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Affiliated to Savitribai Phule Pune University and recognized 2(f) and 12(B) by UGC
(Id.No. PU / PN/ Engg. / 093 (1992)
(Accredited by NAAC with grade A+)

Fake Currency Detection using Image Processing

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Introduction

- Fake currency detection is a serious issue worldwide, affecting the economy of almost every country including India.
- Currency duplication also known as counterfeit currency is a vulnerable threat on economy. It is now a common phenomenon due to advanced printing and scanning technology.
- The possible solutions are to use either chemical properties of the currency or to use its physical appearance.
- Image processing algorithms can be adopted to extract the features such as watermarks, idle pictures, security string, which have been adopted as security features of Indian currency.

Motivation

- Some countries in the world have gone completely cashless i.e. they don't use currency notes anymore.
- However, in a country like India where people in many places still don't have access to smartphones and proper internet connection, going completely cashless is impossible.
- People still depend a lot upon currency notes to make payments.
- Since so much cash is being used, fake currency notes are also very common in circulation.
- The main motivation behind this project is to identify such fake currency notes and to save people from scams and frauds.

Objective

The main objective of this project is to propose a method which can identify fake currency notes quickly and with great accuracy using Image Processing Algorithms.

Literature

| Sr No. | Paper Title | Author and Publication Year | Conclusion |
|--------|---|---|--|
| 1 | A Study On Indian Fake Currency Detection | Devid Kumar and Surendra Singh Chauhan - 2020 | In this study, they have discussed various currency detection techniques and currency security feature. By using said technique they have observed that extraordinary results can produced quickly. |
| 2 | Fake currency detection: A survey | Arun Anoop M and Dr. K. E. Kannammal - 2020 | The authentication of Indian banknote currency is described by applying some image processing methods. In primer research, only three features are considered and extracted including bleeding lines, identification mark and security thread from the image of the currency based on canny edge detection method. |

Architecture and System

- The proposed approach separates various highlights from Indian cash and uses them for counterfeit money discovery.
- For Indian notes following features are considered:
 - Latent Image
 - Identification Marks



Latent Image

Identity Marks



Latent Image

Identity Marks

Feature extraction refers to the retrieval of information about the image by applying image processing algorithms. The images of a currency note is acquired using a digital camera or scanning the currency using a scanner. After acquiring the image, first pre-processing and then feature extraction is done to extract features. Both the steps are described in this section:-

Pre-Processing

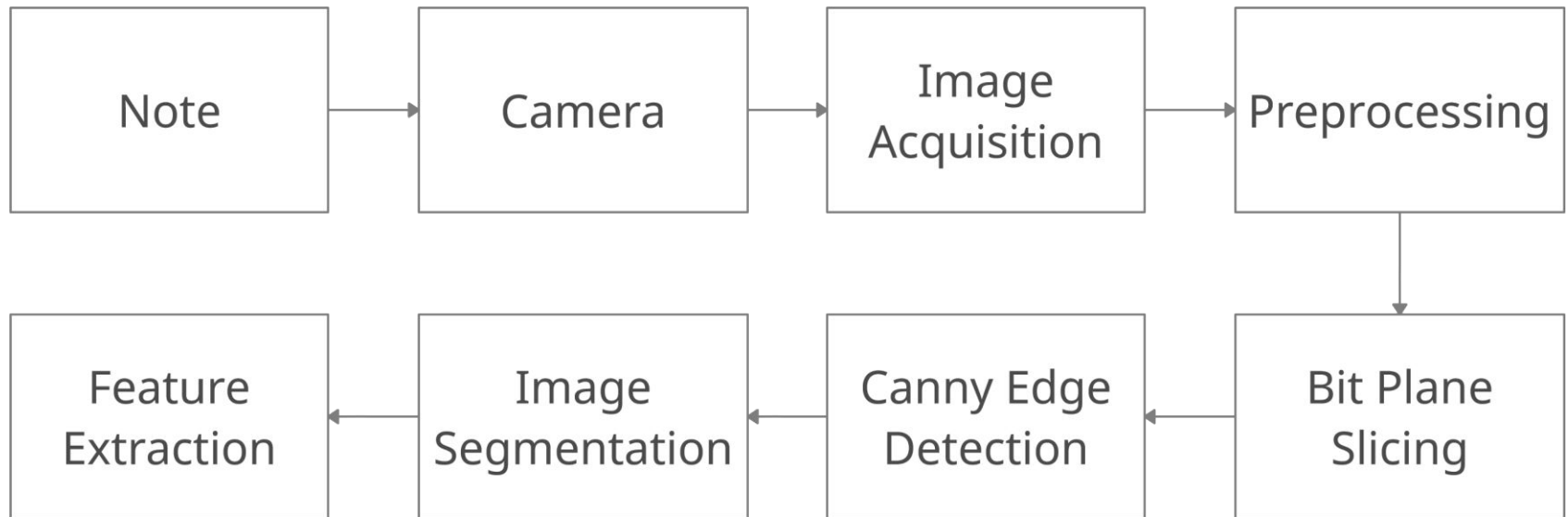
Pre-Processing: In pre-processing, unwanted distortion are suppressed and some features are enhanced that are important to further processing. It includes image adjusting and image smoothening. After these two pre-processing steps, the images of the currency were applied for feature extraction.

Feature Extraction

Feature extraction employs the selection and extraction of some of the Effective and important features, among the largest data

set of the features which are extremely important for the recognition of fake currency. Some Features of an image are Latent image and Identification Mark. We first create a database of a number of authentic Indian notes and then extract their features. The extracted features are used for detection of fake currency.

System Block Diagram



Steps of Implemented System

Image processing based currency detection technique consists of few basic steps like image acquisition, its pre-processing and finally recognition of the currency. Image processing generally involves five steps:-

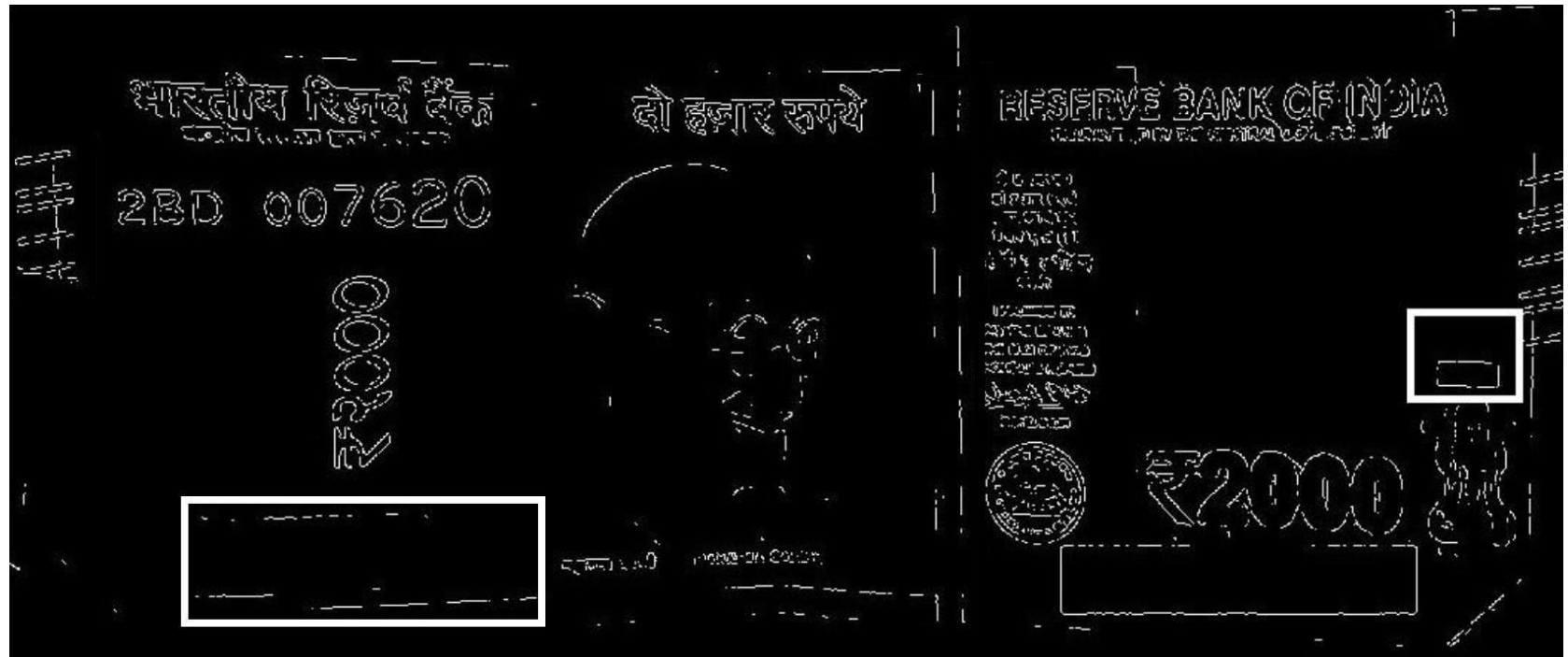
- i. Image Acquisition: Importing an image with a webcam.
- ii. Performing Image pre-processing techniques such as:
 - o Image Adjusting: Reduces the calculations and complexity of the size of the image and used for rotating, zooming, shrinking and for geometric corrections.
 - o Image Smoothing: Reduces the noise introduced in the image.
- iii. Detect the edges of the note and partition it from the surrounding background of the image.
- iv. Perform feature extraction on the note to detect whether the note is real or fake by comparing the features of the note with the stored database.

- v. After feature extraction, the application will detect and recognize the note. The final result will be an output.

Algorithms

- K means Algorithm - It is a method of vector quantization, originally from signal processing, that aims to partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean (cluster centers or cluster centroid), serving as a prototype of the cluster.
- SVM Algorithm - Support Vector Machines are supervised learning models with associated learning algorithms that analyze data for classification and regression analysis.

Results



Real Currency



Fake Currency

- Advantages
 - The differences are clearly visible as seen in the images above
 - Results are obtained quickly
- Disadvantages
 - Cannot be performed by people at home

Conclusion

We have seen a Fake Currency detection Method which uses Image Processing to compare the features of the currency. By using said technique we have seen that differences are clearly visible between a real currency note and a fake currency note.

References

- Devid Kumar and Surendra Singh Chauhan, 2020, "A Study On Indian Fake Currency Detection"
- Arun Anoop M and Dr. K. E. Kannammal, 2020, "Fake currency detection: A survey"