

Currency Detection using Image Processing

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Abstract - The proposed system that detects denomination of Indian currency with the help of image processing. The system takes the image of Indian currency as input and shows the amount of that note. The testing data is present to check whether the results are correct or not. Extraction of features from the notes are necessary for matching them against the set training data. Based on matching the results of the denominations of currency with the training data and display the amount of that particular note. The feature extraction and matching done by ORB (Oriented FAST and rotated BRIEF) which used to extract the key points and descriptors of an image to visualize the features of the denomination of note. After that Brute Force matcher is used to match the extracted features of the current input image with the training data. If the match is found it will show the image of note along with the amount which is present in the currency.

keywords - ORB, Brute Force, Denomination, Test data.

I. INTRODUCTION

Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image. Image processing is among rapidly growing technologies. It forms a core research area within engineering and computer science disciplines.

Digital image processing consists of the manipulation of images using digital computers.[1] Its use has been increasing exponentially in the last decades. Its applications range from medicine to entertainment, passing by geological processing and remote sensing. Multimedia systems, one of the pillars of the modern information society, rely heavily on digital image processing. The banking sector is also getting modern day by day. It is needed for automatic fake currency detection in automatic teller machines and automatic goods seller machines. Many researchers have been encouraged to develop robust and

efficient automatic currency detection machine. The technology of currency recognition basically aims for identifying and extracting visible and invisible features of currency notes. So it is important that we extract the features of the image of the currency note and apply proper algorithms to improve accuracy to recognize the note.

II. METHODOLOGY

In order to feature extraction of paper currencies effectively, the currency images are collected with appropriate spatial resolutions and brightness resolution, where the spatial resolution describes how many pixels comprise a digital image or how many dots are in each inch of a digital image. The concept of the brightness resolution addresses how accurately the digital pixel's brightness can represent the intensity of the original image. After document scanning, a sequence of data pre-processing operations are normally applied to the images of the documents in order to put them in a suitable format ready for feature extraction. There are three different approaches used for this purpose: Size ratio, Color, Text extraction. The methods are listed in order of increasing computation time. Some countries have banknotes that can be easily differentiated by the size. If the country of origin has been identified as one of these, then we can simply compare the size of the given banknote with the known sizes of all the denominations.

This system used opencv3 - python3 for programming. For image acquisition we used a scanner and pre-processed it - crop it. This was included in the training set. For the testing set, photos are captured from a phone and used. Next part was to detect the corners of the rectangle (the currency note), extract them by smoothing the image, canny detectors, sobel operator and contour detecting. For this system, opencv ORB is used for feature extraction and matching. ORB is used to extract keypoints and descriptors of images (training and testing). To match, this system uses opencv Brute Force Matcher. It is passed on to the k-nearest-neighbor operator which detects multiple matching features.

III. RESULTS

1. Result for Rs.50

train50.jpg
good matches 34

Detected denomination: Rs. 50



2. Result for Rs.20

train20.jpg
good matches 24

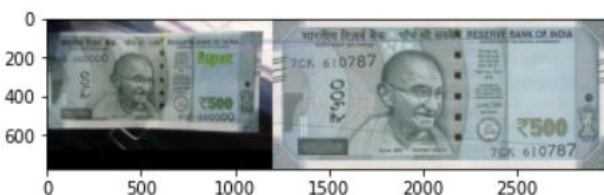
Detected denomination: Rs. 20



3. Result for Rs.500

train500.jpg
good matches 19

Detected denomination: Rs. 500



IV. CONCLUSION

This system represents a currency recognition approach based on machine learning. The machine learning model is used for both feature extraction and values recognition of currency paper. We have designed a system that accurately identifies denominations of a given banknote. The features from images are extracted using a KNN algorithm. The system is capable of extracting features even if the note has scribbles on it. The algorithm processed here works suitably for the newly introduced 500 and 2000 denomination.

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