# CURRENCY DETECTION FOR VISUALLY IMPAIRED

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## ABSTRACT

Despite the quick expanding utilization of Master cards and other electronic types of payment, money is still broadly utilized for ordinary exchanges because of its convenience. However, visually impaired people may suffer from knowing each currency paper apart. Currency Recognition Systems (CRS) can be used to help blind and visually impaired people who suffer from monetary transactions. In this paper, a Currency Recognition System based on Oriented FAST and rotatedYoloV3 algorithm is proposed. The proposed system is applied toIndianpaper currencies including six kinds of currency papers. In the proposed work, we will develop a system to detect currency for Indian Notes. First, take the input of the given image and pre-processed the given image and convert the RGB image into the grayscale image. After pre-processing, apply a Sobel algorithm for the extraction of the inner as well as the outer edges of the image. Clustering will be done using the YOLO V3 algorithm. In which it forms the clustering of feature one by one. After that recognized the input image as a 200, 500, or 2000 and compare the features of the image and classified it as 200, 500, 2000, or not with the help of the YOLO V3 algorithm.

Keywords: Currency Recognition, YoloV3 Algorithm, RGB Image

## INTRODUCTION

The ability to identify currency (both coins and bills) without human input is unfavourable for several applications. Probably the most important one is assisting visually impaired people. According to the GOVERNMENT OF MAHARASHTRA, the number of visually disabled persons was found to be higher. About 165 persons per lakh persons were visually disabled. Among them 82 percent were blind and 18 percent had low vision Recent development of laptop platforms makes the idea of currency recognition with a laptop an appealing one.In this study, we develop a simple approach of template matching with the SURF key point detector for the Windows platform. We are representing an approach in which currency is recognized by the camera andthe result is sent through audio devices. One of the main problems resist by people with visual impairment is the incapacity to identify the paper currencies due to the approximation of paper texture and size between the different currencies. Hence, the role of this system is to develop a solution to resolve this trouble to make blind people feel safe and determined in the financial approach. There are two types in the currency recognition research field; Scanner-based and Camera-based. Scanner-based systems supposed to scan the whole paper. Such systems are suitable for the equipment of currency counters. While camera-based systems except capturing the currency by a camera that may capture a part of the currency. Most related works in documentation assign with the scanner-based type [2-5]. For visually disabled usage, it's assumed to enable users to capture any part of the currency by their laptop and let the system identify it and notify the currency value. In this paper, camera-based Indian currency is trained to be identified using very simple image processing equipment's which makes the processing time is very short with allowable authority. The present systems have the skill to tend currency captured limitedly and contrast lighting situations.

## RELATED WORK

Manycurrencyrecognitionsystemshavebeen proposed. The authors recognize and classify four different currencies using computer vision. The features differentiated based on texture, colour, and

shapes of four differentcurrencies. TheyuseArtificial Neural Network for classification. The average Accuracy rate was 93.84%.

Iyad et al. developed a mobile currency recognition system using a dataset for Jordanian currency. They applied this method on a smartphone using the Jordaniandatasetbasedon thescale-invariantfeature transform (SIFT) algorithm. The system produced accuracy 71% for paper currency and 25% for coin currency.

The author proposed a mobile paper currency detection system that applied to SaudiArabianpapers. Recognizing paper currencies method is based on some interesting features and correlations between two images. It uses Radial Basis Function Network for classification. Thesystemhasanaccuracyof recognition 95.37% for the Normal Non-Tilted Images, 91.65% for Noisy Non-Tilted Images, and 87.5% Tilted Images.

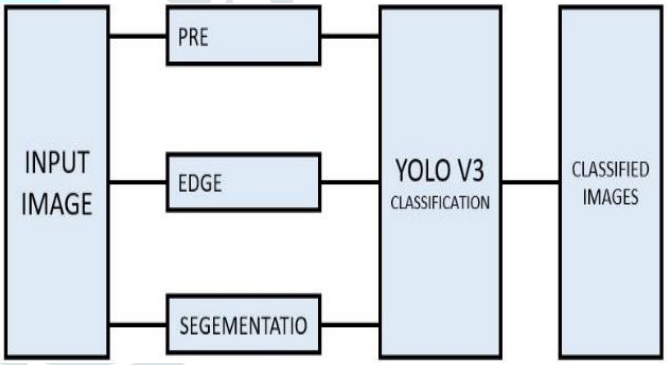
Sungwook et al. Proposed an efficient and fast Algorithm based on size information and correlation matching of multitemplates. As different banknotes have different sizes so this information was regarded to be important features. This method was tested using 55 currencies of 30 different classes from five countries: EUR, KRW, RUB, CNY, and USD. The results of thismethod achieved 100% classification accuracy for normal banknotes and 99.8% classification accuracy for defiled banknotes.

A non-parametric method is proposed foridentifying paper currencies. The proposed method is based on the development of a non-parametric model for each class of paper currency. The model is obtained by averaging all available samples of one banknote. The tested banknote can be recognized by finding the values of the coefficients between the banknote and the non-parametric models and matching based on these values. For capturing the currency, the camera and currency should be aligned horizontally to get a good result. Thismethod isapplied tothreekindsof Saudi Arabian banknotes and tested on a wide range of currencies and the accuracy reaches 100% of identification.

Nouraet al. used a simplecurrencies CRSF. In this method uses the dataset that the proposedmethod used and the proposed method is compared with this method. Basic techniques applied in theproposed system include image segmentation, equalization, region of interests (ROI) extraction and then matching the template based on the correlations between the taken image and dataset on database. The results showed that this method can recognize Egyptian papercurrencies with moderate accuracy reaches89% with 12 seconds running time.

Farid et al. Introduceda recognition methodMexicanbanknotesusingartificialvision [4]. This methodproved thatthe Mexican banknotes can be classified by extracting their texture features and colour. This technique uses the RGB colour model and the Local Binary Patterns for the identification process. Theaccuracy of this method is very low.

Junfang etal. Used an improved LBP algorithm, called block LBP algorithm for characteristic extract. It is based on the ordinary Local Binary Pattern (LBP) method. This method is very simple and has a high speed. The experimental results showed that this improved method has a high recognition rate, as well as robust illumination changes and noise with an accuracy ratio from 92% to 98 %.




## PROPOSED METHOD

The figure shows the block diagram of the proposed system. We have two phases: (offline and online). Theoffline phase in which the dataset is constructed from a given collection of Indian currencies images. The online phase in which the proposed method is running to detect and recognize the unknown input currency image. The online phase has five steps, pre-processing techniques for removing noise sand preparing the image for next operations, segmentation, and ROI extraction processes in the second and third step for extracting the foreground currency from the background, applying ORB Algorithm in step four and finally matching the results with the dataset. In the last step, the input to

the system is obtained from the camera of any Android device and the output is a voice that informs the user with the value of the currency.

In the proposed work, we will develop a system to detect currency for Indian Notes. First, take the input of the given image and pre-processed the given image and convert the RGB image into the grey-scale image. After pre-processing, apply the Sobel algorithm for the extraction of the inner as well as the outer edges of the image. Clustering will be done using YOLO V3 algorithm. In which it forms the clustering of feature one by one. After that recognized the input image as a 200, 500, or 2000 and compare the features of the image and classified it as 200, 500, and 2000 or not with the help of the YOLO V3 algorithm.

## YOLO V3 ALGORITHM:

"You Only Look Once" is an algorithm that uses convolutional neural networks for object detection. You only look once, or YOLO, is one of the widely used algorithm when it comes to detect an object. Even though YOLO is not the most accurate object detection algorithm, but it is an excellent choice when it comes to real time detection. There isn't much loss of accuracy as compared to other algorithms.

In comparison to other recognition algorithms, a detection algorithm such as YOLO does not only predict class labels but detects locations of objects as well. So it will not only classify the image into a category, but also detect multiple Objects within an Image. This Algorithm applies a single Neural network to the Full Image. This means that each image is divided into regions and the network predicts bounding boxes and probabilities for each region. These bounding boxes are then weighted by the predicted probabilities.

The main methodologies that act as a basement and also which has the capability of most of the consideration values were defined and explained as follows viz.,

*Image Acquisition*: The process of retrieving an image from an external source such as hardware-based for processing is termed to be known as Acquisition.

*Binarization of an Image:* The conversion of an image from grayscale to binary using thresholding function is known asthe Binarizationof an Image. The binary document type image will require very little space to get stored.

*Segmentation*: The process of partitioning an image or text into parts to make them useful for the image processing functionalities such as feature extraction, recognition, etc., is termed to be known as Segmentation.

*Feature Extraction:* The process of extraction of the features that act as essential as well as required characteristics such as symbols, text, etc., is termed to be known as Feature Extraction.

*Recognition:* The process of identifying the features after extraction is termed to be known as Recognition.

## SOFTWARE REQUIREMENTS

The software requirements needed to build the system are:

*PyCharm:* PyCharm helps you install packages and creates new virtualenvs. To make this work smoothlyPyCharm bundles a version of pip and setup tools.

*Python 3.6:* Python 3.6.8 was the eighth and the last maintenance released.

## HARDWARE REQUIREMENTS

The hardware requirements are as follows:

*Processor:* 15 Intel

*RAM:*4 GB

*Windows Operating System:* 8 or 10 and 64 bit OS

## CONCLUSION

In this project, to deal with the common aiming problem for blind users, we have proposed a mobile application for currency recognition that recognizes Indian currency to help blind persons in their daily lives. In this project, we get the output in the form of regional audio. The yoloV3 algorithm has better performance and recall value.This work will be extended to apply the classification to compare the original or forgery currency. It is possible to add foreign languages that can be used worldwide. To develop recognition of currency noteson a low-end mobile phone for Visually Impaired persons and notify the user by voice note in regional language. Inthe future, it can be extended to recognize foreign currency.

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