FAKE CURRENCY RECOGNITION SYSTEM FOR INDIAN NOTES USING IMAGE PROCESSING TECHNIQUES

[#] T Naveen Kumar, [#] T Subhash, [#] SK Saajid Rehman, [#] N Hari Babu, [#] P Sai, [*] Dr. D. Regan ,

[#] UG Scholar, [*] Associate Professor, Dept. of ECE
Geethanjali Institute of Science and Technology, Nellore-AP

Abstract : In the point of economic stability of a nation, circulation and use of the fake currency notes pose major threats. Curbing the use of fake currency notes nowadays becomes digitalized with use of digital image processing algorithms. Counterfeit notes are printed with the utmost precision level to par with the original. So fake currency detection is a difficult task by simple visual inspection and use of digital image processing algorithms come to play a vital role. The conceivable arrangements are there, to utilize either chemical properties of the currency or to utilize its physical appearance for detection. The methodology exhibited in this paper depends on physical appearance of the Indian currency. Image processing algorithms have been embraced to expose the highlights of Indian currency notes, for example, security thread, intaglio printing (RBI logo) and distinguishing proof imprint, which have been received as security highlights of Indian currency. To make the framework increasingly robust and exact, the definitive score of all the three highlights has been intertwined to separate among genuine and fake monetary standards. Another parameter used to quantify the execution of the proposed framework is mean square error, which is roughly 1%. It might be embraced by the everyday citizens too, who frequently face the issue of separating among genuine and fake monetary standards.

Keywords : Fake currency, fake currency detection, currency image representation ,dissimilarity space, class learning.

I. INTRODUCTION

Counterfeiting cash represents the illicit replication of unique currency; thus fake currency is a illegal currency that has not been approved by the government. Reserve bank of India (RBI) is the main body which has sole obligation to print currency notes in India. But RBI faces the issue of fake currency notes once sifted and coursed in the market consistently. Prior fake currency detection was finished by utilizing chemical properties of the currency paper. With the approach of computerized reasoning and image processing, advanced image processing is as often as possible utilized for fake currency detection by separating properties from images that speak to the highlights of currency. Feature extraction is testing function as it includes the extraction of legitimately or in a roundabout way unmistakable highlights of Indian currency. Security highlights of a currency are basic for deciding genuine and fake monetary forms. Basic security highlights incorporate watermarks, idle images, security thread, intaglio, optically factor ink, smaller scale lettering and fluorescence [1]. In the proposed work, a methodology for fake currency detection is introduced that removes the general qualities, for example, shape, including the security thread, RBI logo and recognizable proof imprint from the image of the paper currency. Advanced Image Processing is a field that includes concentrating just as processing of images by removing properties from images and incorporates the acknowledgment of individual articles. Extricating properties for images of currency notes can get very unpredictable as it includes the extraction of some obvious and imperceptible highlights of Indian currency

II. LITERATURE SURVEY

Counterfeiting of cash is anything but another issue and has been available since the coinage of cash was begun by the Greek in around 600 B.C. Amid that time, the edges of coins were utilized to be cut off to get valuable metal and the metal was utilized to make fake coinage. Paper cash came inexistence in 1200s in China utilizing the wood of mulberry trees was utilized to profit. Amid that time, the watchmen used to care for mulberry woodlands and counterfeiting of cash were deserving of death. History reveals to us that counterfeiting of cash has been an old wickedness. In present day times the issue still wins and henceforth the utilization of various kinds of printing systems and consideration of various sorts of highlights in monetary forms has been going on, meaning to give a simpler method to identify imitations [2]. In any case, all the new contraptions utilized these days in banks are not open to non-specialists; thus the issue of recognizing fake cash stays in the general public. In this paper, we set forward a methodology that can possibly go about as a layman's instrument to identify fake cash. The utilization of computerized image processing for this reason gives us a conservative choice to make a strong fake cash identifying framework that can profit the general public all in all. The fake currency detection for Bangladeshi notes dependent on image processing has been finished by Ahmed et. al. [5]. Another methodology was proposed by Ogeila et. al. [6] for fake currency detection in electronic currency trade. The fake currency detection was of significant noteworthiness to the extent cash store in an ATM is concerned [7]. Another intriguing methodology was displayed by Santhanam et. al. [8] by including polarization idea and holographic detection strategies alongside image processing procedure.

III. PROPOSED METHOD

In this work, fake currency detection system for Indian Notes is proposed. Initially a database of various bonafide Indian notes of various denomination are prepared and test conducted for comparison between input image and database images. Firstly, the input currency images are preprocessed for conversion from RGB to gray for easy of further process, input image noisy images are median filtered for noise reduction. To keep the maximum features, DTCWT (Dual Tree Complex Wavelet Transform) are applied on the preprocessed images. This wavelet transform retains the maximum features of images without more losses. This wavelet transform comprises of a couple of DWT (Discrete Wavelet Transform) trees. In DTCWT, a genuine flag is connected to the two trees for decay and the yields of the both remade tress are found the middle value of toward the finish of the recreation stage. The DTWCT was created to defeat the absence of move in variance property of customary DWT. Next to the wavelet transform application, k-means segmentation algorithm for clustering the input images such as 200, 500 or 200 etc. is implementated and compare the features of the image and classified it as original or fake note.

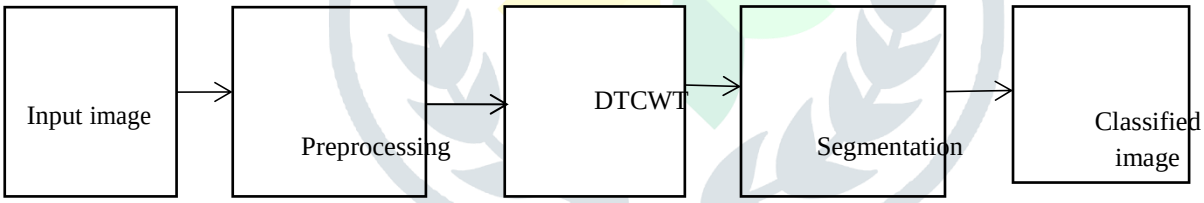

Fig. 1. Block diagram of Proposed system

Input image: The camera or scanner is used for image acquisition. The acquired image should consist of all the features.

Pre-processing: In preprocessing to upgrade the visual appearance of images and to improve the control of informational indexes. Middle channel is utilized for expelling the commotion while playing out the preprocessing. K means arrangement calculation is connected to have image segmentation.

Dual Tree Complex Wavelet Transform: Dual Tree Complex Wavelet Transform (DTCWT) comprises of a couple of DWT (Discrete Wavelet Transform) trees, each speaking to genuine and fanciful pieces of the transform. In both DWTs every one of the channels are genuine and these two genuine trees utilize two unique arrangements of channels. These arrangements of channels are together structured with the goal that the general transform is roughly analytic. The complexity of the transform can be seen from the recurrence reaction of wavelets. In DTCWT, a genuine flag is connected to the two trees for decay and the yields of the both remade tress are found the middle value of toward the finish of the recreation stage. The DTWCT was created to defeat the absence of move in variance property of customary DWT.

Segmentation: In computer vision, 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.

Classified image: In classification we have to compare the features of Indian currencies and classified it as original or fake note with help of MATLAB coding.

Here we are using k-means algorithm for clustering the objects in the notes.

K-means Algorithm: The k-means method aims to minimize the sum of squared distances between all points and the cluster centre.One can apply the 1-nearest neighbor classifier on the cluster centers obtained by k-means to classify new data into the existing clusters.This is known as Rocchio algorithm.

IV. RESULTS

The performance of the proposed system is evaluated with the parameters listed in the table. The basic image properties are used to evaluate the classification results in the system. Matlab 2013b used for the simulation of the proposed system on windows 10 operating system with 4 GB RAM and 2.95 GHZ.

Fig 2:- Input image

Fig 3 Objects In Cluster 1

Fig 4:Preprocessed Image

Fig 5 : Segmentated Image

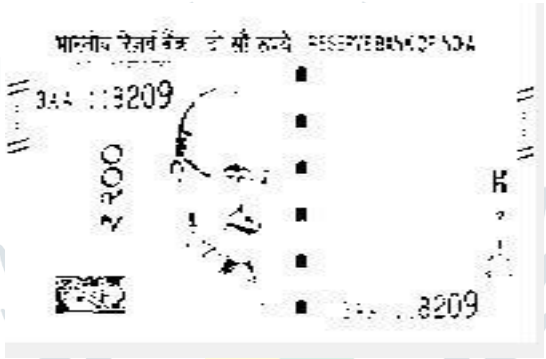

Fig 6. Segmented Image

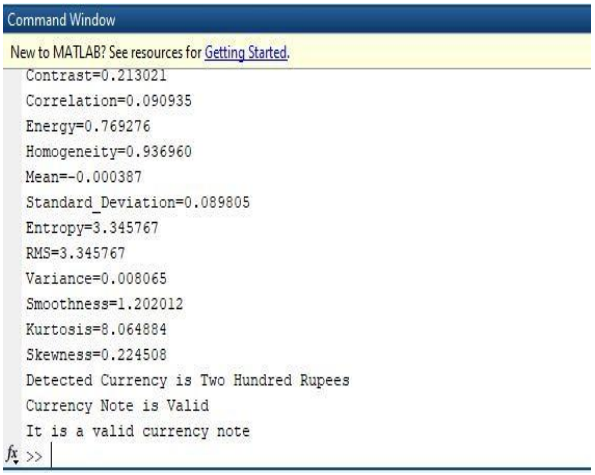

Fig 7:- Fake Currency Result

Fig 8:- Original Currency Result

V. CONCLUSION:

The proposed methodology demonstrates the productive technique for fake currency detection of indian currency notes dependent on physical appearance. By using digital image processing, analysis of currency image is more accurate as well as this method is in terms of cost efficient and time consuming compared to existing technique. MATLAB software is used for this analysis.

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