

Image based Text Translation using Firebase ML Kit

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Abstract—At present, people use mobile phones to capture every important moment. In addition, smart phones are widely used for taking screen shots so important information can be saved. Image-based Text Extraction has a growing requirement in today's generation. Educational organizations, medical and banking, engineering sectors generate lot of images every day. It is essential to extract text from these images in a simple yet effective manner. Text Extraction involves a lot of processes such as text detection, localization, segmentation and, text recognition. The Optical character Recognition (OCR) System involves several algorithms that fulfill this purpose. Tesseract is the one of the OCR Engine build by HP Labs and owned by Google. Google's ML kit is also one of the optimized technology build and owned by Google and It provide methods for easy text extraction. Once the text is extracted it can be translated using different API's available for Language translation. Google translate API is the most popular and accurate technology so far. Also, many mobile applications are available to translate from English to other languages and vice versa. The Proposed system aims to detect, recognize and extract the text from images with plain white as well as color and complex background. It uses Machine Learning technology to extract text from image and then translate it into available set of languages. This application can be useful to overcome the language barrier among tourists, who are visiting other countries. So, by using this application they can get the right information wherever it is needed and it will make communication more easier.

Index Terms— Text-extraction, text-recognition, scan, image, translation, firebase, ML-kit, Mobile application, flutter, cross-platform development.

I. INTRODUCTION

Today, many apps are available to scan images but many few of them are able to extract the text from images. So many language translator apps are available to users but none of these applications provide the feature of scanning image which contains text and translating that text into desired languages.

The proposed system is supposed to extract text from the scanned image and translate the text into the selected language of the user using android device. This system aims to develop an android application for users with the goal so user can scan or select from device any image having text in multiple languages and can find the translation of the text in other language. The application should help user to get translation of text included in image in given set of languages.

II. RELATED WORK

Taking into consideration and exploring research papers related to contribution towards text recognition using ML kit and translation using translator-API, following researches and their approaches were fitted into system's goal for image-based text translation.

For detecting, Searching Images and extracting text from images OCR is one of the most useful known technologies. OCR scans image and converts it into format which is understandable by computer. It keeps improving year after year[1]. Flutter applications are hybrid and provides functionalities for ios as well as android devices with single codebase and less development time, consequently decreasing the cost and complexity of application creation across IOS and Android. One more important advantage of using flutter is it requires minimum lines of code and less implementation time[2]. Image processing is a software-focused domain, it has a wide range of applications. Tesseract is an OCR Software used for the conversion of an image into text. If the quality of an image is not pristine, this software is prone to errors. So, here we decided to find suitable alternative for Tesseract OCR so app could able to extract text even from color images as well as handwritten text with more accuracy[3]. Google's Language Translation had been reviewed to gather information on the additional languages and it is able to translate approximately 108 languages so far. This helped us a lot and made our task easier for text translation[4]. According to several researches that were done on mobile application development, mobile apps caught attention of users and reached consumers on very large scale. Mobile app development has increased the interest of freelancers and independent developers. There are many development environments, emulators, programming tools and tutorials available on the Internet[5]. Firebase brings google's machine learning expertise for mobile applications for android and ios devices with easy to use library. One can easily make use of these libraries even if he/she is new in machine learning and no deep knowledge of neural networks and ML is required. Firebase ML kit has features like face detection, text recognition, barcode scanning as well as detecting objects and recognizing landmarks[6].

TABLE I. COMPARISON OF VARIOUS TOOLS USED FOR INTERFACE DEVELOPMENT

Name of research Paper	Description	Inputs from paper	Different approach and technologies used
Image Assistant Tools for Extracting, Detecting, Searching Images and Texts	For extracting text from images OCR is the best technology used.OCR translate images of type written or handwritten characters into electronically editable format by preserving font properties It keeps improving year after year.	Text Extraction from image with OCR	Text Translation from one language to other.
Comparison of Flutter with Other Development Platforms	Flutter application can also run equally on both platforms, consequently decreasing the cost and complexity of application creation across IOS and Android. Using Flutter for Development 1.Hybrid and cross platform development 2.Minimum lines of code	Flutter for full application development.	Text extraction and translation.
Name of research Paper	Description	Inputs from paper	Different approach and tech used
Comparative Analysis of Text Extraction from Color Images using Tesseract and Open CV.	Image processing is a software-focused domain, it has a wide range of applications. Tesseract is an OCR Software used for the conversion of an image into text. If the quality of an image is not pristine, this software is prone to errors.	Using OCR for text extraction from color images.	Text translation from one language to other.
Image to Multilingual Text Conversion for Literacy Education	Google's Language Translation had been reviewed to gather information on the additional languages and it able to translate approximately 108 languages so far.	Multi lingual text translation with help of text conversion.	Text extraction and flutter development.

III. PROPOSED SYSTEM

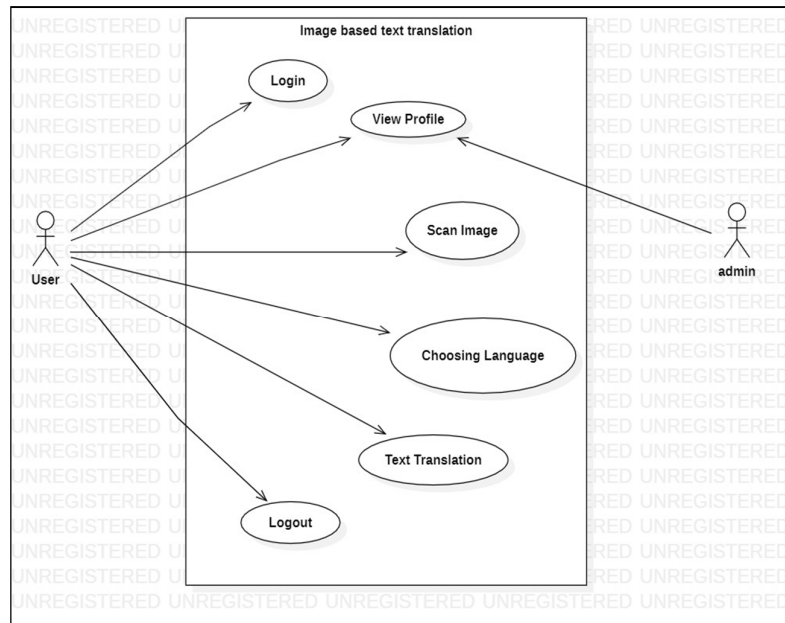


Figure 1.Usecase Diagram

As shown in Fig. 1, The application is divided into 3 basic modules.

A. Image capturing

Image can either be captured using device camera or it can be selected from the images available in local files in device.

B. Text recognition

The text in selected language will be recognized and extracted using OCR or similar technology(ML) and it will be stored temporarily for further processing.

C. Text translation

Appropriate language will be chosen and text will be translated into desired language using Google translate API or similar technology whichever stands suitable at time of implementation.

IV. METHODOLOGY

The overall flow and working of application is as follows.

- The user will download the application on their phone.
- After granting all the required permissions, user will be able to scan the image using device camera or select the image from device itself.
- User will have to choose the language of text in the image as well as language of translation.
- The text will be translated and the output will be shown as a string.

Fig 2 shows the flow of the application interface. It provides the simplest and smooth way for users to extract text from an image and then get the text converted into language of their choice.

V. COMPARISON BETWEEN VARIOUS TECHNOLOGIES

A. Flutter vs Android

Flutter supports cross platform development ie. applications made with flutter are compatible for both android as well as IOS devices with single code base.

Flutter has fast development of the apps as compared to core android development. Flutter provides the hot reload functionality which enables quick and easy experimenting and helps to reduce bugs faster.

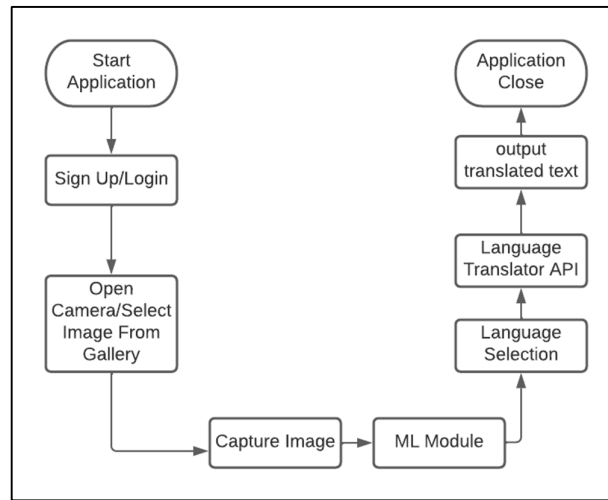


Figure 2. Flow Diagram

B. Tesseract OCR vs Firebase ML kit

It is studied with the implementation that Firebase ML-kit has more accuracy as compared to Tesseract-OCR although both of them support over 100 languages.

ML kit has number of API's which are ready to use and provide functionalities such as text recognition, face detection, barcode scanner, etc.

C. Google translator API vs other platforms

There are around 40 free to use online translator API's available on web. But the reason behind choosing Google translate api is it is most compatible with flutter and it also supports around 108 languages.

VI. RESULTS

Results of basic UI of application and some of captured outputs are as follows:



Figure 3. Basic UI of application

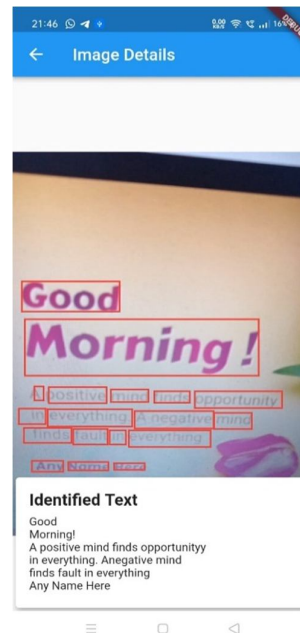


Figure 4. Output with Simple text and plain background

As shown in fig. 3, basic view of App will contain options for Clicking or selecting images. As in above figure, system is able to recognize text in the images having plain background.

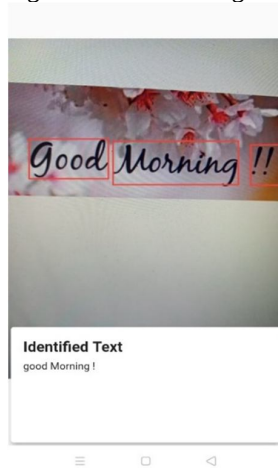


Figure 5. Text in different font with image as a background

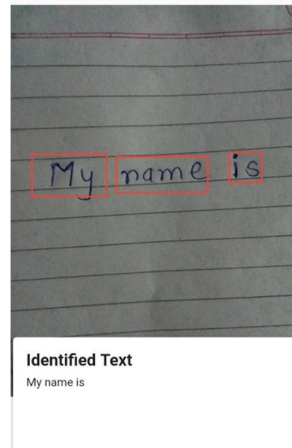


Figure 6. Output of handwritten text on the paper

As shown in fig. 5 , system is able to extract Text even from complex and color background. As shown in fig. 6, handwritten text can be Recognized accurately with ML kit.



Figure 7. Translation from English to Marathi



Figure 8. Translation from English to French language

As in fig. 7, The complete and accurate translation can be Obtained with translator API. As shown in fig. 8, translation from English to foreign languages is possible with google translate API.

VII. CONCLUSION

Firestore ML Kit plays crucial role in text extraction. Comparative analysis of Tesseract OCR and Firestore ML kit helped to understand variation and accuracy in outputs. ML kit is very accurate even for color background and different fonts and consumes less space as compared to tesseract OCR. The output of various images has been subjected to ML kit and best output has been considered for obtaining results. For text translation, further processing of text is done with help of google translate API. Translate API of Google is proved to be very accurate and it supports more than 100 languages as of ML kit. Text processing and understanding of regular expressions in languages can improve working of text recognition and translation. The authors experimented with available technologies and then integrated the best and optimized techniques to develop the proposed

application. The developed system is useful for tourist and many such category of users for understanding the text embedded inside an image and thus read them in any particular language.

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