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Multilingual Chat Application to remove language barrier with OCR feature

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Abstract – Now-a-days, Chat application is the most common means for distant communication and to connect to individuals. Many people face language barriers during chatting, especially in a country like India where more than 22 languages are present. Our project will try to solve this issue. The proposed system eliminates the need to have a common language for text communication. In this chat application the user will be able to chat in their own language with anyone, anywhere, anytime in the world. In this research work, an application is developed to translate the text integrated to images for better communication. Further, several approaches for image-to-text multilingual translator and text to text translator are reviewed in detail. An improved methodology is proposed by bridging the gaps identified by a thorough review of the literature. Our application goes through four major phases of development including: capturing, extraction, recognition and translation. Furthermore, the Optical Character Recognition algorithm is used for high-accuracy character extraction and recognition in a variety of environments. It translates text simply by capturing an image with the user's smartphone camera, and the translation appears on the user's mobile screen in the language selected by the user. The proposed system eliminates the need to have a common language for text communication. In this chat application the user will be able to type in their own language after selecting the language of their comfort, then the text will be recognized and translated to the language opted by end user and then system will send this "translated text" with the "original text" to the end user.

Keywords—multilingual image to text translation; image extraction; recognition; OCR; multilingual chat application; text translation;

I. INTRODUCTION

While communicating, the difference of language between the end users creates barriers for conveying their thoughts to others and leads to unsuccessful communication. For solving this problem, we have introduced this application named "Multilingual Chat Application". It has the inbuilt feature of Translating the message sent by the end user to convert it in user preferred language, so the user can understand the exact thought which end user wanted to convey which as a result automatically leads to successful communication. Text translation is primarily used to convert text from one language to another because the goal of translation is to convey the original tone and intent of a message while accounting for cultural and regional differences between the source and target languages. Humans have used translation for centuries, dating back to the invention of written literature. For letting users understand the text of an image we have used the OCR technology. Optical character recognition (OCR) is used to extract the text from images and then we show that text to the user in his/her preferred language. This image extraction is used to understand the language of sentences which are into image.

Optical character recognition is the method of classifying the optical patterns of digital images. OCR (Optical Character Recognition) is a technology that converts image data into text that can be edited using a computer program. In the literature, OCR does have some fascinating applications. We used OCR for feature extraction and compared several techniques for such purpose. Optical character recognition has also been used in the field of natural language processing. We examined the use of OCR for all scripts in different languages and their representation in the form of databases with text images. Our main target will be learning purpose and tourism. This app is quite easy to use as a person just has to capture an image from his/her mobile camera and our application will handle other processes. The user just needs to start this application, focus the image and click on capture button, after that the user just needs to select the language in which he/she wants its text to be getting translated and after completing this process translation will appear on user's mobile screen in the user desired language.

The working of the application is described in Fig. 1

The paper is organized as follows: Section II deliberates processes representing system architecture. Section III refers to requirements, Section IV talks about conclusion and future work.

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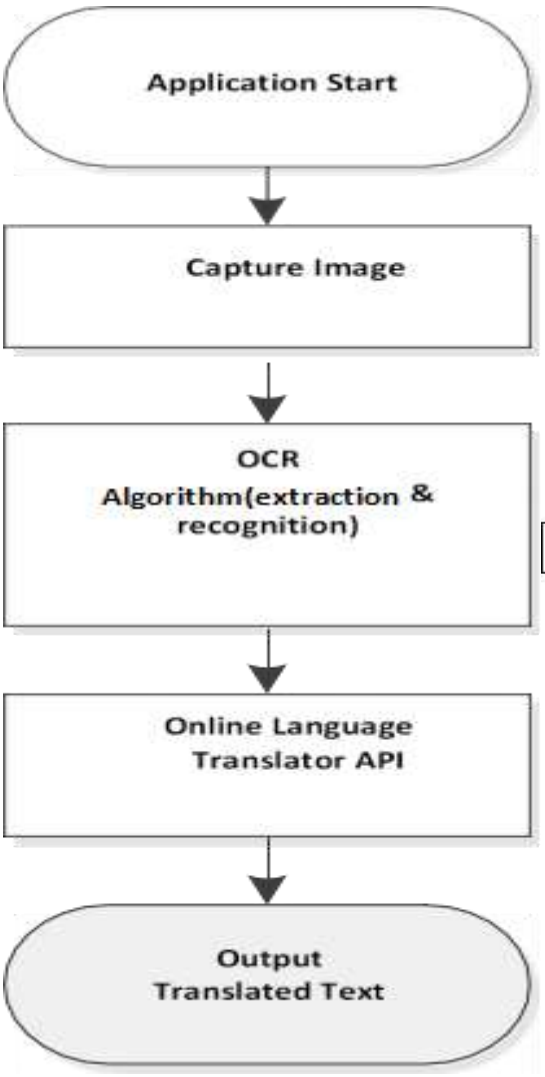

Fig. 1 Basic Flow Diagram

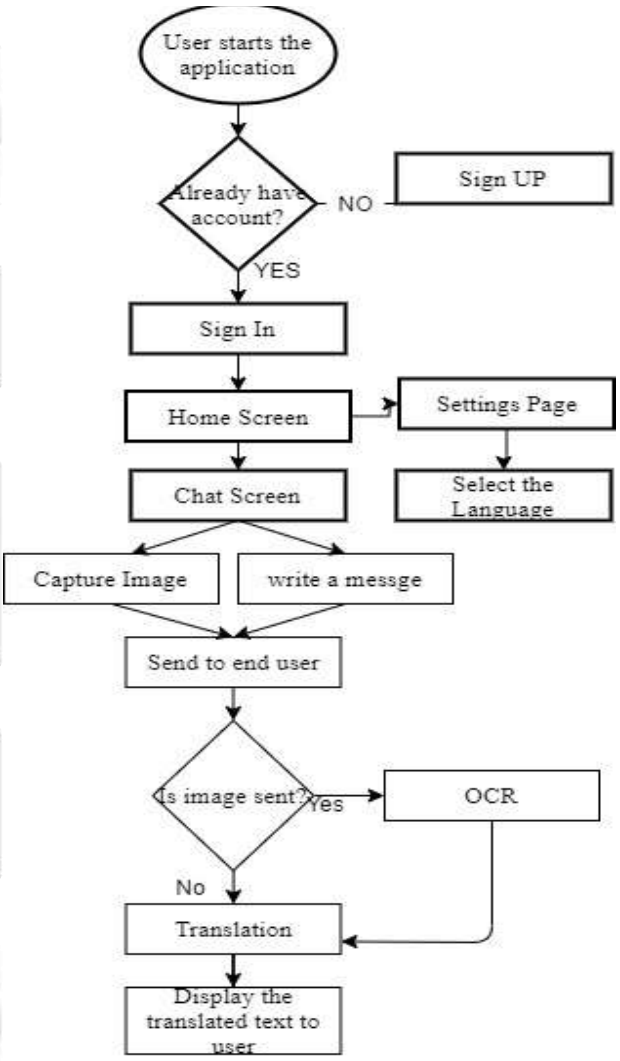

Fig. 2 System Architecture

II. PROCESSES

The character recognition is accomplished by using segmentation, feature extraction and finally by using classification. Moreover, OCR have four main components which includes segmentation, preprocessing, feature extraction, recognition or classification. Preprocessing involves the removing of noise, smoothing the scanned images and normalization to obtain the uniform size of characters. Further, segmentation involves in implicit and explicit segmentation. Thereafter, feature extraction can be done through structural analysis, transformation or distribution of points. There are several methods for classification including artificial neural networks, support vector machine and statistical techniques.

The proposed systems' architecture is elaborated in Fig. 2.

The proposed methodology goes through three major phases:

A. Image capturing
B. Algorithm
C. Translation

A. Image Capturing

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User will just need to click the application. On doing so they could chat with people in their contact. If they want to translate an image they have to be connected to internet. As shown in figure below (see Fig. 3):

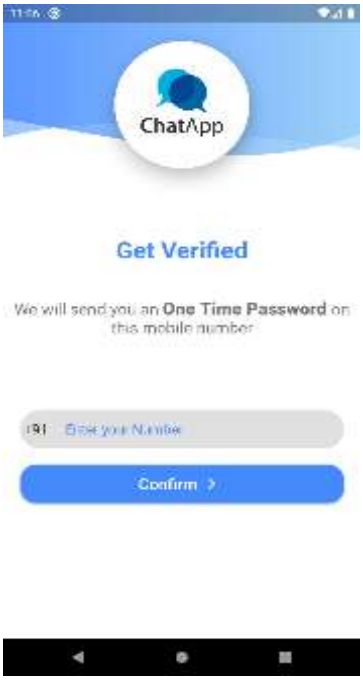

Fig. 3 LogIn Screen

B. Algorithms

We have used the OCR algorithm for extraction and recognition of text in our application and it is already known that the OCR algorithm has made great advances in the field of pattern recognition. It is being used in security, image processing and scanning documents applications providing 99% accuracy rate for printed characters and more than 90% for handwritten characters. The algorithm is briefly described in Fig. 2.
OCR algorithm is designed to convert scanned images into digital documents that are editable. OCR includes following phases:

a. Pre-processing: Pre-processing is very important phase in which it changes the effective processing. After capturing the data pre-processing phase decreases the reduction using normalization and reduces the variations that otherwise causes the low recognition rate. It uses gray scale techniques to convert the input image into binary format. This process is known as binarization on digitization of images.

b. Extraction: In extraction, the relevant information is extracted from the image. It extracts the each character of text embedded in the input image. The pre- processed image is referred to as the input image. The text extraction in the proposed methodology is shown in Fig. 4.

c. Recognition: In this phase, each character in the extracted image is converted into the code labelled as the letter. Each text is considered as a meaningful object.

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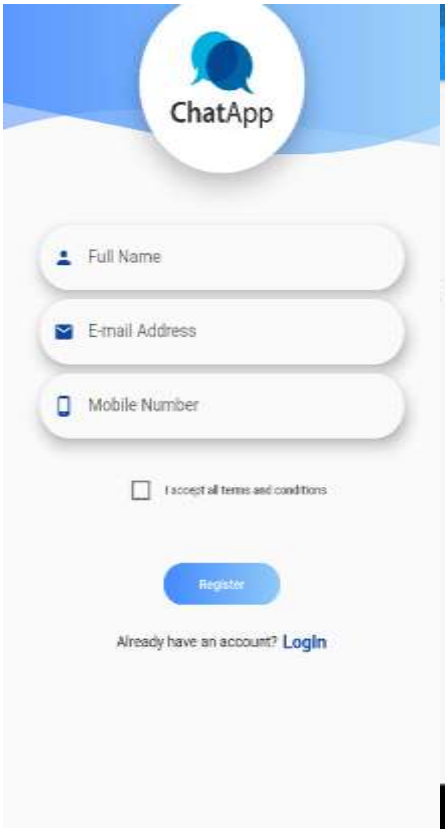

Fig. 4 Register Screen

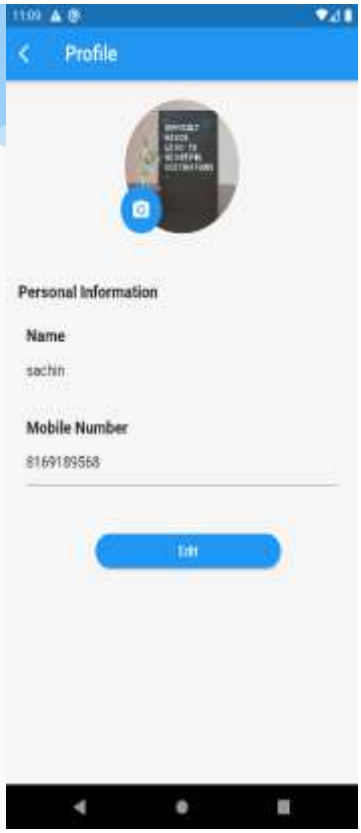

Fig. 5 Profile Settings

Fig.6 Language Section

Fig.7 Message Screen

d. Post-Processing: Last phase of OCR is post processing, which gives meaning to unrecognized text or character and eliminates the abnormal object. Abnormal object is any unrecognized and distorted object. This phase only demands

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the meaningful labelled letters. solutions. Further, response time for different pre-modules are explained in Table 1.

TABLE 1: EXPERIMENT RESULTS FOR MODULE OPERATIONS

No	Application per-module operation	
	Per-Module Operations	**Ave. Time**
1	Total request time	1-2 sec
2	Online text translation response time	300ms
3	Online image translation response time	1-2 sec

It is important to explain here that application online text translation response time depends on the speed and connection status of the internet.

Fig. 7 Request for translation of text

C. Translation

After applying OCR algorithm, the extracted string is translated with the help of dictionary embedded in the software database. The language selection module is developed for such purpose, (see Fig. 6). If any string is not found in its database then the application will automatically use Microsoft Translation API for output translation which is shown on

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your mobile screen. The output of the proposed application is in the form of translated language, as shown in Fig. 7.

III. REQUIREMENTS AND EXPERIMENTS

Different module response time during the experiments of the proposed solution is explained in this section. Several experiments were run to check the performance of the proposed.

TABLE 2: SOFTWARE AND HARDWARE REQUIREMENTS

No	Hardware and Software Requirements	
1	Device	Smart Phone
2	Operating System	Android, IOS
3	Tool	Android Studio, Flutter
4	Languages	Dart

A. Testing Phase

We planned to do manual black box testing using functional regression technique. Complete project has been tested including all modules and sections.

1) Device for testing: We tested our application on:

a) Phone: android, Ios

b) Version: android lollipop, all latest

c) Processor: Quad-core

d) RAM: 1 GB

IV. CONCLUSION

This proposed system gives the solution for chatting between users using different languages, by overcoming the language gap between the users. This application will help users to communicate with others in their preferred language. Application will use firebase as cloud storage, where it will store all chats of users. Application will extract data from firebase and then convert that data in users preferred language and then it will show all data to the user. One limitation of provided methods however is that as there are more than 7000 languages present in all over the world, this will support most of it but not all. However, it is important to note that by covering the few most popular languages of the world we can cover most of the population of the world.

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