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Indian Fake Currency Note Detector

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Abstract: Counterfeit money is imitation currency produced without the legal sanction of the state or government. Producing or using this fake money is a form of fraud or forgery. Counterfeiting is as old as money itself, and is sufficiently prevalent throughout history that it has been called 'the world's second oldest profession'. This has led to the increase of corruption in our country hindering country's growth. There are machines present at banks and other commercial areas to check the authenticity of the currencies. But a common man does not have access to such systems and hence a need for a software to detect fake currency arises, which can be used by common people. Fake money recognition is very crucial and important aspect for today's life. In India, people are trying to have cashless transactions using various systems like Credit Card, Debit Card, Net Banking, Mobile Banking, UPI Applications, etc. But still, there are many places where people are not able to use these facilities. They have to use cash in such cases; and where cash comes into the picture, fake money also comes handin-hand. That's why, detecting such fake counterfeit money is very important.

I. INTRODUCTION

The proposed system gives an approach to verify the Indian currency notes. Verification of currency note is done by the concepts of image processing. The result will predict whether the currency note is fake or not. There are some physical features set by Reserve Bank of India for authentic Indian Currency Notes (Rupees). These features must be followed for valid currency notes. Our system checks those features and gives result accordingly, so we can conclude from the result whether the currency note is fake or authentic. Our system is software based. We are using python language for coding the program for our system. Also, we are using various techniques of image processing in our system. We have referred to some of the previous papers and studied their technology. We used the knowledge that we could get from those papers and projects and tried to build our currency detector system. This system is useful not only for industries, but also to small scale start-ups and common people. We are trying to make the system easy to use so that it can be learnt with least efforts and can be used in much wider areas.

II. LITERATURE SURVEY

1) Feature Extraction for Paper Currency Recognition H. Hassanpour, A. Yaseri and G. Ardeshiri have proposed a new technique of paper currency recognition which is based on three characteristics of paper currencies including size, color and texture. By using Image Histogram, the different color in paper currency is compared to reference paper currency. They presented model texture of the paper currencies based on Markov Chain concept. Their proposed method can be used for recognizing paper currency from different countries. With one example of paper currency for training system, but they tested more than 100 denomination from different countries. The proposed system recognizes data with almost 95 percent accuracy.

2) Recognition of Fake Currency based on Physical Features of currency As mentioned by authors – Eshita Pilania and Bhavika Arora, no person can be 100 percent sure of the manual recognition and so the system was proposed to compare images of currency with the stored data and detect whether the currency is fake or genuine. This system used MATLAB software to run and perform various operations on the system. This system was mainly focused on physical features of the currency such as Security Thread. The feature extraction process emphasizes on Hue, Saturation, Value (HSV) of the currency. Hue: Various Colors, Saturation: Shades of particular color, Value: Brightness intensity. The image is divided into blocks and the operations are performed on the region of interest.

3) Recognition System for real time paper currency C. X. Yan and M. Lin have designed a money number recognition system. They discussed the position of money number when is based on gray value accumulation. They used the least square method. The least squares method is a statistical procedure to find the best fit for a set of data points by minimizing the sum of the offsets or residuals of points. The method is used to detect the edge line of money number using the geometrical rotation gray adjacent interpolation method to correct the number which is based on character structure characteristic to realize the character recognition. The presented system has high accuracy (more than 90

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4) Indian Currency Recognition and Verification System using Image Processing B. P. Yadav, C. S. Patil and R. R. Karhe have designed a system for automated recognize and verify the Indian currency using Image Processing. Authors describe the two characteristics of Indian Currency that is based on counterfeit note which included Identification Mark and Serial Number. They also used characteristics extraction which have been performed on the image of currency and then compared it with characteristics of genuine or original currency. They also elaborated number of steps including: Image Processing, Edge Detection, Image Segmentation, Characteristic Extraction and Comparison.

5) Feature fusion for Fake Indian Currency Detection N. Rathee, A. Kadian and R. Sachdeva have studied the physical and chemical properties of fake currency. They presented a core software system to build a robust system for detection of fake currency using physical properties. In Image Processing algorithm, they adopted the extraction of important features such as Security Thread, Intaglio Printing (RBI Logo) and Identification Mark. These features are adopted as security features of Indian Currency. Authors elaborated the difference between real and fake currency note based on above three features. Authors also measured the performance of proposed system based on accuracy and it came out to be sufficiently high.

III. METHODOLOGY

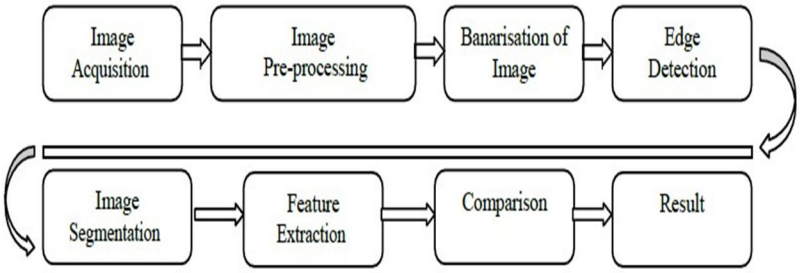

Fig. 1: Block diagram

The currency recognition and authentication based on Image processing technique consists of few basic steps like image acquisition, its pre-processing and finally recognition of the currency. Image processing generally involves three steps: 1. Import a currency image with a scanner or directly through digital camera. 2. Manipulate or investigate the image with the help of Image processing. 3. Output the result.

IV. FEATURES AND ADVANTAGES

A. *Features*

1) Easy to use: In our project, as user has to capture only the image of the currency note. He/she do not have any restriction to capture image in specific manner. Thus, it is easy to use for end users.

2) Fast processing: As our project works only on python -opencv, and it is a library of programming functions mainly aimed at real-time computer vision. Our project do not required any third party software. Thus, it has fast processing speed.

3) Better accuracy: In this project, we use various method for the image acquisition, enhancing the image and various methods for the comparison. Thus, it has better accuracy of genuine and counterfeit note detection.

B. *Advantages*

1) The system can be used on any level. Even common mancan use this system easily. This system will help people to recognize whether the currency note is fake or not.

2) As the system is easy to handle, it can be learned withoutmuch effort. In India, small children and old age people are usually fooled by frauds, but this system will help to catch those frauds.

3) It can also be used on industrial level in small startups andcompanies, where buying expensive machines for this task is not possible. It is easy to maintain track record of the counterfeit currency. It helps in counting counterfeit currency in root level area.

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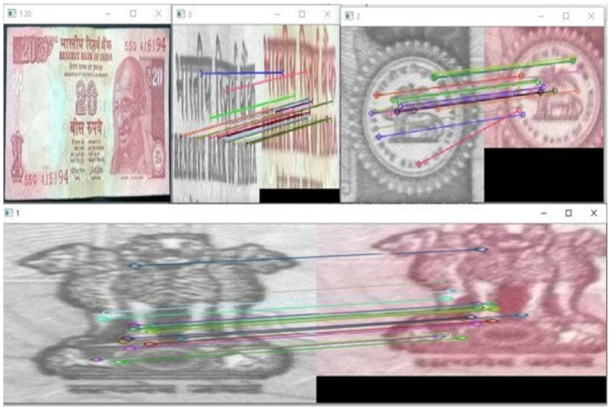
V. IMPLEMENTATION DETAILS

1) *Image Acquisition:* The first stage of any vision system is the image acquisition stage. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks. Performing image acquisition in image processing is always the first step in the workflow sequence because, without an image, no processing is possible. There are various ways to acquire image such as with the help of camera or scanner. Acquired image should retain all the features.
2) *Pre-processing:* The main goal of the pre-processing to enhance the visual appearance of images and improve the manipulation of datasets. Pre-processing of image are those operations that are normally required prior to the main data analysis and extraction of information. Image preprocessing, also called image restoration, involves the correction of distortion, degradation, and noise introduced during the imaging process. Image pre-processing can significantly increase the reliability of an optical inspection. Several filter operations which intensify or reduce certain image details enable an easier or faster evaluation
3) *Gray Scale Conversion:* The image acquired is in RGB color. It is converted into gray scale because it carries only the intensity information which is easy to process instead of processing three components R (Red), G(Green), B(Blue). to take the RGB values for each pixel and make as output a single value reflecting the brightness of that pixel. One such approach is to take the average of the contribution from each channel: (R+B+C)/3. However, since the perceived brightness is often dominated by the green component, a different, more ”human-oriented”, method is to take a weighted average.
4) *Edge Detection:* Edge detection is the name for a set of mathematical methods which aim at identifying points in a digital image at which the image brightness changes sharply or, more formally, has discontinuities. Edge detection is a fundamental tool in image processing, machine vision and computer vision, particularly in the areas of feature detection and feature extraction. It works by detecting discontinuities in brightness.

5) *Image Segmentation:* Image segmentation is the process of partitioning a digital image into multiple segments. The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze.
6) *Feature Extraction:* Feature extraction is a special 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. If the features extracted are carefully chosen it is expected that the features set will extract the relevant information from the input data in order to perform the desired task using this reduced representation instead of the full size input.



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VI. RESULTS

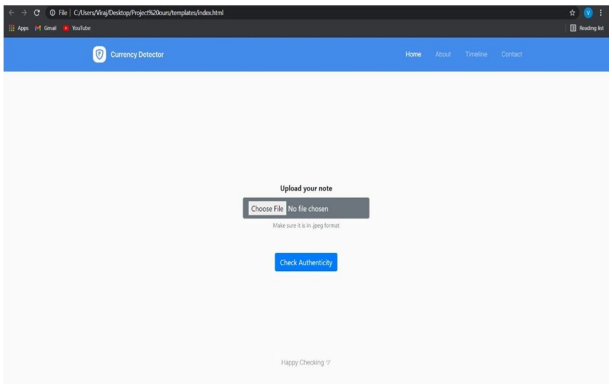

Fig. 2: Interface

This is the interface of our proposed system. There is a button to upload the image. When user clicks the button, there comes an option to capture a photo or to choose a stored file. User can select either of the options and upload the image. The code in the background runs and compares it with the stored dataset. If accuracy of comparison is greater than 65 percentage, the result will be shown as Genuine, else Fake. Following is one of the example of the results:

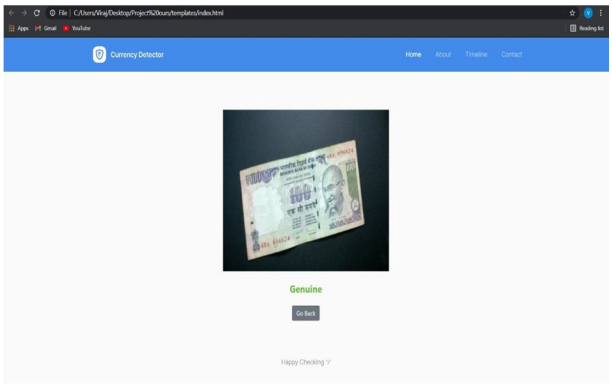

Fig. 3: Result

VII. CONCLUSION

The system can be used on any level right from Industries or Banks to Personal Level. Even common man can use this system easily. This system will help people to recognize whether the currency note is fake or not. As the system is easy to handle, it can be learned without much effort. In India, small children and old age people are usually fooled by frauds, but this system will help to catch those frauds. It can also be used on industrial level in small startups or companies, where buying expensive machines for this task is not possible. Also, it is useful for economic surveys and audits held on small level.

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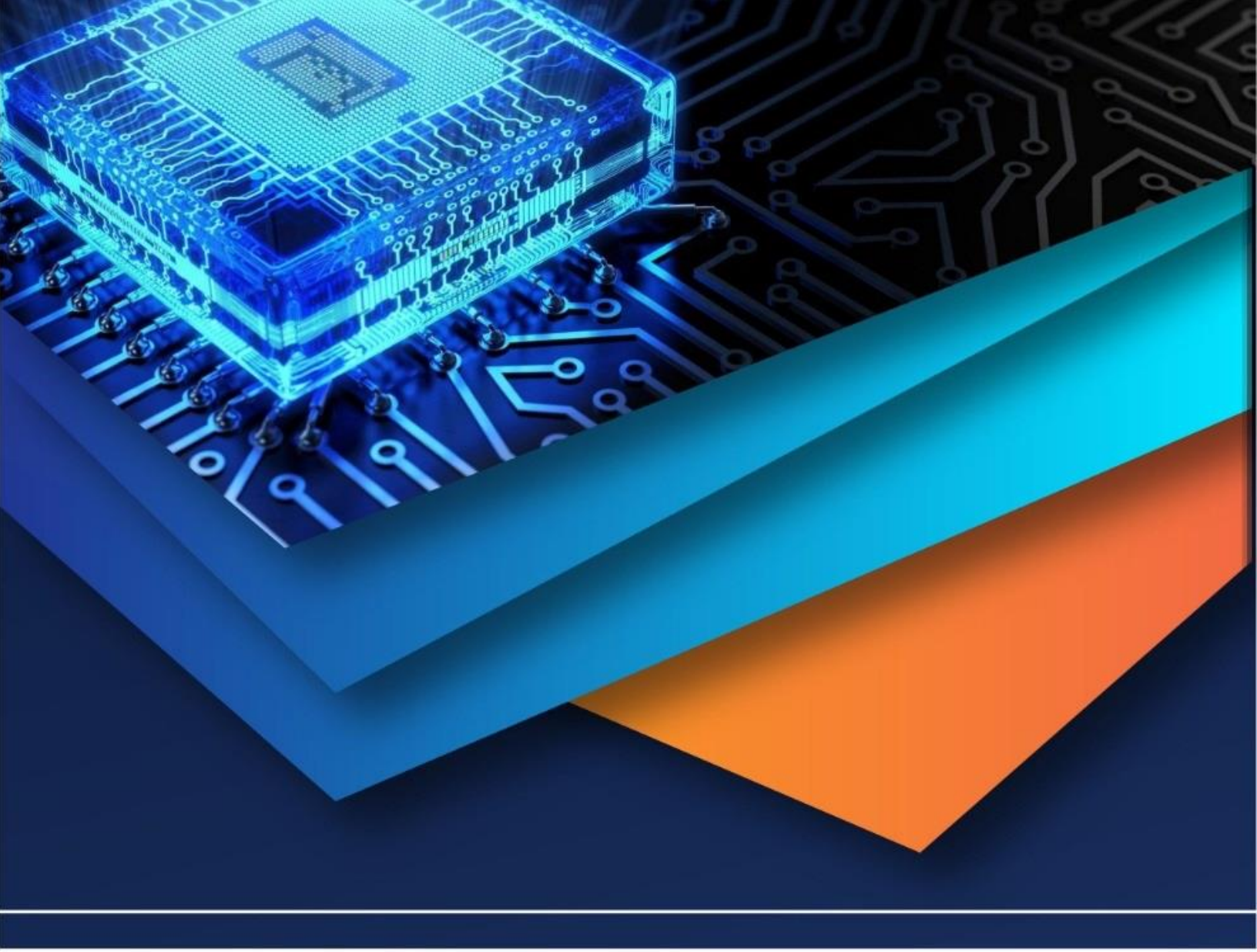

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