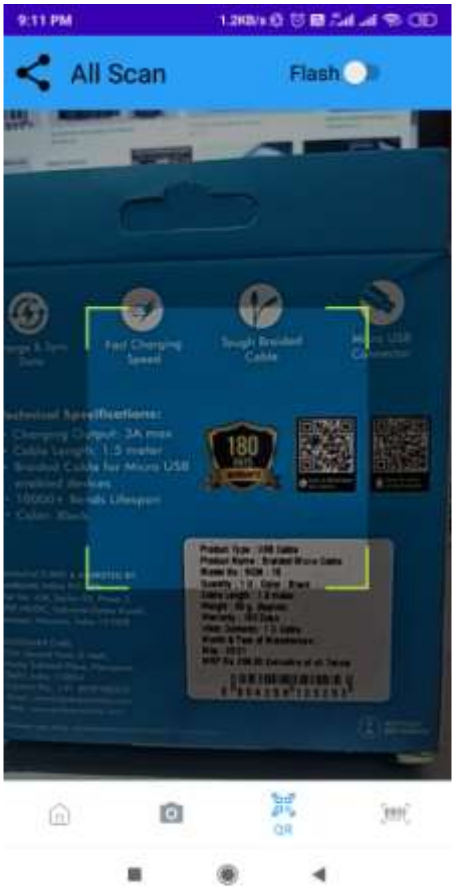
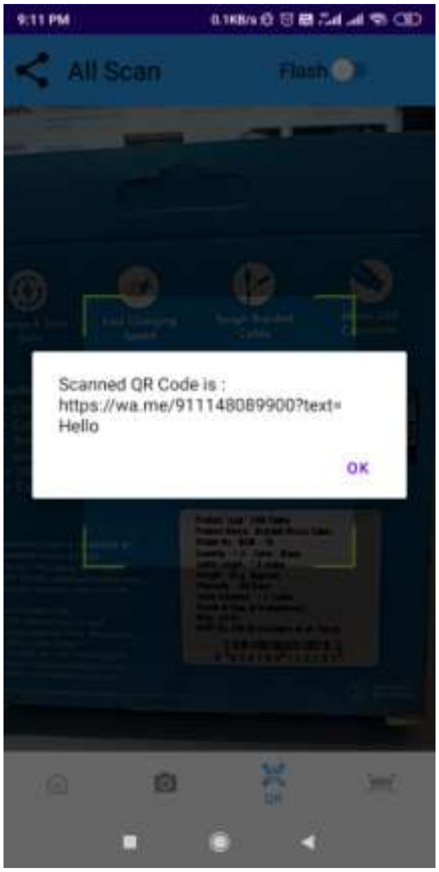


Figure 5. This image demonstrates how to take input.

QR Version 1 contains '21×21 modules' (rows or columns) while Version 40 contains '177×177 modules'.



Scanned QR Code is :
https://wa.me/911148089900?text=
Hello

OK

Figure 6. This represents output of QR Code.

Version Numeric Only Alphanumeric (with spaces and punctuation)/ Binary.

Table 1. Version with maximum allowed data for Numeric and Alphanumeric [8].

Version	Numeric Only	Alphanumeric (with spaces and punctuation)/ Binary
1	34	14

10	513	213
20	1600	666
30	3289	1370
40	5596	2331

QR CODE Structure [8]

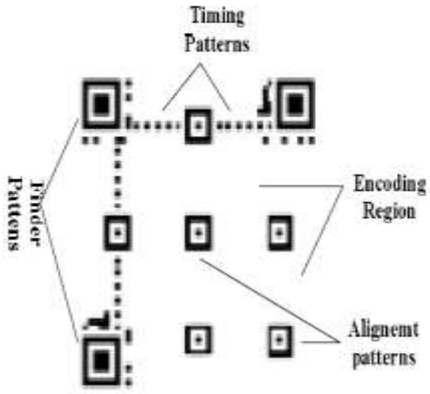


Figure 7. The Structure of QR Code.

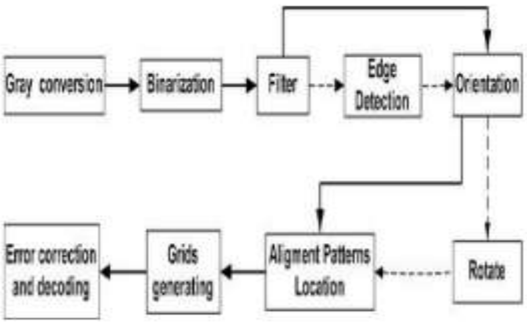


Figure 8. The flowchart of our approach.

We can scan any barcode from this QR code Reader by placing a barcode inside the viewfinder rectangle to scan the code and after successful scanning, it gives the result in the form of a Scanned QR code and tells us the information regarding Scanned QR.

c. Text Recogniser

In this fast trending world, typing a text from a billboard or poster is an old methodology. So, it was expected or needed of the user that some technique should be there that can extract the text from the source. Hence, Text Recognition came under light. In some contexts, it is referred to as OCR which stands for “Optical Character Recognition”.

Code Snippet: [9]

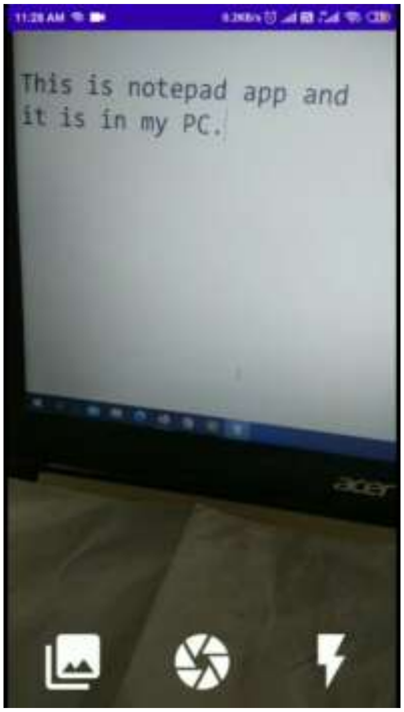
```
//To create a FirebaseVisionImage object from a file URI
FirebaseVisionImage image;
try{
image=FirebaseVisionImage.fromFilePath(context, uri);
} catch (IOException e) {
e.printStackTrace();
}
//To use the on-device model:
FirebaseVisionTextRecognizer detector = FirebaseVision.getInstance()
.getOnDeviceTextRecognizer();
```

Working Process in application:

Step 1. Open the application, Tap the “Camera” from the bottom navigation bar.

Step 2. Hold the mobile towards the text which needs to be extracted. (See Figure 9).

Step 3. On perfect alignment, click the capture icon.

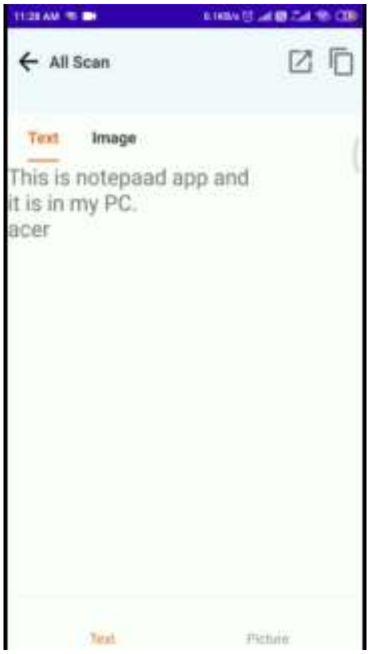


This is notepad app and it is in my PC.

Figure 9. To capture image from application.

Step 4. You will be automatically redirected to the Text Tab in which Output will be extracted in text form (See Figure 10). You may see the captured image from the Image tab.

Step 5 (optional)**.** If there is dim light, User can turn on Flash for lighting. Note that, Mobile must have Flash to use this feature.



This is notepaad app and
it is in my PC.
acer

Figure 10. The extracted text output will be available in Text Tab.

3. Conclusion

This paper presents the combined features of extracting text from image, barcode and QR code reader. Working of data extraction splits into four different parts: pre-processing, text detection and localization, text extraction and enhancement followed by text recognition. During the recognition process the first screen contains one button which captures an image from the camera or gallery of any image or cards or books or pages. In the second screen display image and all text present in the image line by line using Firebase Text Recognizer.

There is also scope as we recognised the text, barcode and QR code. Similarly, we may recognise the object based on their appearance and shape. We may also include some more powerful features that can recognise the breed types of Dog or any other animal or recognise and tell the tree name which will be helpful in educational purposes.

In our application, we can expand our knowledge and experience from OCR to Speech recognition.

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