Indian Currency Recognition System

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Abstract- **Counterfeit notes are one of the biggest problem occurring in cash transactions. For country like India, it is becoming big hurdle. Because of the advances in printing, scanning technologies it is easily possible for a person to print fake notes with use of latest hardware tools. Detecting fake notes manually becomes time-consuming and untidy process hence there is need of automation techniques with which currency recognition process can be efficiently done. This work Extraction of different features in fake and real currency notes and through comparing with each other we can able to differentiate the fake note from the real note. In this approach, feature extracted dataset is used and for detection of the genuineness currency. Security feature of Indian currency note available on front and back side of the notes are used as features. This work uses ORB (Oriented FAST and Rotated BRIEF) and Brute-Force matcher approach to extract the feature of currency. The identification mark, optical variable ink, and extracted currency features decides the currency recognition. The features extraction is performed on the image of the currency and it is compared with the features of genuine currency. The desired result will indicate whether the note is genuine or fake.**

Keywords- **Currency recognition, Image Processing Technique, Image segmentation Character extraction, Currency verification.**

I. INTRODUCTION

Currency duplication also known as counterfeit currency. Counterfeit currency is a vulnerable threat on economy. Although fake currency is being printed with precision, the Crime Investigation Department (CID) says that they can be detected with some effort. Currency printed by local racketeers can be detected easily as they use the photographic method, hand engraved blocks, lithographic processes and computer color scanning.

In counterfeit notes, the watermark is made by using opaque ink, painting with white solution, stamping with a dye engraved with the picture of Mahatma Gandhi. Tourists are the most vulnerable people to fake currencies, because they don't know the proper and precise way of finding the difference between fake and real currencies note.

Automatic identification of currencies using image processing technique will be helpful to these people. It is also be useful at other workplaces. . The system designed to check the Indian currency note with denominations 500 and 2000. It will pre-process the digital pictures and organize the prepared arrangement of information and it will distinguish in monetary forms. This work proposes a convenient and cheapest method for identifying Indian currencies. At the end of the process user can know whether the currency note is fake or real.

II. LITERATURE SURVEY

Many researchers have used MATLAB using image processing.

Deshpande and Shrivastava [1], the propose a recognition and authentication system using image processing which can be a good for recognition the fake currency note. In this methodology, extract the security features with Multispectral imaging. They are so many feature extract in this process is Mahatma Gandhi portrait, watermark, RBI watermark , 2000 watermark, electrotype watermark of 2000 denomination note.

Y. Neeraja et.al. [2] Describe a fake currency detection using knn technique. In this methodology, the feature extraction process by knn technology is a robust and versatile classifier that is often used as a benchmark for more complex classifiers such as support vector machines (SVM).

Sawant and More [3], introduce an approach to detect fake note using minimum distance classifier technique. In this paper, the extract an ID mark and latent image and compute the Euclidean distance between the test sample and train sample. The Fourier descriptor is used to describe the note boundary. The experimental setup is done on rupees 20, 50, 100,500 and 1000.The average success rate achieved is 90.0%.

K. B. Zende et.al. [4] Describe a fake note detection system automatic recognition of Indian currency security feature based on MATLAB system. They are so many step including in this process is feature extraction, image segmentation, edge detection, bit plane slicing and comparison of image. In this paper extract some many feature watermark Detection, Security Thread Detection, checking currency series number, identification mark and sees through register. Here, they propose a GUI platform to check the currency is fake or real.

Bhagat and Patil [5], proposed a fast binary descriptor based ob BRIEF, called ORB, Which resistant to noise. In this paper, proposed the system on both side of currency feature. The recognized samples for conditions as illumination changes, rotation and scale change. The experimental setup is done 210 Indian currency notes sample 15 each on rupees Rs. 5, 10, 20, 50, 100, 500 and 1000.The average success rate achieved is 97.14%.

Yanyan Qin et.al. [6], proposed systems provide by SIFT (Scale-Invariant Feature Transform). Initially, the scale spaces were built for the detection of stable extreme points, and then the detected stable extreme points were considered to be feature points which have scale in variance. Secondly, ORB descriptor is used to describe the currency feature points. This finally generated the binary descriptors with scale and rotation in variance. The ORB is 65.28 times faster than SIFT. The experimental setup is done 20 images and achieves accuracy 92.53%.

III. SYSTEM ANALYSIS AND DESIGN

As in any other system development model, system analysis is the first phase of development in case of Object Modeling too. In this phase, the developer interacts with the user of the system to find out the user requirements and analyses the system to understand the functioning.

Based on this system study, the analyst prepares a model of the desired system. This model is purely based on what the system is required to do. At this stage the implementation details are not taken care of. Only the model of the system is prepared based on the idea that the system is made up of a set of interacting objects. The important elements of the system are emphasized.

As the basic philosophy of Object-Oriented method of system analysis is to perceive the system as a set of interacting objects, a bigger system may also be seen as a set of interacting smaller subsystems that in turn are composed of a set of interacting objects. While designing the system, the stress lies on the objects comprising the system and not on the processes being carried out in the system as in the case of traditional Waterfall Model where the processes form the important part of the system.

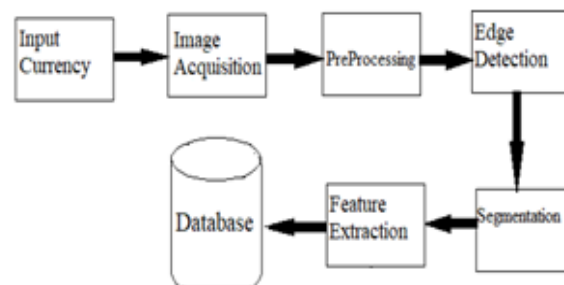## IV. PROPOSED METHODOLOGY

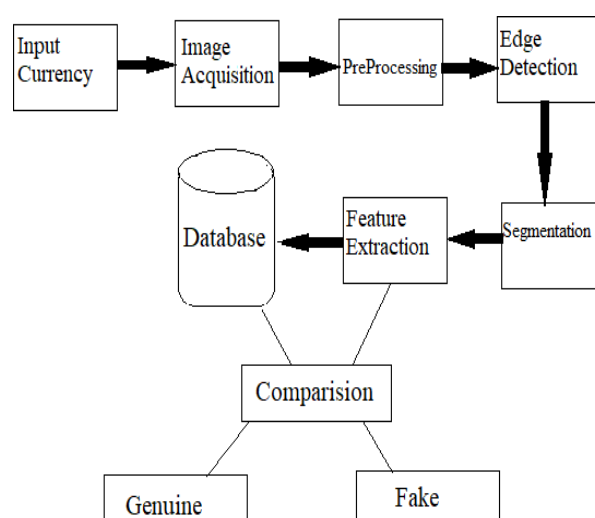**1. Database Creation:**

Fig 1. Database Creation.

Fig 2. Testing.

2. Feature Extraction and Comparison:
Feature extraction is a particular form of dimensional reduction. When the input data to an algorithm is too large to be processed and it is suspected to be very redundant then the input data will be transformed into a reduced representation set of features.
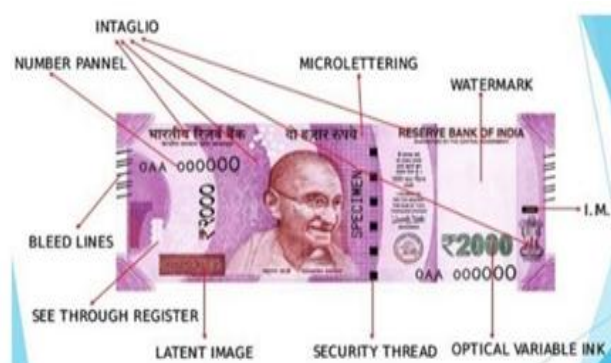
3. Features of a Real Not:

Fig 3. Security features of the note.

Six features extracted from the currency,
- Security Thread
- Intaglio Printing
- Latent Image
- Identification Mark
- Optically Variable Ink
- Swiss Punk Typography

V. METHODOLOGY

The system proposed here work on the image of Indian currency note acquired by a digital camera.

The method which is applied here is as follows
- Acquisition of image of Indian currency note by simple digital camera or scanner.
- Image acquired is RGB image and converted to Gray scale image.
- Edge detection of whole gray scale image.
- Now Indian currency features of the paper currency both observe and reverse will be cropped and segmented.
- After segmentation, feature of Indian currency note are extracted.
- BF matcher match that database trues with test images note then the test note is said as original otherwise fake.

VI. IMPLEMENTATION

1. Language Overview:
Python is a general-purpose interpreted, interactive, object- oriented and high-level programming language. An interpreted language, Python has a design philosophy that emphasizes code readability (notably using white space indentation to delimit code blocks rather than curly brackets or keywords), and a syntax that allows programmers to express concepts in fewer lines of code.
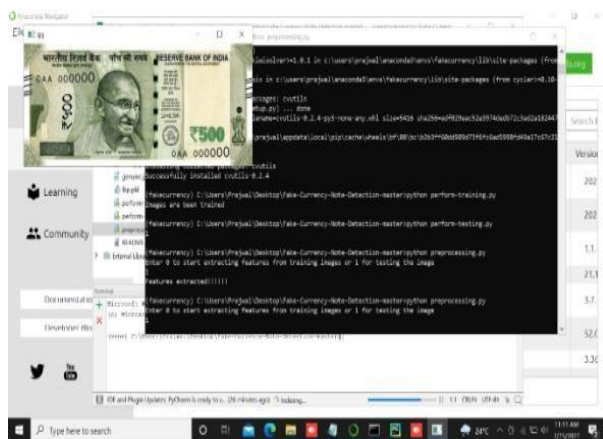
2. Image Acquisition:

Fig 4. Image Acquisition.

Executing image acquisition in image processing is always the primary step in the work flow sequence because, without an image, processing is impossible.

3. Pre-processing:
The main aim of the pre-processing is to improve the visual appearance of images and to enhance the management of data sets.

Fig 5. Pre-processing.

4. Gray scale:
Gray scaling is the process of converting an image from other color spaces e.g., RGB, HSV, etc.

Fig 6. Gray scale.

5. Edge Detection:
Edge detection is the name for a set of mathematical processes that are intended to identify points in a digital image at which the image brightness changes harply or, more properly, has these continuities. The points at which image brightness varies sharply are usually organized into a set of curved line segments termed edges.
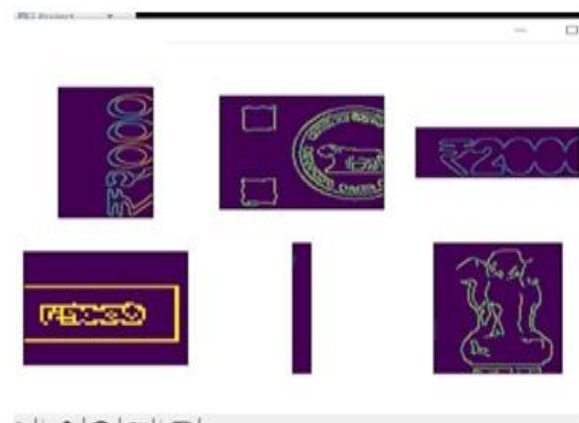
Fig 7. Edge Detection.

Fig 8. Feature Extraction.

Fig 9. comparison output

VII. CONCLUSION

In this project we actually worked on two currencies and it was found that the proposed algorithm based on color and feature analysis works well for currencies. So we can conclude that with proposed algorithm we can recognize currencies which have good differentiation in color and size related to features this system could be very useful to in order to prevent high order counterfeiting by taking advantage of cheaper and high quality equipment.

We proposed ORB (Oriented FAST and Rotated BRIEF) and Brute-Force matcher in OpenCV for Indian currency detection system and currency security feature; everybody has its own centrality. By using said technique we have find that extraordinary results can be complete less time. The paper also includes the study of detailed information about various Indian currency notes. After using all these method the currency can be recognized as genuine or fake.

In Future, Mobile app can be developed which would be useful for normal as well as visually impaired persons, the same system can be developed for the remaining Indian currency notes and other country's currency notes. The app's interface can be further modified as per the user requirements. This will increase its utilization by increasing its user network since India is going to establish the largest digital network in the world in the coming years. Thus the application will be available in all android devices and IOS devices in future if worked upon.

ACKNOWLEDGEMENT

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