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ABSTRACT

Indian is a developing country, Production, and printing of Fake notes of Rs.100, 500 and 1000 were already there but after the demonetization, the counterfeit notes of new Rs.50,200,500,2000 have also come to the light in very short time and which effects the country's economic growth. From last few years due to technological advancement in color printing, duplicating, and scanning, counterfeiting problems are coming into the picture. In this article, recognition and verification of paper currency with the help of digital image processing techniques is described. The characteristics extraction is performed on the image of the currency and it is compared with the characteristics of the genuine currency. The currency will be recognized and verified by using image processing techniques. The approach consists of a number of components including image processing, edge detection, image segmentation and characteristic extraction and comparing images. The desired results will be the text and voice output of the currency recognized and verified.

Keywords: *Currency Recognition, Image Processing Technique, Image Segmentation Character Extraction, Currency Verification.*

1. INTRODUCTION

Technology is growing very fast these days. Consequently, the banking sector is also getting modern day by day. This brings a deep need for automatic currency recognition. Many researchers have been encouraged to develop robust and efficient automatic currency detection machine [1]. An automatic machine which can detect banknotes is now widely used in dispensers of modern products like candies, soft drinks bottle to bus or railway tickets. The technology of currency recognition basically aims for identifying and extracting visible and invisible features of currency notes. Until now, many techniques have been proposed to identify the currency note. But the best way is to use the visible features of the note [2]. For example, color and size. But this way is not helpful if the note is dirty embedded in the Indian economy that even bank branches and ATMs are disbursing counterfeit currency. From petrol stations to the local vegetable vendor, everybody is wary of accepting banknotes in denominations of Rs.50, 200,500 and Rs.2, 000 (which were released after the *demonetization*) a majority of them are almost impossible to tell from genuine banknotes. The usual effect of counterfeit on the economy is inflation.

The only solution that is presently available for common man to detect recognize counterfeit currency is "Fake Note Detector Machine". This machine is mostly available only in banks which is not reachable every time by the average citizen. All these scenarios need a kind of solution for common people to judge a forged bank note and to refrain our currency from losing its value.

We apply here a simple algorithm which works properly. The image of the currency note is captured through a digital camera. Processing on the image is done on that acquired image using concepts like image segmentation, edge information of image and characteristics feature extraction [3-4]. MATLAB is the perfect tool for computational work and analysis. The image formats supported by MATLAB are JPEG, PCX, TIFF, PNG etc.[13][14]. Feature extraction of images is challenging task in digital image processing. It involves extraction of invisible and visible features of Indian currency notes. This approach consists of different steps like image acquisition, edge detection, gray scale conversion, feature extraction, image segmentation and decision making [5-6]. Acquisition of image is a process of creating digital images, from a physical scene. Here, the image is captured by a simple digital camera such that all the features are highlighted. The image is then stored for further processing.

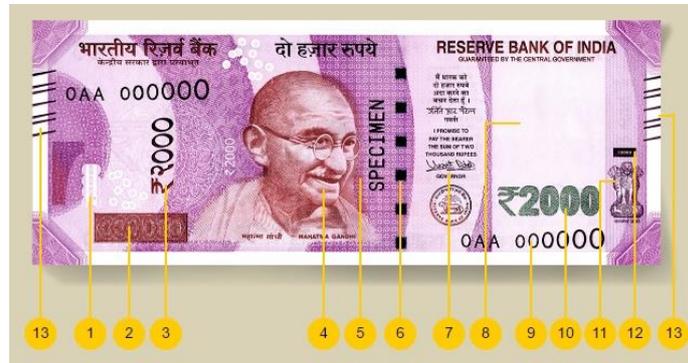
1.1. The process of Edge Detection: It is a basic tool in image processing. It is widely used in the area of feature detection and extraction. This process aim at identifying a point in a digital image at which image brightness sharply changes.

1.2. The process of Texture Feature Extraction: It is a tool in image processing. It is used in Haar feature extraction of the digital image depending on the pixel value which is applied to the KNN classifier.

2. RELATED WORK

Features of Indian Currency

There are too many features present in Indian currency which is decided by Reserve Bank of India. Figure 2.1 gives the idea about currency features of 1000 Rs note.



3. PROPOSED SYSTEM

The proposed system of this article consists of 2 parts

- Currency Recognition
- Currency Verification

3.1. Currency Recognition:

In currency recognition, we detect and isolate the denomination of the currency with the help of image processing. Here we are extracting the features of the acquired image. We are pursuing the followed steps.

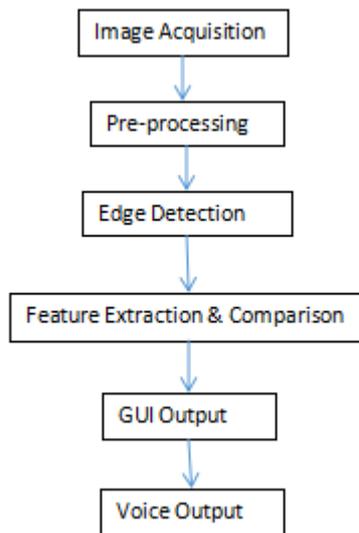


Fig. (a)-Flow Chart of Currency Recognition

3.1.1 Image Acquisition:

Performing image acquisition in image processing is always the first step in the work flow sequence because, without an image, no processing is possible. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks. There are various ways to acquire images such as with the help of camera or scanner. The acquired image should retain all the features [7].

3.1.2 Pre-processing:

The main goal of the pre-processing to enhance the visual appearance of images and improve the manipulation of data sets. Image pre-processing, also called image restoration, and involves the correction of distortion, degradation, and noise introduced during the imaging process. 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 processing is being performed. However, noise affects segmentation and pattern matching [7].

3.1.3 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 these continuities. The points at which image brightness changes sharply are typically organized into a set of curved line segments termed edges. 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 [8].

3.1.4 Image Segmentation

Image segmentation is the process 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

3.1.5 Feature Extraction and Comparison:

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 [7].

3.1.6 Output

The output of the currency recognition will be given in the format of text as well as the voice. The text output will be given in a text box of GUI.

3.2. Currency Verification

In currency verification, we check or authenticate whether the currency is valid or not. Here we extract the texture features (HAAR) of the currency and compare it with the stored HAAR features, then produce the output. For the above process, we follow steps.

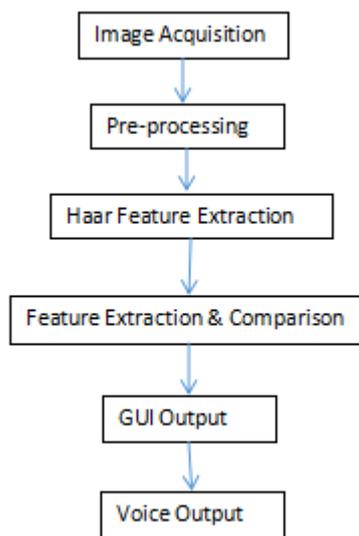


Fig. (b)-Flow Chart of Currency Verification

3.2.1 Image Acquisition:

Performing image acquisition in image processing is always the first step in the work flow sequence because, without an image, no processing is possible. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks. There are various ways to acquire images such as with the help of camera or scanner. The acquired image should retain all the features [7].

3.2.2 Pre-processing:

The main goal of the pre-processing to enhance the visual appearance of images and improve the manipulation of data sets. Image pre-processing also called image restoration and involves the correction of distortion, degradation, and noise introduced during the imaging process. 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 processing is being performed. However, noise affects segmentation and pattern matching [7].

3.2.3 Haar Features Extraction

Haar-like features are digital imaging features which are working only on image intensities (i.e) RGB values of each and every pixel in an image. A Haar-like feature considers neighboring rectangular regions at a definite location in a detection window, each region pixel intensities are summed up also calculates the difference between these sums. Then it is used to categorize subsections of an image. In this work image database with currencies are used. For all currencies the region of the denomination design is darker than the region of the see-through of Gandhi's portrait is a common observation. So a common haar feature for currency detection is a set of adjacent triangles that lie in plain regions. The region of these triangles is defined relative to a detection window that acts like a bounding box to the target object of the currency note [9].

3.2.4 Feature Comparison

The main goal is to compare the extracted features with the stored features which are stored in data sets which gives the result.

3.2.5 Output

The output of the currency recognition will be given in the format of text as well as the voice. The test output will be given in a text box of GUI.

Voice Output: The most widely used „Speech synthesis“ also called „Text to speech synthesis“ is the artificial production of human speech. A computer system used for this purpose is called a speech synthesizer and can be implemented in software. A text-to-speech (TTS) system converts text to speech in MATLAB [12].

4. RESULTS

In this section, results obtained after performing morphological image processing operation. An original image is read from the database. A captured image has dimensions 866×356, vertical and horizontal resolution 96dpi. The readout image shown in Figure 4.1 titled as “Image acquisition of 2000 rs note”.



Figure 4.1: Image Acquisition of 2000 rs note

Feature Extraction is a method of capturing the visual content of images for indexing & retrieval. Primitive or low-level image features can be either general features, such as extraction of color, texture, and shape or domain specific features. The results of the feature extraction are calculated and compared with the stored values gives the output of the Recognition Fig[4.2].

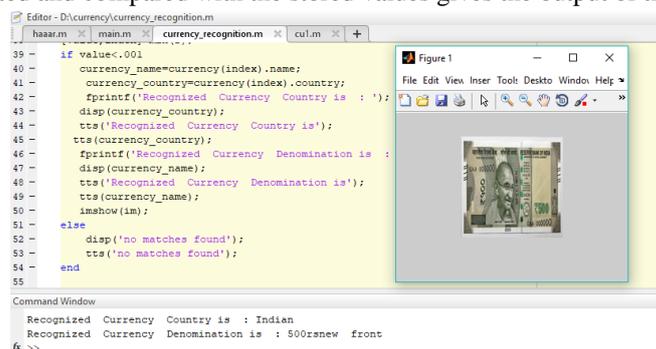


Fig.[4.5]-Recognized Currency

Haar features are extracted and stored for the comparison to give the verification result. shown in Fig[4.3],[4.4]

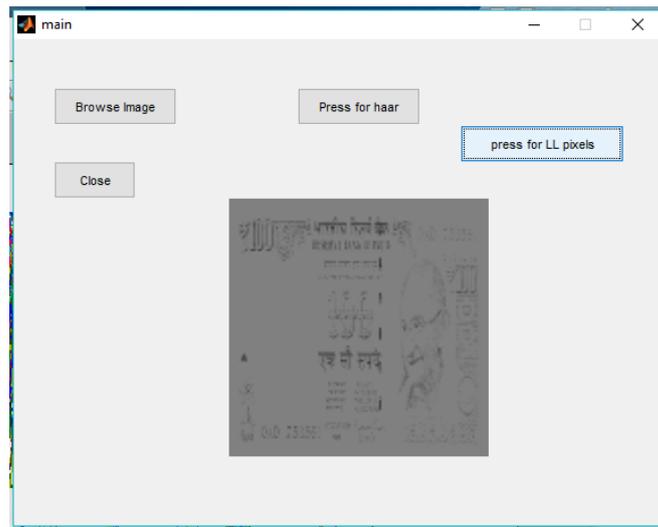


Fig [4.3]-Haar features extracted

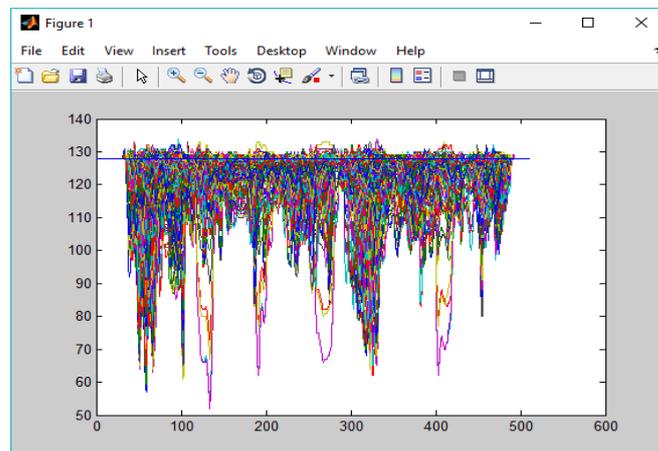


Fig [4.4]-Haar Wavelet

5. CONCLUSION AND FUTURE WORK

By using digital image processing, analysis of Currency image is more accurate as well as this method is efficient in terms of cost and time consuming compared to existing techniques. MATLAB Software use for this analysis. Day by day research work is increasing in this field and various image processing techniques are implemented in order to get a more accurate result. The proposed system is worked effectively for extracting a feature of Indian currency images.

Extracted features of currency image will be using for currency value recognition as well as for its verification. Application-based system shall be designed to get a proper result whether currency image is fake or it's genuine.

6. REFERENCES

- [1] Fake currency detection using image processing Tushar Agasti et al 2017 IOP Conf. Ser.: Mater. Sci. Eng. 263 052047
- [2] Trupti Pathrabe G and Swapnali Karmore 2011 Int. J. Comp Trends Tech 152-156
- [3] Tanaka M, Takeda F, Ohkouchi K and Michiyuk 1998 IEEE Tran on Neural Network 1748- 53.
- [4] Jahangir N, Ahsan Raja Chowdhury 2007 IEEE 10th Int. Conf. on Computer and Information Technology 1-5.
- [5] Rubeena Mirza, Vinti Nanda 2012 IFRSA Int.J. Computing 2 375-80
- [6] Junfang Guo, Yanyun Zhao, and Anni Cai 2010 Proc IEEE Int. Conf Network Infrastructure and Digital Content 359-363.
- [7] M.Deborah and Soniya Prathap "Detection of Fake currency using Image Processing". *IJISSET- International Journal of Innovative Science, Engineering & Technology*, Vol. 1, Issue 10, 2014.
- [8] Ingulkar Ashwini Suresh, "Indian Currency Recognition and verification Using Image Processing". *IRJET-International Research Journal of Engineering and Technology*, Vol.3, Issue-6, 2016
- [9] Brindha M "Object Detection using Haar-Like Feature Extraction " *International Journal of Computer Applications (0975 – 8887) Volume 153 – No 9, November 2016*

- [10].Srishti Royl”Simulation of Iris Comparison and Recognition System Using MATLAB”.SSRG International Journal of Computer Science and Engineering- (ICCREST’17) - Special Issue - March 2017
- [11]Azad Ghaffari” Preparing Figures in Matlab”Cymer Center for Control Systems and Dynamics - UC San Diego.Second Edition, January 2014
- [12]Mohd Bilal Ganai” Implementation of Text to Speech Conversion Technique”-International Journal of Innovative Research in Computer and Communication Engineering (An ISO 3297: 2007 Certified Organization) Vol. 3, Issue 9, September 2015
- [13] Rafael C. Gonzalez (University of Tennessee), Richard E. Woods (MedData Interactive) and Steven L. Eddins (The MathWorks, Inc.), in ‘Digital Image Processing Using MATLAB’ Second Edition, 2009 by Gatesmark, LLC.
- [14] Alasdair McAndrew, in ‘An Introduction to Digital Image Processing with Matlab, Notes for SCM2511 Image Processing 1’, School of Computer Science and Mathematics , Victoria University of Technology
- [15]P. Mohanaiah”Image Texture Feature Extraction Using GLCM Approach”International Journal of Scientific and Research Publications, Volume 3, Issue 5, May 2013 1 ISSN 2250-3153