

Text Recognition and Translation Application for Smartphone

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Abstract:The language barrier among tourists was one of the major difficulties when travelling. The tourists can rely on mobile phone for travelling purposes. Mobile dictionary is used for word search for a better travelling guide. Android platform has gained popularity in recent years in terms of market share and number of available applications. Android makes it easier for consumers to get and use new content and applications on their Smart phones. This project aims to develop an Android-platform based text translation application that is able to recognize the text present on sign board images taken with a mobile phone camera, translate the text from Marathi to English, and display the translation result back onto the screen of the mobile phone.

Keywords: Pre-process, OCR, Smartphone, Text Extraction

I. INTRODUCTION

Signboard information plays an important role in our society. Their format is often concise and direct, and the information they give is usually very useful. However, the foreign visitors may not understand the language that the signboard is written in, with the consequently loss of all that important information also they pose problems or even danger when we are not familiar with them. For example, a tourist might not be able to understand a sign in a foreign country that specifies warnings or hazards.

The gaining momentum of portable mobile devices, the growing of their computational power and the inclusion of cheap digital cameras on them makes it possible to change from the classical hand dictionary translation to a new faster, comfortable and affordable way. In this sense, it is expected that a high percentage of the world population will own a mobile phone with an embedded camera, which is all that our system needs. Research in the field of Optical Character Recognition (OCR) was limited to document images acquired with flatbed desktop scanners. The usability of such systems is limited as they are not portable because of large size of the scanners and the need of a computing system. Recently, with the advancement of processing speed and internal memory of hand-held mobile devices such as high-end cell-phones, Personal Digital Assistants (PDA), smart phones, iPhones, iPods, etc. having built-in digital cameras, a new trend of research has emerged into picture. We propose an Android application that detects the text information within an image taken with a mobile phone camera, extracts it, recognizes it and translates it from Marathi to English.

II. TEXT RECOGNITION

The Optical Character Recognition (OCR) process is divided into following phases preprocessing,

segmentation, feature extraction and classification. Fig 1. shows phases in classical OCR [9].

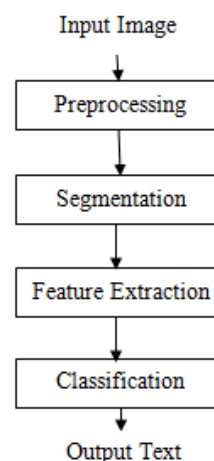


Fig .1.Optical Character Recognition

A. Preprocessing

It smooth the digitized characters to remove noise. The smoothing implies bothfilling and thinning. Filling eliminates small breaks, gaps and holes in the digitized characters. Thinning reduces the width of the line. The normalization is applied to obtain characters of uniform size, slant and rotation.

B. Segmentation

Segmentation is a classifier which helps to fragment each character from a word present in a given image / page. The objective of the segmentation is to extract each character from the text present in the image. After performing



Segmentation, the characters of the string will be separated and it will be used for further processing.

C. Feature Extraction

In this stage, the features of the characters that are crucial for classifying them at recognition stage are extracted. Following are the techniques for features extraction Template matching, Transformations, Distribution of points(Zoning, Moments, n- tuple, Characteristic loci, Crossings) Structural features.

D. Classification

The classification is the process of identifying each character and assigning to it the correct character class

1) *Decision-theoretic methods*: The principal approaches to decision-theoretic recognition are minimum distance classifiers, statistical classifiers and neural networks.

2) *Structural Methods*: Measures of similarity based on relationships between structural components may be formulated by using grammatical concepts. Suppose that we have two different character classes which can be generated by the two grammars G1 and G2, respectively. Given an unknown character, we say that it is more similar to the first class if it may be generated by the grammar G1, but not by G2.

E. Post Processing

1) *Grouping*: The process of performing this association of symbols into strings, is commonly referred to as grouping. It is based on the symbols' location in the document. Symbols that are found to be sufficiently close are grouped together

2) *Error-detection and correction*: utilizes the possibility of sequences of characters appearing together.eg. In English language the probability of a "k" appearing after an "h" in a word is zero, and if such a combination is detected an error is assumed.

III. TEXT TRANSLATION

With the extracted string, we use translator module which translate Marathi words / phrases to English. Instead of Google API for translation, we proposed translator module. Translator is designed for common phrases/words in Marathi language, which are used on sign board or banners

IV. TECHNIQUES USED

A. Algorithm for Segmentation of Marathi Script

Step 1: Line Segmentation

The steps for line segmentation areas follow:

- Construct the Horizontal Histogram for the image
- Using the Histogram, find the points from which the line starts and ends.

- For a line of text, upper line is drawn at a point where we start finding black pixels and lower line is drawn where we start finding absence of black pixels. And the process continues for next line and so on.

Step 2: Word Segmentation

- Construct the vertical histogram for each segmented line
- Using the vertical Histogram, find the points from which the word starts and ends.
- Vertical lines are drawn at starting and ending points for each word.

Step 3: Character Segmentation

- Draw the horizontal histogram for each segmented line
- From the horizontal histogram, find the row which consists of maximum value.
- The row which consists of maximum value of black pixel for each line is actually the row which consists of Header line.
- Draw the vertical histogram for each segmented word in below of header line.
- Draw the vertical histogram for each segmented word in above of header line
- Using the histogram, find the points from which the character starts and ends.
- Draw line according these coordinate.

Step 4: Maintain the data structure to feed the line, word and character boundaries such that the character boundary could be sufficiently extracted from the image which is required for the further training and recognition portion of the system [2].

B. Template matching

The matrix containing image of the input character is directly matched with a set of prototype characters representing each possible class. The distance between the pattern and each prototype is computed, and the class of the prototype giving the best match is assigned to the pattern. It is simple and easy to implement in hardware.

V. CONCLUSION

We proposed a system to translate signboard images taken with a mobile phone camera from Marathi to English. Since the computational resources of these devices are limited, we had to use fast, simple and accurate possible algorithms to work in the most common situations. Our system shows some characteristics that make it interesting and deserve further research: Other systems like Chinese-English translation have been proposed, but no research has been found for Marathi to English translation of outside signboard texts. Future work involves automatic

recognition and translation of handwritten Marathi signboards.

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BIOGRAPHIES



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