JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

FAKE NOTE DETECTION USING IMAGE PROCESSING AND ANN

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Abstract : In recent years, a lot of illegal counterfeiting rings manufacture and sell fake coins and at the same time fake note currency is printed as well, which have caused great loss and damage to the society. Thus it is imperative to be able to detect fake currency. We propose a new approach to detect fake Indian notes using their images. A currency image is represented in the dissimilarity space, which is a vector space constructed by comparing the image with a set of prototypes. Each dimension measures the dissimilarity between the image under consideration and a prototype. In order to obtain the dissimilarity between two images, the local key points on each image are detected and described. Based on the characteristics of the currency, the matched key points between the two images can be identified in an efficient manner. A post processing procedure is further proposed to remove mismatched key points. Due to the limited number of fake currency in real life, SVM is conducted for fake currency detection, so only genuine currency are needed to train the classifier.
Key words: Fake currency, fake currency detection, currency image representation, dissimilarity space, class learning.

I. INTRODUCTION

From ancient times, currency has played a very crucial role in human civilization. With the change of time, its presentation view has been evolved. Generally, the term currency is a medium of exchange or standard parameter or a value, which provides the facility of goods and services. Earlier, the medium of exchange was developed based on valuable things such as animals, precious heavy metal in way of ingots and later coins then credits, paper money and currently digital currency. The concept of money as a commodity was removed by Fiat money and promises the value stated on it. Cash is any item or record that is commonly revered for the installment of things and administrations and the reimbursement of cash owed in a specific financial setting or country. The cash of India is the Indian Rupee (INR). "Rupee" starts from the Sanskrit word rup or rupa significance silver. Sher Shah Suri (1486-1545) presented the absolute first rupee, which has a proportion of 40 copper pieces (Paisa) per rupee. The name is gotten from the Sanskrit word raupyakam, and that implies silver. In the eighteenth hundred years, confidential banks, for example, - the Bank of Bengal, the Bank of Bombay and the Bank of Madras started the most common way of giving paper cash. The Indian government was given an imposing business model on printing cash after the paper money demonstration of 1861.

The GOI has printed cash until RBI was laid out in 1935, expecting that responsibility. By 1938, only Rs 100, Rs 10, Rs 1,000 and Rs 10,000 were issued. RBI issued notes Rs 50, Rs 100, Rs 2000, Rs 5, Rs 10, Rs 500 and Rs 20, also known as banknotes. With the demonetization printing of Rs 5 note was halted. After the freedom, the ruling government of that time planned to remove the picture of George VI from the banknotes. The government has continued Rs 1 and also RBI also continued all different denominations including

Rs 5,000 and Rs 10,000. Rs 20 and Rs 50 banknotes were introduced in the year 1970. Currencies that were more than Rs 100 stopped in the year 1978. By 1987, Rs 500 notes were introduced trailed by Rs 1,000. Meanwhile, Rs 1 and Rs 2 notes were stopped in the year 1995.

The central government had approved the design of the currency which was recommended by RBI's central board. In India, currency notes are printed by three important presses which are- Currency Note Press in Nashik, the Bank Note Press in Dewas, the Bharatiya Reserve Bank Note Mudran (P) Ltd. at Salboni and Mysore and the Watermark Paper Manufacturing Mill in Hoshangabad. RBI issues Mahatma Gandhi series banknotes on which the picture of Mahatama Gandhi was printed on the front side of the note. In 1996, all lion capital series banknotes were replaced by the Mahatma Gandhi series and introduced notes of Rs 10 and Rs 500. In the year 2009, Rs 5 note printing was started. The denomination was written in 17 languages on each banknote. On which Hindi and English denominations were written on the front side and remaining on the backside which shows the diversity of India. The Indian currency denoted by a word such as 'Rs' or 'INR', is an abbreviation of the Rupee. In the year 2010, the design of Rupee was finalized by the Reserve bank of India (RBI). In the year 2012, the new ' ' symbols of the rupee were fused into Mahatma Gandhi series banknotes in sections of 10, 20, 50, 100, 200, 500 and 2000.

Demonetization is the process of withdrawing a particular note from the market. If RBI introduces any change in the banknotes then demonetization plays a very important role [192]. The old note will be replaced by the feature of a new note. Demonetization is necessary for every country because this is a direct or indirect way to remove black money from the market. However, this is the best approach by the government to remove black money from the market. Earlier, demonetization was occurred several times, the first time in January 1946, the second time in January 1978 and recently it is done in November 2016 In 1946 demonetization, Rs 1000 and Rs 10,000 notes were removed [188]. In 1978 demonetization, Rs 1000, Rs 5000 and Rs 10,000 were removed to eliminate the counterfeit note from the market. On 8 November 2016, the Indian Prime Minister Narendra Modi had announced to stop the circulation of Rs 500 and Rs 1000 notes of the Mahatma Gandhi series and also launched new Rs 500 and Rs 2000 note of the Mahatma Gandhi series .

II. LITERATURE SURVEY

1. In the year 1995, Takeda and Omatu [1] have provided a framework that improves the accuracy and speed of the U.S. and Japanese currency recognition. Authors have used two datasets such as series data and Fourier power spectra as an input of Neural Network. This design is generally using the subset of the main data which is obtained by the random masks. Here discussed the result between main data and subset data and also a comparison between the subset data to Fourier power spectra and time series. In the year 1996, Frosini et al. [52] have planned a model that perceives and checks the various nations' cash utilizing a brain network approach.0020This system gives a very appropriate result using the low-cost sensor.

In the year 1998, Leelasantitham et al. [88] have proposed a method for Thai currency detection based on the watermark feature. The watermark feature has been identified by correlation mapping to the border of the testimonial image. Then entered the position value of the watermark to the neural network for verification. This practical approach applies to the different types of value of a currency. After classification, the model is trained and gives 99% accuracy.

2. In the year 2000, Takeda [2] has designed the system for Euro currency recognition. They used the axis-symmetrical mask and two image sensors. First, the proposed system tested on a duplicate copy of currency then it applied to daily life currency. In the year 2003, Ahmadi et al. [5] have studied the reliability of US (dollar) paper currency. They used the Principle component analysis (PCA) for feature extraction and with the help of the model has mapped the data and variables. Aoba et al. [16] have also proposed the NN model for the US bill. They told that the NN model is based on three layers. The infrared image takes as an input in the NN model then visible all features of the bill. On that basis, calculated the acceptance and rejection rate of bills. Takeda et al. [153] have described the importance of the NN model in the field of banking application. This approach is based on the Thai bill. They said that take the bill as an image and get slab value in the form of pixel mask value. Then it merges with the non- masked value of the bill. At the last slab, the value provides input in the NN model and trains it. For the verification of the model, it applies to the DSP unit. Zhang et al. [180] have proposed the neural network (NN) model for RENMINBI (RMB) china currency identification. They explained this model gives the

best result if use variation in the value of a currency. As input in the NN model has used the different characteristics of a currency. The result of the experiment was satisfactory.

3. In the year 2004, He et al. [65] have provided a framework for Scotland currency validation based on optimization technique Genetic Algorithm (GA). Ahmadi et al. [6] have made sense of a strategy that depends on PCA which expands the dependability of the acknowledgment framework and the proposed framework perceives the six distinct kinds of bills of US dollars. First and foremost, the picture is caught by the Line sensor, then, the picture is extricated with the principal include and diminished the element of the picture utilizing the PCA strategy. It is utilized Direct Vector Quantization (LVQ) organization and results show that the steadfastness has been augmented up to 95% when the PCA part and LVQ vectors are taken accurately to perceive the monetary standards for Australian visually impaired individuals.

4. In the year 2006, Hinwood et al. [3] have introduced a device for blind people to identify the Australian currency. In the year 2007, Hassanpour et al. [64] have explained a novel technique for banknote recognition, which is based on currency characteristics such as color, size and texture. With the help of a histogram, input currency has been compared to the reference currency. The authors introduced the model design of paper monetary forms in view of the Markov chain idea. The proposed strategy can be utilized to distinguish the paper cash of various nations. With an illustration of paper cash for the preparation framework, however they tried north of 100 groups from an alternate country. The proposed framework perceives 95% right information.

5.In the year 2012, Further, Fan et al. [4] have depicted the data set end up obsolete rapidly and figure out that various assessments of a comparable substance exist in a data set connected with the money. García-Lamont et al. [55] have Authors have introduced a method to identify the Mexican bills through the texture feature such as color and texture. The authors have also suggested using this model for other countries' currency recognition.

III. PROPOSED METHOD

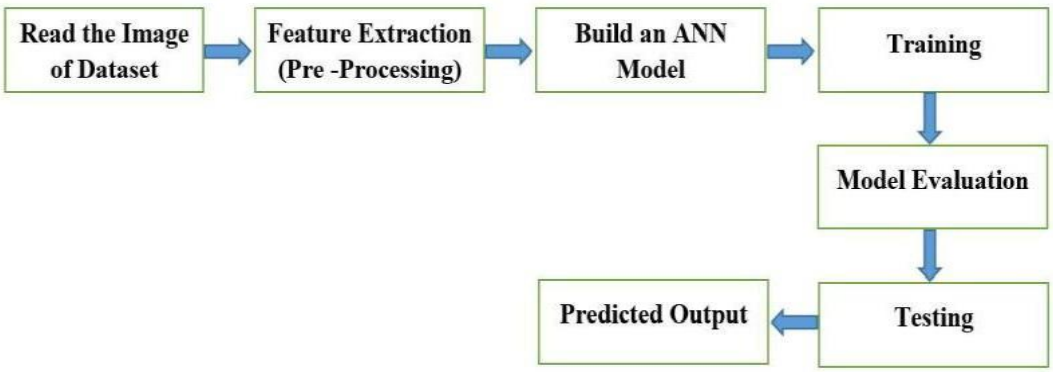

Figure1. Fake note identification flow diagram

In the computerized time of innovation, distinguishing counterfeit paper currency is undeniably challenging. Unlawful replication of unique cash is known as duplicating. The Public authority of India (GOI) has involved the term counterfeit cash instead of fake. This is an extremely provoking issue to distinguish counterfeit cash. Save Bank of India (RBI) is the main body that assumes sole liability to print paper money in India. Extricating security highlights from Indian money is generally significant for the exactness and heartiness of the computerized framework. Highlights extraction as variety, shape, surface, or setting are the main strategies of picture handling and example acknowledgment. Albeit numerous methods are accessible in the writing to figure out the example of paper cash, highlight extraction is the most widely recognized strategy as variety highlights, change highlights, shape highlights, surface elements, edge, and limit highlights. From the writing of the money ID, it is seen that there is no work on the recently evolved paper cash by RBI yet some little data in the writing are accessible for the Mexican banknotes, Euro, US Dollar connected with the nations to be specific Australia, Bangladesh and Cyprus, Sri Lankan. Further, it is found from the writing that the banknotes of every nation are demonstrated by removing the vital element that relies upon the identity of money. Thusly, the commitment of the efficient methodology is to perceive the cash by surface element investigation. In the accompanying figure 5.1, the conventional method for imaging examination in picture

handling is addressed. In the year 2010, Kekre et al. [79] have made sense of a strategy for picture recovery utilizing surface component extraction from GLCM.

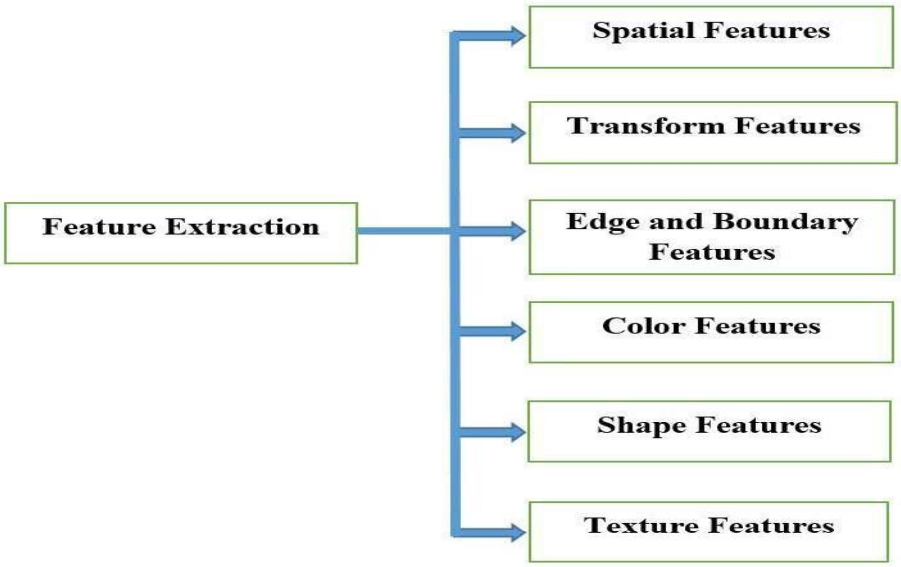

Figure 2: Several Kinds of Feature Abstraction

This segment momentarily explains on advanced Picture handling, design acknowledgment, and element extraction. Highlight extraction is the most fundamental piece of example acknowledgment that arrangements with dimensionality decrease. To manage gigantic data that contains repetitive information, the element extraction strategy is utilized to successfully lessen the information size without losing significant and applicable data. By and large, highlight contains data about variety, shape, surface, or setting [139]. The sort of writing has proposed a great deal of procedures for include extraction from pictures, some are recorded.

IV. RESULTS

This section discusses about the experimental setup for evaluating the effectiveness of the proposed approach along with the schema quality parameters used for the evaluation. Further, the results obtained with the proposed is compared with other approaches.

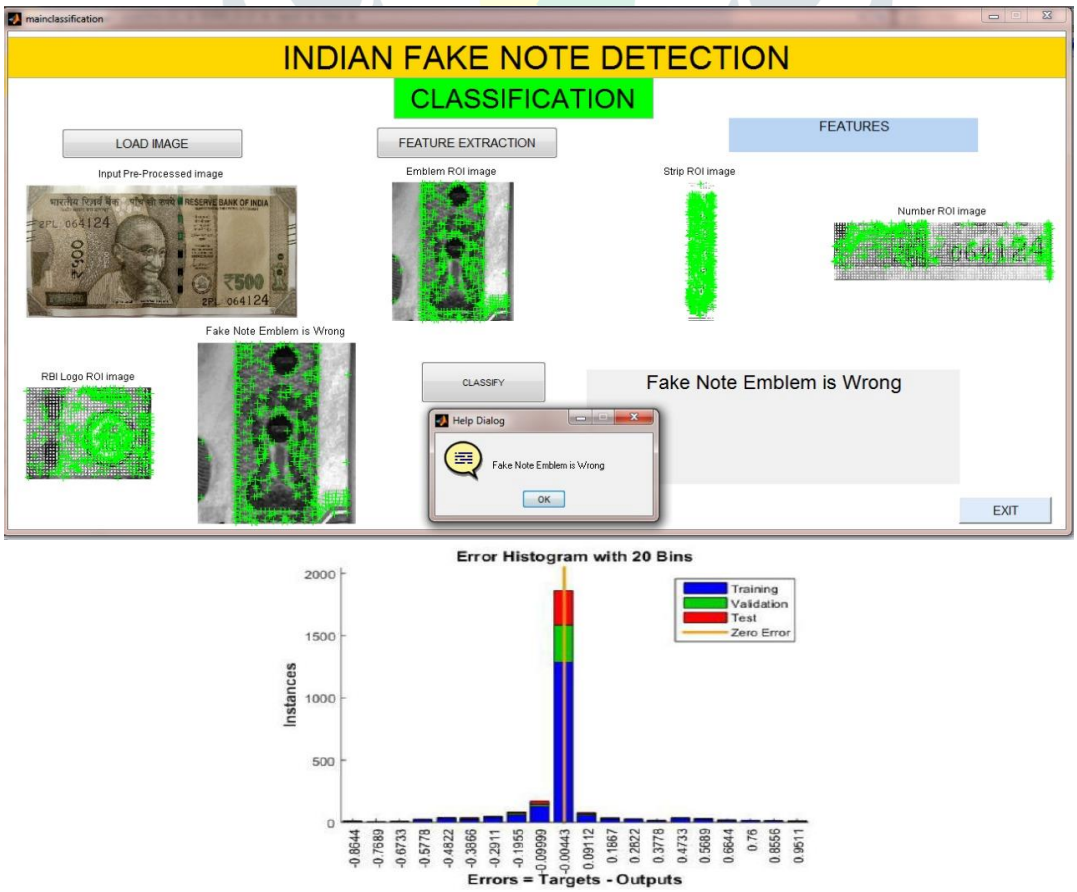

Fig3:Final result's of fake note

V. CONCLUSION

The Identification of fake notes in the Indian business market is a big challenge as there is no technique available in the shop of businessmen. The common person cannot identify the currency whether it is fake or real. In the present work, some of the methods have been implemented for the Identification of fake currency so that the crime of fake currency may be minimized. From the presented work, some of the major findings are summarized below: The entire work is based on the new arrival of Indian currency. The proposed approach of fake currency identification is based on an Image processing algorithm;

UML is used for designing of the activity model which is found that UML is an excellent modeling language for the recognizable proof of phony money and effectively carried out on recently sent off a note of Rs 2000 by an Indian Government; In different problems, MATLAB code is created and through a code, we got class portrayals without a doubt and phony Pictures of the money. This is a result of a choice of streamlined classes and traits; PCA is a fantastic methodology for the recognition of phony cash in the Indian situation as well as around the world; The model proposed in a second Chapter is found to be efficient and obtained the optimized results

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