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FAKE INDIAN CURRENCY DETECTION

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Abstract: India is a vast country, and while counterfeit notes of Rs.100, 500, and 1000 were always in circulation before demonetization, counterfeit notes of new Rs.50,200,500, and 2000 have also surfaced in a short period of time, posing a threat to the country's economic progress. Counterfeiting issues have emerged in recent years as a result of technology advancements in colour printing, duplication, and scanning. The recognition and verification on paper cash using digital image processing techniques is detailed in this article. The image of the currency is used to extract the properties, which are then compared to the characteristics of actual currency. Image processing techniques will be used to recognise and verify the cash. Picture processing, edge detection, image segmentation, characteristic extraction, and image comparison are among the components of the method. The expected consequences will be the text and vocal output of the identified and authenticated currency.

Index Terms **– Currency Recognition, Image Processing Technique, Image Segmentation Character Extraction, Currency Verification**

I. INTRODUCTION

Currency duplication, commonly known as counterfeit currency, poses a serious economic danger. Because to advances in printing and scanning technologies, it is now a common occurrence. Bangladesh has been grappling with a severe problem: an increase in the number of fake money on the market. To address this issue, a variety of false note detecting systems are available around the world, the most of them are hardware-based and expensive. Many applications, such as automatic products seller machines and automated goods tellers machines, require automatic recognition of phoney Indian rupee notes. Watermarking, latent image, micro lettering, see through register optically changeable link, security threads, intaglio printing, fluorescence, identity mark, and legal restrictions against counterfeiting are some of the ways for identification presented by several analyst. For detecting false currencies, there are additional automated tools available. Fake currencies are available online for use with banking services, however the accuracy varies from one method to the next. As a result, a dependable system for trustworthy currency recognition with less processing speed and accuracy is necessary. The Indian government announced on November 8, 2016, that the Rupees 500 and 1000 notes would no longer be legal tender in order to reduce the size of the country's economy by rooting out black money and counterfeit currency used to fund illegal activities such as terrorism, and introduced new currency in the form of Rupees 500 and Rupees 2000.

However, following Demonetization, officials recovered counterfeit currency worth Rs 21.54 crore, which included the recently launched 2000, 500, and 200 currency notes. A total of 39,604 2000-denominated currency notes were seized around the country. Corrupted individuals are involved in the development of fake notes aimed at high denomination value notes.

The "Fake Note Detector Machine" is now the sole solution available to the general public for detecting counterfeit currency. This machine is usually found in banks, which are not always accessible to the general public. All of these possibilities necessitate some sort of method for ordinary people to identify a fake bank note and prevent our currency from losing value.

Here, we use a basic approach that works well. A digital camera is used to capture the image of the currency note. Image processing is carried out on the acquired image using concepts such as image segmentation, image edge information, and feature extraction. OPEN CV is an excellent tool for computational and analytical work. JPEG, PCX, TIFF, PNG, and more image formats are supported by OPEN CV. Image feature extraction is a difficult task in digital image processing. It entails the extraction of both hidden and apparent elements from Indian banknotes. Picture acquisition, edge detection, grey scale conversion, extraction of features, image segmentation, and decision making are all processes in this method. Acquisition of image is a process of creating digital images, from a physical scene. A simple digital camera was used to create this picture, which highlights all of the details. The image is then stored for further processing.

II. LITERATURE SURVEY

[1] A paper published by Trupti Pathrabe and Swapnili Karmore introduced a new technology to improve the recognition ability and transaction speed to classify Japanese and American bank notes. This compares two types of data set, using time series data and Fourier power spectrum. In both cases, they are used directly as inputs to the neural network. They also involve a new method of assessing recognition capabilities.

[2] The article proposed by Mirza and Nanda, there is a technique for extracting the denomination of banknotes. The regions of interest extracted can be used for pattern recognition and neural network matching technology. First, your uses a simple flatbed to get an image of a specific size at a fixed dpi and sets the pixel level to get the image. Filters are rarely applied to extract denomination value from banknotes. They use different pixel levels in different banknote denominations. Pattern recognition and neural network matching technology is used to match or find the currency value / denomination of banknotes.

[3] The article proposed by Pathrabe and Bawane provides an algorithm with low computational complexity, which can meet the high speed requirements of in practical applications. It should be noted that the proposed technology may not be able to distinguish between fake and real banknotes. In fact, the technology that uses infrared or ultraviolet spectroscopy may be the technology used to distinguish real banknotes from counterfeit banknotes.

[4] Comment submitted by Komal vora et al. It is recommended that the study of the banknote recognition system be thoroughly reviewed. Many techniques applied by different researchers to assess the state of the art are briefly proposed. Here, the author mainly focuses on the coin detection system, including the different steps such as image acquisition, feature extraction and classification systems that use different algorithms. The result utilises Optical Character Recognition and primarily uses serial number extraction to aid in fraudulent coin identification. The proposed method was found to give excellent results.

[5] An article published by Sai Prasanthi and Rajesh Setty describes a method to verify Indian banknotes. The coin will be verified using image processing technology. In this document, features are drawn from 6 features. The method consists of many components, including image processing, edge detection, image segmentation, feature extraction, and image comparison. The characteristics of coin images were extracted and compared with the characteristics of the real coin. The Sobel operator with an amplitude gradient is used for feature extraction. The banknote with high recognition accuracy and fast processing speed is very important to the banking system.

[6] A paper proposed by Ms. Monali Patil also devised a mechanism for dealing with counterfeit Indian cash. They employ the k-means clustering approach to create feature clustering one by one. The input image was then identified as a 200, 500, or 2000 by comparing the attributes of the image and using the SVM method to classify it as genuine or fraudulent. The experimental results show that the SVM Algorithm outperforms the KNN Algorithm in terms of accuracy.

[7] An article published by Bhurke et al. developed a currency note recognition algorithm. To detect the feature of paper cash, the proposed technique based on an image processing approach was discussed with MATLAB. They reviewed the fundamental requirements for an algorithm, which include simplicity, low complexity, high speed, and efficiency, and offered an algorithm design that is simple but efficient and useful for a large number of currencies. The authors worked with five currencies for this project: Indian Rupees.

2.1 Existing System

Based on the observations of the articles, we can conclude that certain stages are critical in the current system architecture. First, we have image acquisition, which means that we must collect input as an image exclusively through the scanner, with no usage of a digital camera to capture the image in a real-time system.

Only the front section of the note is taken into account in the current architecture, not the back. The preprocessing procedure is the next step after that. Preprocessing, grayscale conversion, edge detection, and segmentation are the three to four sub phases involved.

2.2 Proposed System

The proposed method incorporates the benefits of the existing system while eliminating its drawbacks.

III. METHDOLOOGY

3.1 OVERALL ALGORITHM:

A. A simple scanner or digital camera will be used to capture an image of paper cash.
B. The acquired image is RGB, and it will be transformed to grayscale later.
C. The grayscale image will be edge detected in its entirety.
D. The three features of the paper currency will be cropped and segmented after the edges have been detected.
E. The features of the paper money will be obtained after segmentation.
F. The test image's properties are compared to the system's original pre-stored image.
G. If the numbers match, the money is genuine; otherwise, it is counterfeit.

4.2 CURRENCY RECOGNITION:

With the use of image processing, we can identify and isolate the cash denomination in currency recognition. We're extracting the features of the acquired image in this step. We are following the steps that have been laid out for us.

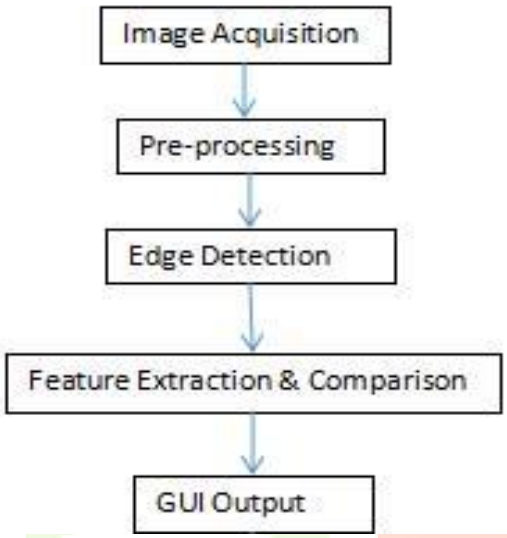

Figure 3.1: Flow diagram of the system

1. IMAGE ACQUISITION

Image acquisition is always the initial stage in the work flow sequence in image processing because processing is impossible without an image. After the image has been captured, it can be processed using a variety of approaches to perform the various visual tasks. Images can be acquired in a variety of methods, including using a camera or a scanner. All of the features should be retained in the obtained image.

2. PRE-PROCESSING

The primary purpose of pre-processing is to improve the visual look of photographs and data set modification. Image pre-processing, also known as image restoration, is the act of removing distortion, deterioration, and noise that occur during the imaging process. Interpolation is a technique that is commonly used for operations including zooming, rotating, shrinking, and geometric calculations.

3. EDGE DETECTION

The term "edge detection" refers to a set of mathematical approaches for finding points in a digital image where the image brightness abruptly changes or, more formally, has certain continuities. The sharp fluctuations in image brightness are usually grouped into a collection of curved line segments called edges. Edge detection is an image processing approach for detecting item boundaries within images. It works by sensing brightness discontinuities. In domains like image processing, computer vision, and machine vision, edge detection is utilised for image segmentation and data extraction.

4. IMAGE SEGMENTATION

The technique of segmenting a digital image into many segments is known as image segmentation. The purpose of segmentation is to make an image more intelligible and easier to examine by simplifying and/or changing its representation.

5. FEATURE EXTRACTION AND COMPARISON:

A unique type of dimensional reduction is feature extraction. When an algorithm's input data is too vast to handle and is suspected of being highly redundant, the data is transformed into a reduced representation set of features. Feature extraction is the process of transforming raw data into a set of features. It is assumed that the features set will extract the required information from the input data in order to accomplish the intended task using this reduced representation instead of the full-size input if the features extracted are correctly chosen.

OUTPUT

The result of the currency recognition will be provided in both text and audio formats. The text output will be shown in a GUI text box.

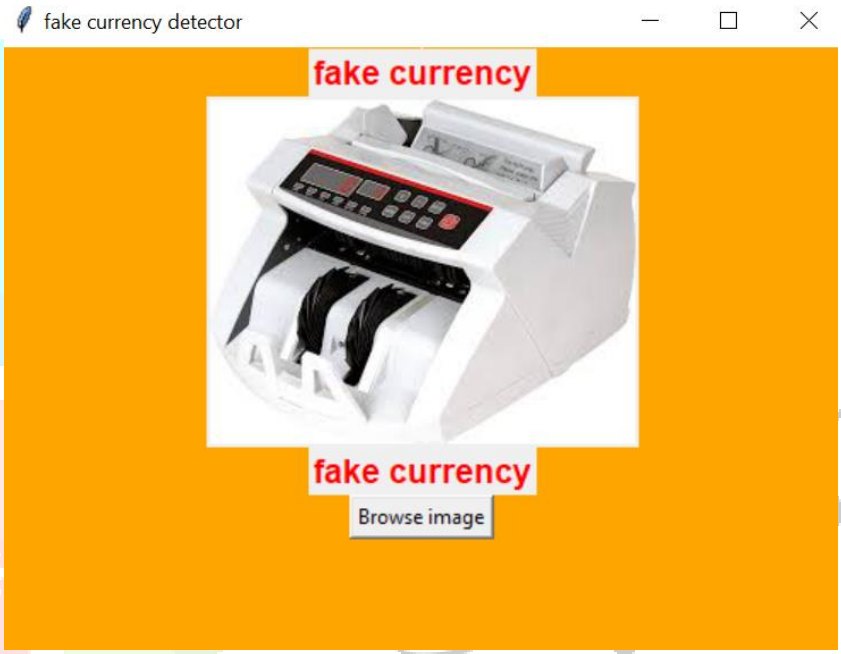

Figure 3.2: GUI output

Figure 3.3: Gray scale converted image

Figure 3.4: Image Segmentation

Figure 3.5: Edge Detection

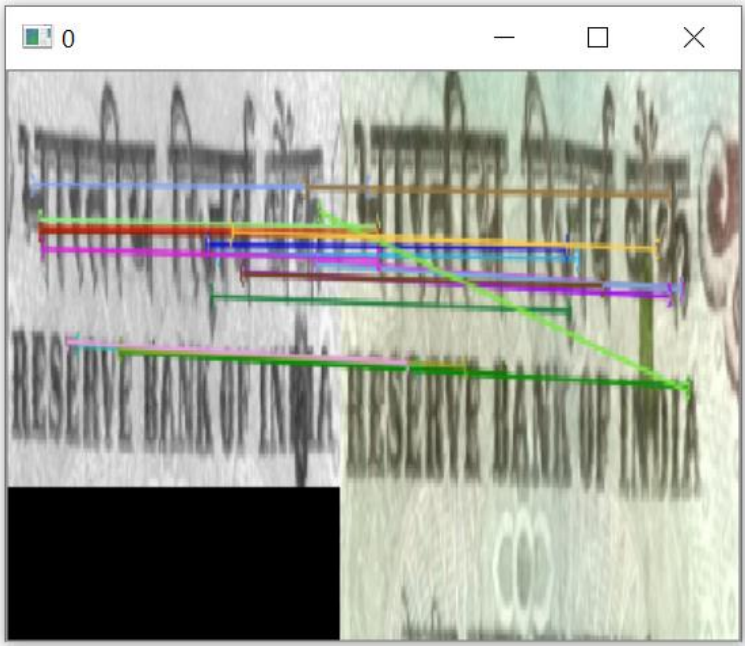

Figure 3.6: Haar feature extraction

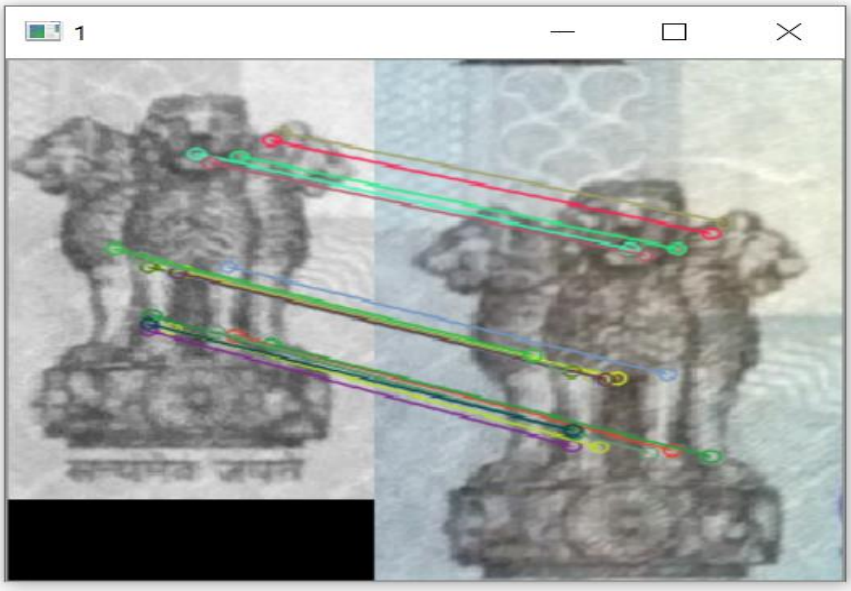

Figure 3.7: Haar feature extraction of emblem

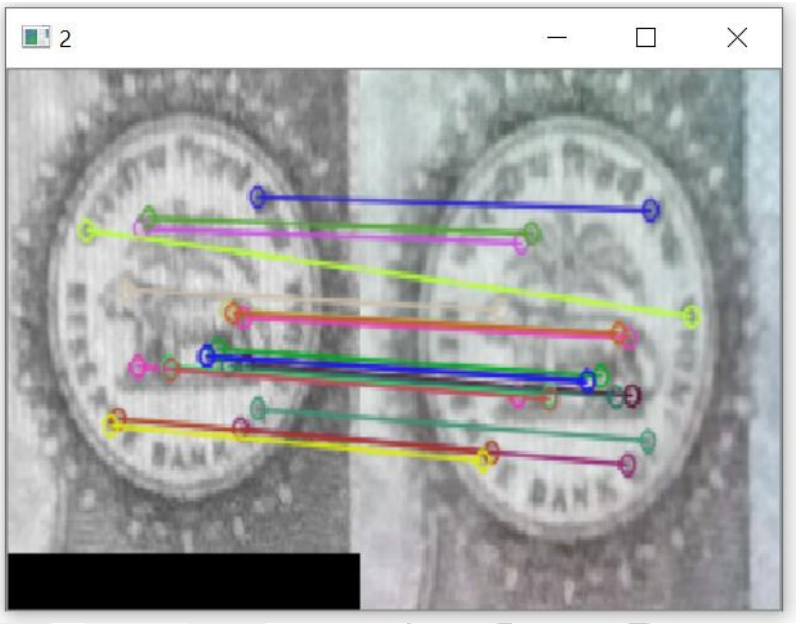

Figure 3.8: Haar feature extraction of RBI logo

IV.CONCLUSION

Analysis of the Currency picture is more accurate and efficient in terms of cost and time compared to previous procedures when employing digital image processing. For this analysis, OPEN CV software was used. The amount of study being done in this sector is growing all the time, and various image processing techniques are being used to produce a more accurate result. The proposed technique has been successfully used to extract a characteristic from Indian money photos.

Currency value recognition and verification will be based on extracted features from the image of the currency. The application-based system must be built to produce the desired outcome, whether it is a money picture or not.

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