

DETECTION OF INDIAN CURRENCY NOTES USING DEEP LEARNING TECHNIQUES

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Abstract: Currency duplication is very harmful for the economy of a particular nation and also it is global issue. We are developing a system through which we are able to identify those fake currency notes. In our system we mainly focus on the security features of currency note like intaglio, microlettering, number panel, bleed lines, latent image, security thread, optical variable link, etc. Previously, the fake currency identification system is developed with the helps various algorithms, but as per our survey the neural network algorithms (RNN) are more efficient than previously used algorithms. So, with the help of these security features and Recurrent Neural Network algorithm.

Keywords: Fake currency, security features, RNN.

INTRODUCTION

In the last eight years more than 3.53 lakh cases of counterfeit currency detection in India's banking channels is heighten according to latest government reports. The practice of counterfeiting became more refined with the arrival of paper currency. The Indian Government has taken a astonishing stride of demonetizing 500 and 1000 Rs. notes. Prime Minister Shree. Narendra Modi stated that one of the cognition for this policy was to counter the climbing menace of counterfeit Indian Currency notes. However, the Indian banks acknowledged an all- time peak amount of fake currency and also noticed an over 480% increment in doubtful transactions after demonetization, a first ever report on questioning credits ended in the wake of 2016 notes ban has discovered. The Reserve Bank of India (RBI) is the only one which has the singular authority to issue bank notes in India. The RBI being the highest monetary authority in the country prints the currency notes of all denominations from Rs.2 to 2000. Several security features have been published by the RBI so that the counterfeit notes can be detected by the general public. However, distinguishing a counterfeit note just by visual per lustration is not an easy task. Moreover, an average person is unaware of all the security features. Developing applications which can detect a currency note to be counterfeit by a camera image can help solve this problem. Deep learning models have witnessed a tremendous success in image classification tasks. Our model proposes a binary image classification task with two classes-fake or real. The Deep RNN model we have built helps us detect the counterfeit note without actually manually extracting the features of images. By training the model on the generated dataset, the model learns on it and helps us detect a counterfeit note.

LITERATURE SURVEY

In present scenario, the Indian government has announced the demonetization of all Rs 500 and Rs 1000, in reserve bank notes of Mahatma Gandhi series. Indian government has introduced a new Rs 500 and Rs 2000, to reduce fund illegal activity in India. Even then the new notes of fake or bogus currency are circulated in the society. The main objective of this work is used to identify fake currencies among the real. From the currency, the strip lines or continuous lines are detected from real and fake note by using edge detection techniques. HSV techniques are used to saturate the value of an input image. To achieve the enhance reliability and dynamic way in detecting the counterfeit currency [1]. Counterfeit currency is one of the threats which creates vice to nation's economy and hence impacts the growth worldwide. Producing forge currency or fabricating fake features in the currency considered to be a crime. Currency crime comes under the criminal law and known to be as Economical crime. Over the past few years many researchers have proposed various techniques to identify and detect forged currency. The serious problem has been come up with variety of solutions in terms of hardware related techniques, Image processing and machine learning methods. Advancements in printing and scanning technology, trading of material are some of the problems in germinating counterfeit currency. The study presents various fake currency detection techniques proposed by various researchers. The review highlighted the methodology implemented on particular characteristics feature with success rate of each method to detect counterfeited currency. Moreover, the study includes the analysis of widely acceptable statistical classification technique for currency authentication. The comparative analysis of Logistic Regression and Linear Discriminant Analysis (LDA) was performed to realize the better model for currency authentication. The study will benefit the reader in identifying most feasible technique to be implemented based on the accuracy rate [2]. Bank note identification is most important approach based on an image processing method. Many techniques and methods are studies involved in the classification of bank notes from different countries conducted experiments on separated image data sets of each country's. Deep learning is machine learning technique that analyze & learns the features of original note. The most important aspect is to find more essential features by using neural networks. In the era of big data where for any real world application, large amount of data has to be processed, deep learning is the superior techniques. In this research, we studied bank note of various countries by extracting its features in depth and analysis it using deep learning. Our system recommended a deep learning-based algorithm to detect Forged bank note through general scanners that can be used by persons to prevent personal monetary damages caused by fake bank note [3]. The one important asset of our country is Bank currency and to create discrepancies of money miscreants introduce the fake notes which resembles to original note in the financial market. During demonetization time it is seen that so much of fake currency is floating in market. In general, by a human being, it is very difficult

to identify forged note from the genuine not instead of various parameters designed for identification as many features of forged note are similar to original one. To discriminate between fake bank currency and original note is a challenging task. So, there must be an automated system that will be available in banks or in ATM machines. To design such an automated system there is need to design an efficient algorithm which is able to predict whether the banknote is genuine or forged bank currency as fake notes are designed with high precision. In this paper six supervised machine learning algorithms are applied on dataset available on UCI machine learning repository for detection of Bank currency authentication. To implement this we have applied Support Vector machine, Random Forest, Logistic Regression, Naïve Bayes, Decision Tree, K- Nearest Neighbor by considering three train test ratio 80:20, 70:30 and 60:40 and measured their performance on the basis various quantitative analysis parameter like Precision, Accuracy, Recall, MCC, F1-Score and others [4]. In today's world scenario, paper currency is economical in the sense that its face value is greater than intrinsic value. It is also more elastic and stable, paper currency can be counted quickly, it is easy to move and safe to store. These all are the main reasons because of which counterfeit currency recognition is crucial. Fake currency cannot be identified by human vision and due to this recognition of forged currency notes has become crucial problem because counterfeiters are using new and improved methods. The methods currently existing to determine whether the notes are real cannot be accessed by the common people and are also complex hardware-based methods. There are no applications or devices available through which fake currencies can be detected and identified easily by common people. The main purpose of the project is to identify Indian paper currency with a new methodical approach using Generative Adversarial Networks (GAN). In this system, the Indian currency note features would be primarily extracted using Convolutional Neural Networks (CNNs). The processed image data are then fed to a Generative Adversarial Network which helps to classify the currency as either real or fake. GAN consists of two main modules – Generator and Discriminator. The Generator generates fake currency images and the Discriminator identifies and labels the real and fake images) [5]. The paper currency counterfeiting is a big problem for the world. Almost every country has been badly affected by this which has become a very acute problem. The main purpose behind this study is to recognize Indian paper currency with this hybrid approach which is portable and making an application used on the go. In this study, the Indian currency note features will be extracted and will be stored in MAT files and then these stored features will be matched with the input paper currency to recognize whether it is genuine or duplicate. With this system, easy to recognize the currency note anywhere, anytime. The image processing is a way to improve the pictorial information of the image for the sake of machine or hardware perception. The currency notes will be recognized with the combination of both local binary patterns and principal component analysis. The LBP is significant progress in texture analysis and used for matching purpose. PCA is used for training purpose [6]. In this paper, a hybrid fake currency detection model was proposed and implemented on MATLAB. In the proposed model, three image processing algorithms were chosen to get enhanced results. The acquired comparison was tabulated [7]. In this paper, detection of fake Indian currency note is done by using image processing principle. This the low cost system. The system works for denomination of 100, 500 and 1000 for Indian currency [8].

SYSTEM ARCHITECTURE

In a proposed system, we are proposing experiment on genuine or real fake currency with limited set of supervised data. We are proposing a recurrent neural network based multimodal classes risk prediction model for limited notes with higher accuracy. We are going to solve accuracy issue in diagnosis of genuine or fake with accurate stage predictions. We will be building Recurrent neural network according to algorithm which will be trained on the given fake and original currency data set, and later can predict whether the given currency image is fake or original. In this we will be solving an image classification problem, which will give the class of input image. We are going to achieve it by training an artificial neural network on image data set of currency and make the RNN (Neural Network) to predict which class the image belongs. Recurrent neural network (RNN's) are widely used in pattern-recognition and image-recognition problems. We generated data-set of paper currency. The data-set is segregated into two types, original note and fake note (Figure 1). In this we have used 75% of the images in the data set for training and the rest 25% of the images for purpose of testing. We give the training images as input to our model and train the model. We compare the input with the dataset that is already available.

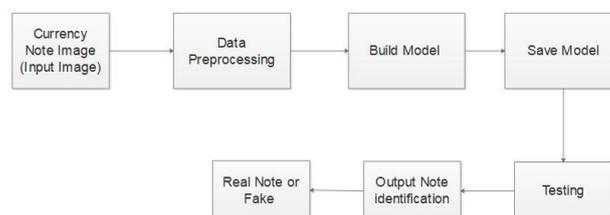


Fig -1: System Architecture Diagram

METHODOLOGY

Currency recognition is based on image processing techniques typically follows some essential steps such as image acquisition, preprocessing and lastly recognition of the currency.

- **Input as a Indian currency Note:-** We are providing input as a Indian currency note to our system.
- **Data Preprocessing**
 1. Create Dataset :- Creation of dataset.
 2. Resize Dataset :- After creating dataset (10gb) we are resizing it upto 160 to

170 mb to reduce the time detection process and to increase the accuracy.

3. Train Dataset :- We are going to train our data using Recurrent Neural Network.

- **Build Model :-** After preprocessing one model is generated of that particular inputted note.
- **Save Model :-** By saving our generated model we are supposed to use this model in other system also.
- **Testing :-** We are testing generated model once again sometimes it might be happen that it will give inputted note is 70% detected as real or fake. To overcome this issue we are testing model once again.
- **Identification and Result :-** After testing it will identify output and finally we will get the output as real.

CONCLUSION

It is proposed to design a system to detect fake Indian currency notes. The deep learning approach will be used to detect fake Indian currency notes. The system will improve the accuracy of detection of fake currency notes. It will overcome the drawback of existing system such as minor contents in the notes. It will also check the security feature in note such as security thread, script, signature etc.

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