

IDENTIFICATION OF INDIAN CURRENCY NOTES USING RECURRENT NEURAL NETWORK

¹Aniket Suryawanshi, ²Akash Toshniwal, ³Shruti Salve,
⁴Ruchita Shinde, ⁵K.V. Metre

Dept. of Information Technology
MET's Institute of Engineering
Adgaon Nashik -422003.

Abstract– The identification of fake currency notes is being developed through the focus on security features such as intaglio, micro lettering, number panel, bleed lines, latent image, security thread, optical variable link, etc. Previously, the fake currency identification system was developed with the assistance of various algorithms, but according to our survey, the recurrent neural network algorithms (RNN) are considered more efficient than the previously used algorithms. Therefore, the security features and the RNN algorithm are utilized in the development of the system for identifying fake currency.

Keywords: Fake currency, security features, RNN.



Published in IJIRMP (E-ISSN: 2349-7300), Volume 11, Issue 3, May-June 2023

License: [Creative Commons Attribution-ShareAlike 4.0 International License](https://creativecommons.org/licenses/by-sa/4.0/)



INTRODUCTION

According to the latest government reports, it has been observed that more than 3.53 lakh cases of counterfeit currency detection in India's banking channels have been heightened in the last eight years. The practice of counterfeiting has become more refined with the arrival of paper currency. An astonishing stride was taken by the Indian Government, with the demonetization of 500 and 1000 Rs. notes. It was stated by Prime Minister Shree. Narendra Modi that one of the cognitions for this policy was to counter the climbing menace of counterfeit Indian Currency notes. However, an all-time peak amount of fake currency was acknowledged by Indian banks, and an over 480% increment in doubtful transactions after demonetization was noticed. A first-ever report on questioning credits ended in the wake of the 2016 notes ban has been discovered. The singular authority to issue bank notes in India is held by the Reserve Bank of India (RBI). The currency notes of all denominations from Rs.2 to 2000 are printed by the RBI, being the highest monetary authority in the country. 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. Furthermore, all the security features are not known by an average person. The problem can be solved by developing applications that can detect a currency note to be counterfeit by a camera image. A tremendous success in image classification tasks has been witnessed by deep learning models. A binary image classification task with two classes-fake or real is proposed by our model. The counterfeit note can be detected by the RNN model we have built, without actually manually extracting the features of images. The model learns on the generated dataset by training, and it helps us detect a counterfeit note.

LITERATURE SURVEY

In the present scenario, the demonetization of all Rs 500 and Rs 1000 banknotes of the Mahatma Gandhi series has been announced by the Indian government. A new Rs 500 and Rs 2000 notes have been introduced by the Indian government to reduce illegal activity in India's fund flow. However, fake or bogus currency notes continue to circulate in society. The identification of fake currencies among the real ones is

the main objective of this work, utilizing edge detection techniques to detect strip lines or continuous lines in the currency. The HSV techniques are employed to saturate the value of an input image. The aim is to achieve enhanced reliability and a dynamic approach in detecting counterfeit currency [1]. The nation's economy and global growth are impacted by counterfeit currency, which is considered a threat. The crime of producing forged currency or fabricating fake features in the currency is considered to be committed. Various techniques have been proposed by researchers over the past few years to identify and detect forged currency. Solutions in terms of hardware-related techniques, image processing, and machine learning methods have been come up with to address the serious problem. Problems in germinating counterfeit currency include advancements in printing and scanning technology and trading of material. The study presents various fake currency detection techniques proposed by various researchers. The methodology implemented on particular characteristics features with the success rate of each method to detect counterfeited currency is highlighted in the review. The analysis of widely acceptable statistical classification techniques for currency authentication is included in the study. A 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 the most feasible technique to be implemented based on the accuracy rate [2]. Banknote identification is considered the most important approach based on an image processing method. Many techniques and methods are studied that are involved in the classification of banknotes from different countries, and experiments were conducted on separated image datasets of each country's banknotes. Deep learning is a machine learning technique that analyzes and learns the features of the original note. More essential features are found by using neural networks. In the era of big data, where large amounts of data have to be processed for any real-world application, deep learning is considered a superior technique. In this research, banknotes of various countries were studied by extracting their features in depth and analyzing them using deep learning. Our system recommends a deep learning-based algorithm to detect forged banknotes through general scanners that can be used by individuals to prevent personal monetary damages caused by fake banknotes [3]. The creation of discrepancies in the financial market through the introduction of fake notes, which resemble the original notes, poses an important challenge to the bank currency of our country. During the time of demonetization, a significant amount of fake currency was observed in the market. It is difficult for a human being to identify forged notes from genuine ones, despite various parameters designed for identification, as many features of forged notes are similar to original ones. An automated system is needed, available in banks or ATM machines, to discriminate between fake bank currency and original notes. To design such an automated system, an efficient algorithm is required that can predict whether the banknote is genuine or a forged bank currency, as fake notes are designed with high precision. In this paper, six supervised machine learning algorithms are applied to a dataset available on the UCI machine learning repository for the detection of bank currency authentication. Support Vector Machine, Random Forest, Logistic Regression, Naïve Bayes, Decision Tree, and K-Nearest Neighbor are applied by considering three train-test ratios, 80:20, 70:30, and 60:40, and their performance is measured based on various quantitative analysis parameters such as Precision, Accuracy, Recall, MCC, F1-Score, and others [4]. Counterfeit currency recognition is crucial due to the economical nature of paper currency, where its face value is greater than its intrinsic value. Fake currency cannot be identified by human vision, and hence the recognition of forged currency notes has become a crucial problem as counterfeiters are using new and improved methods. The current methods to determine the authenticity of notes cannot be easily accessed by the general public and are complex hardware-based methods. There are no readily available applications or devices through which fake currencies can be easily detected and identified by the general public. The main purpose of this 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 is then fed to a Generative Adversarial Network, which helps 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 problem of paper currency counterfeiting is a big problem for the world, and almost every country has been badly affected by it, making it a very acute problem. The main purpose of this study is to recognize Indian paper currency with a hybrid approach that is portable and can be used on the go. In this study, the Indian currency note features

will be extracted and 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, the currency note can be easily recognized anywhere, anytime. Image processing is used to improve the pictorial information of the image for machine or hardware perception. The currency notes will be recognized using a combination of both local binary patterns and principal component analysis. Local binary patterns are significant progress in texture analysis and are used for matching purposes, while PCA is used for training purposes [6]. In this paper, a hybrid fake currency detection model was proposed and implemented on MATLAB. The proposed model chose three image processing algorithms to achieve enhanced results, and the acquired comparison was tabulated [7]. This paper focuses on the detection of fake Indian currency notes using image processing principles. The system is a low-cost system that works for denominations of 100, 500, and 1000 for Indian currency [8]. In this paper, an efficient approach is introduced to extract the features of Indian currency notes and recognize it. The paper also contains the fake currency detection and authentication [9]. In this project they have identified the original rupees and fake rupees using structural similarity index method after that if the user given original image [10]. In this paper they studied image processing based currency recognition system [11].

PROBLEM STATEMENT

The advancement of color 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.

AIM & OBJECTIVES

- To design a system to detect the currency note easily.
- To Avoid Time Consuming process of detection fake currency.
- To develop Web-based app (software) for user interface.

MOTIVATION

Automatic identification of fake note is very crucial in some areas like banking, jewellery shops nowadays. This method is used to find whether the note is genuine or duplicate, by the automated system which is by convolution neural network, in intense learning. Intense learning shines in the task of identification and dividing the images over a huge data collection. The demonetization drive is a tramp to eradicate manipulation and black currency notes, but it badly fails to find the problems of counterfeit currency. A intense neural network is a mathematical model that works in a close trend to the neurons in our brain.

SYSTEM ARCHITECTURE

In the this system, an experiment on genuine or fake currency is being proposed with a limited set of supervised data. A recurrent neural network-based multi-model classes risk prediction model is being proposed for limited notes with higher accuracy. The accuracy issue in the diagnosis of genuine or fake currency is intended to be solved with accurate stage predictions. A recurrent neural network will be built according to the algorithm, which will be trained on the given fake and original currency dataset, and later used to predict whether the given currency image is fake or original. An image classification problem will be solved by training an artificial neural network on the image dataset of currency, and the RNN (Recurrent Neural Network) will be used to predict the class to which the image belongs. Recurrent neural networks (RNNs) are widely used in pattern recognition and image recognition problems. A dataset of paper currency was generated. The dataset is segregated into two types: original notes and fake notes (Fig 1). In this, 75% of the images in the dataset are used

for training, and the remaining 25% of the images are used for testing purposes. The training images are given as input to our model and the model is trained. The input is compared with the dataset that is already available.

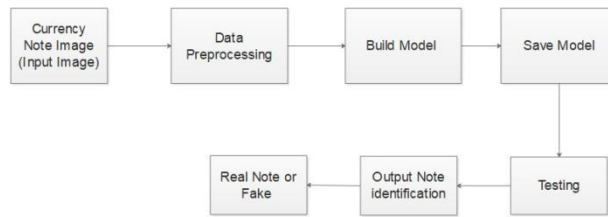


Fig -1: System Architecture Diagram

APPLICATIONS

- Hospital
- Banking
- Petrol pumps
- Malls

RESULT

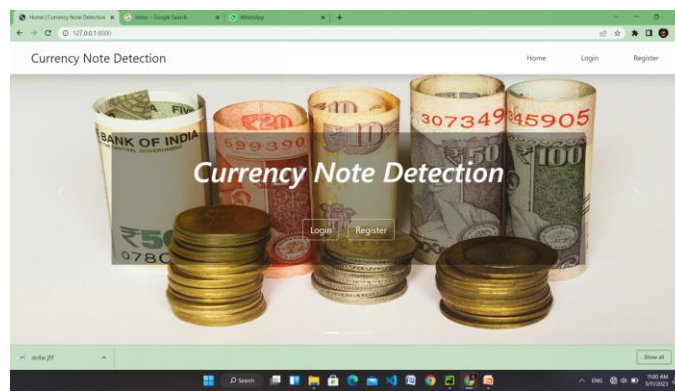


Fig -2: Home page

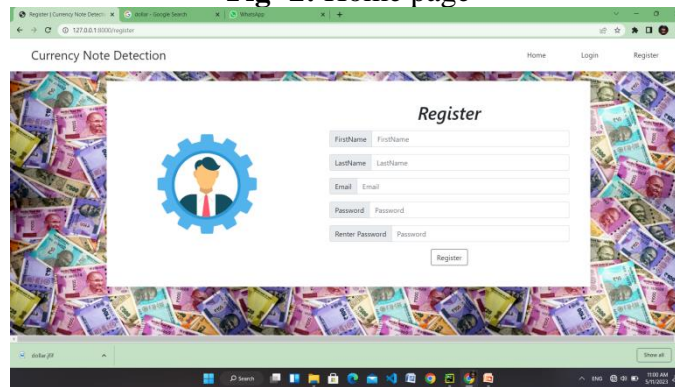


Fig -3: Registration Page

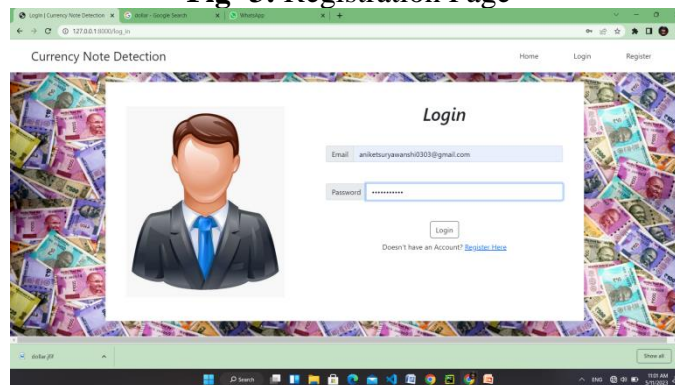


Fig -4: Login Page

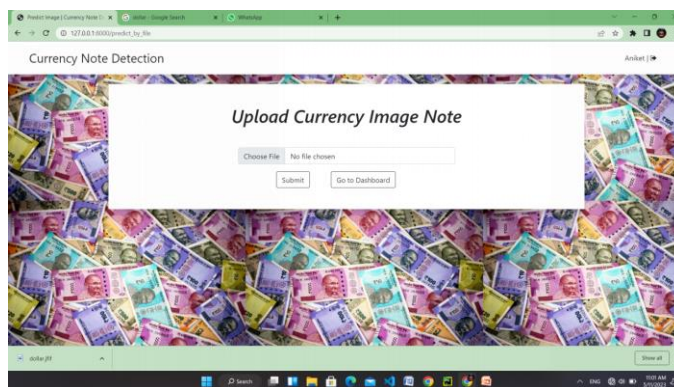


Fig -5: Dashboard

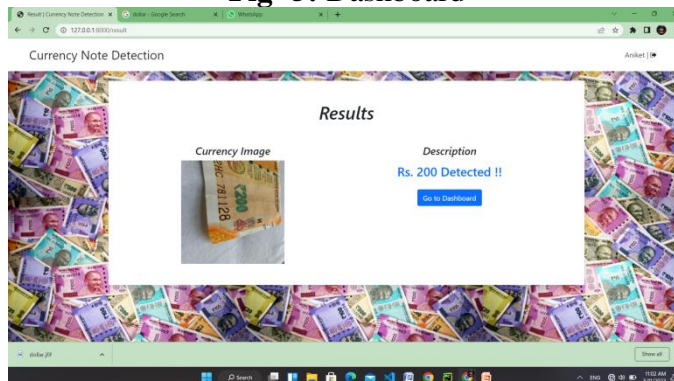


Fig -6: Uploaded Real Currency Note

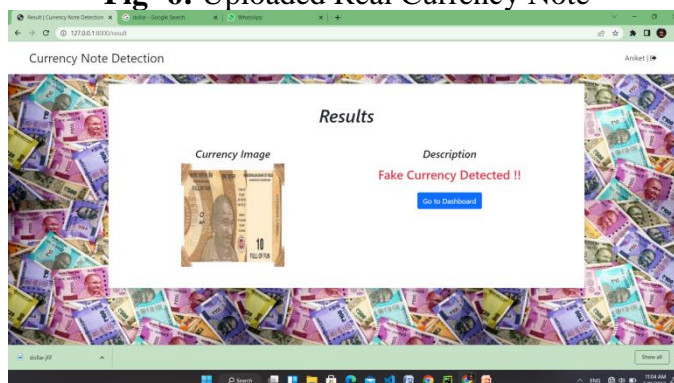


Fig -7: Uploaded Fake Currency Note

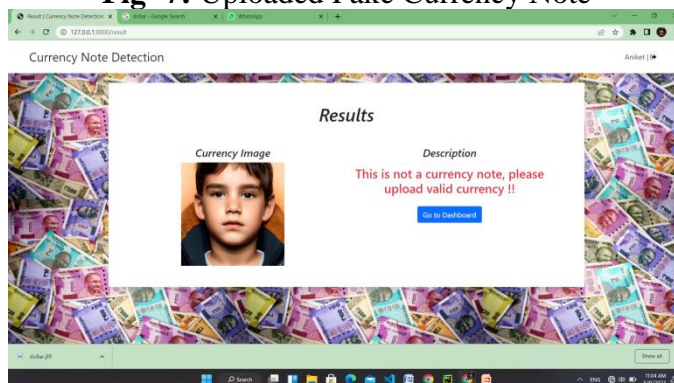


Fig -8: Uploaded Random Image

CONCLUSION

"Identification of Indian currency notes using Recurrent Neural Network" has yielded promising results, showcasing the effectiveness of the deep learning approach in accurately detecting and distinguishing genuine and fake Indian currency notes. The system successfully overcomes the limitations of existing methods by addressing minor contents in the notes and verifying security features like the security thread,

script, and signature. With improved accuracy above 94%, the developed system provides an automated solution for banks and individuals to prevent financial losses caused by counterfeit currency. Further research can focus on expanding the dataset and incorporating additional security features to enhance the system's performance and ensure its robustness, further strengthening efforts to combat counterfeit currency and maintain the integrity of the financial system.

REFERENCES:

1. Bogus Currency Authorization using HSV Techniques, International Conference on Electronics, Communication and Aerospace Technology ICECA 2017.
2. Analysis of Counterfeit Currency Detection Techniques for Classification Model, 2018 4th International Conference on Computing Communication and Automation (ICCCA).
3. Currency Identification and Forged Banknote Detection using Deep Learning, 2019 International
4. Detection of Counterfeit Currency using Image Processing Techniques, 2019 5th International Conference for Convergence in Technology (I2CT) Pune, India 2019.
5. CNN based Counterfiet Indian Currency Recognition Using Generative Adversial Network (2021).
6. Counterfeit currency detection using deep Convolutional Neural Network (2019).
7. Automatic Recognition of Fake Indian Currency Note (2016)
8. A Hybrid Fake Banknote Detection model using OCR, Face Recognition and Hough Features (2019).
9. Ms.Namrata Rathore, Mrs. Jyotsna Sagar “A Review on Fake currency detection using feature extraction (2019)”.
10. Pratiksha Ganjave, Rushikesh Markad, “Currency Detector for visually Impaired (Study of the system which identifies Indian Currency for Blind People, 2021)”.
11. Research on Fake Indian Currency Note Detection using Image Processing(2021).