

Automatic Fake Currency Detector Using Image Processing

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Abstract- *The advancement of colour printing technology has increased the rate of fake currency note printing and duplicating the notes on a very large scale. Few years back, the printing could be done in a print house, but now anyone can print a currency note with maximum accuracy using a simple laser printer. As a result the issue of fake notes instead of the genuine ones has been increased very largely. India has been unfortunately cursed with the problems like corruption and black money. And counterfeit of currency notes is also a big problem to it. This leads to design of a system that detects the fake currency note in a less time and in a more efficient manner. The proposed system gives an approach to verify the Indian currency notes. Verification of currency note is done by the concepts of image processing. This article describes extraction of various features of Indian currency notes. MATLAB software is used to extract the features of the note. The proposed system has got advantages like simplicity and high performance speed. The result will predict whether the currency note is fake or not.*

Keywords- Segmenting feature of currency, canny, financial system, genuine note.

I. INTRODUCTION

Digital image processing is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing. It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing.. Digital image processing allows the use of much more complex algorithms, and hence, can offer both more sophisticated performance at simple tasks, and the implementation of methods which would be impossible by analog means. Image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super pixels).

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. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain characteristics. Image restoration is different from image enhancement in that the latter is designed to emphasize features of the image that make the image more pleasing to the observer, but not necessarily to produce realistic data from a scientific point of view. Image enhancement techniques (like contrast stretching or de-blurring by a nearest neighbour procedure) provided by "Imaging packages" use no a priori model of the process that created the image. With image enhancement noise can effectively be removed by sacrificing some resolution, but this is not acceptable in many applications

II. LITERATURE SURVEY

In 2016 International Conference on Electrical Power and Energy Systems (ICEPES) Maulana Azad National Institute of Technology, Bhopal, India presented as Automatic recognition of fake Indian currency note is important in many applications such as automated goods seller machine and automated goods tellers machine. This system is used to detect the valid Indian currency note. The system consists of eight steps including image acquisition, grey scale conversion, edge detection, feature extraction, image segmentation, comparisons of images and output. Automatic machine more helpful in banks because banks faces the problem of counterfeit currency notes or destroyed notes. Therefore involving machine makes note recognition process simpler and systematic.

International Journal of Engineering Science and Innovative Technology (IJESIT) 4, July 2014 presented as An automatic recognition of fake Indian paper currency note using MATLAB. Manual testing of all notes in transactions is very time consuming and untidy process and also there is a chance of tearing while handing notes. Therefore Automatic methods for bank note recognition are required in many applications such as automatic selling-goods and vending machines. Extracting sufficient monetary characteristics from

the currency image is essential for accuracy and robustness of the automated system. This is a challenging issue to system designers. Every year RBI (Reserve bank of India) face the counterfeit currency notes or destroyed notes. Handling of large volume of counterfeit notes imposes additional problems.

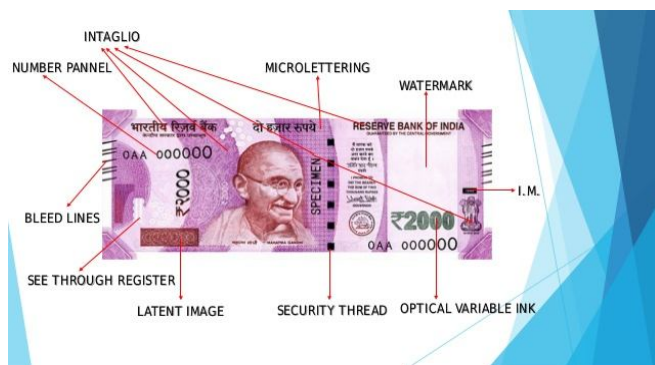
In 2015, Komal Vora, Ami Shah, Jay Mehta they presented The entire system is pre-processed for the optimal and efficient implementation of two dimensional discrete wavelet transform (2D DWT) which is used to develop a currency recognition system. A set of coefficient statistical moments are then extracted from the approximate efficient matrix. The extracted features can be used for recognition, classification and retrieval of currency notes. The classification result will facilitate the recognition of fake currency mainly using serial number extraction by implementing OCR. It is found that the proposed method gives superior results.

III. PROPOSED DESIGN

1. See Through Register: The small floral design is printed in the middle of the vertical band and next to watermark. The floral designed on the front is hollow and in back is filled up. The floral design has back to back registration. The design will seen as one floral design when seen against the light.

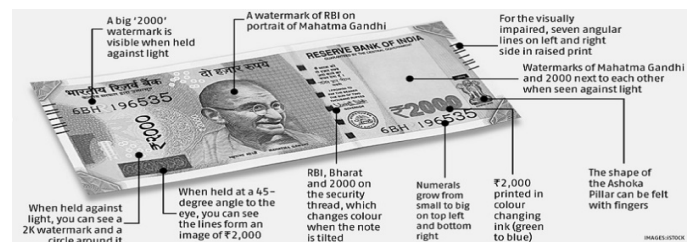


2. Water Marking: The Mahatma Gandhi watermark is present on the bank notes. The mahatma Gandhi watermark is with a shade effect and multidirectional lines in watermark



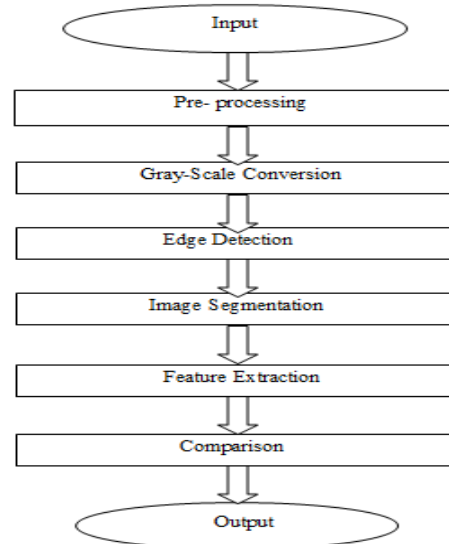
3. Fluorescence Number: panels of the notes are printed in fluorescent ink. The notes also have optical fibres. Both can be seen when the notes are exposed to ultra-violet lamp.

4. Security thread: The Rs.500 and Rs.100 notes have a security thread with similar visible features and inscription „Bharat“ (in Hindi), and „RBI“. When held against the light, the security thread on Rs.1000, Rs.500 and Rs.100 can be seen as one continuous line. The Rs.5, Rs.10, Rs.20 and Rs.50 notes contain a readable, fully embedded windowed security thread with the inscription „Bharat“ (in Hindi), and „RBI“. The security thread appears to the left of the Mahatma’s portrait.



IV. METHODOLOGY

System Architecture:



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.

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 pre-processing, 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. Image Adjusting is done with the help of image interpolation. Interpolation is the technique mostly used for tasks such as zooming, rotating, shrinking, and for geometric corrections. Removing the noise is an important step when image processing is being performed. However noise may affect segmentation and pattern matching. When performing smoothing process on a pixel, the neighbour of the pixel is used to do some transforming. After that a new value of the pixel is created.

Gray Scale Conversion: The image acquired is in RGB colour. It is converted into grey 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, e.g.: $0.3R + 0.59G + 0.11B$.

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. The points at which image brightness changes sharply are typically organized into a set of curved line segments termed edges. The same problem of finding discontinuities in 1D signals is known as step detection and the problem of finding signal discontinuities over time is known as change detection. Edge detection is a fundamental tool in image processing, machine vision and computer vision, particularly in the areas of feature detection and feature extraction. Edge detection is an image processing technique for finding the boundaries of objects within images. It works by detecting discontinuities in brightness. Edge detection is used for image segmentation and data extraction in areas such as image processing, computer vision, and machine vision.

Image Segmentation: Image segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super pixels). 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. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images.

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. Transforming the input data into the set of features is called feature extraction. 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.

V. CONCLUSION

This project proposed fake currency detection using image processing. In image pre-processing the image was cropped, adjusted and smoothed. Then the image converted into gray scale. After conversion the edges are detected. In edge detection used the sobel operator. Next the image segmentation is applied. After segmentation the features are extracted. Finally compared and find the currency original or fake.

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