

## AUTOMATIC CLASSIFICATION AND DETECTION OF COUNTERFEIT BANKNOTES BASED AI

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**Abstract:** On the basis of the look, people can easily differentiate banknotes and coin denominations. The coincurrencies can be identified visually impaired people based on touch, but the note currencies cannot be identified easily as it has similar texture and appearance, it can be challenging for visually challenged people to distinguish the currencies. Demonetization has boosted the availability of fake cash in recent years. People face difficulty in distinguishing between real and fake banknotes because they are unaware of these security elements utilized in modern currencies. Additionally, these fake cash mislead persons who don't have proper vision. So, it becomes important to identify the denominations and detect fake and real banknotes in order to avoid the problems caused due to these currencies or banknotes. This issue highlights the requirement for an accurate banknote identification model. By spotting the counterfeit currency, inflation and currency devaluation can be stopped. The suggested model aims to identify the denomination and categorize if a money note is real or fraudulent. The banknote denomination is determined using the machine learning algorithms.

**Key words:** Machine learning, Deep learning, Fake currency, Random Forest Classifier, Decision Tree Classifier, Algorithms, Banknote, Detection

### 1. INTRODUCTION

Today's financial transactions require a significant amount of paper money. Though the online payment platforms are widely used, people carry money for some emergency purposes. People who can see properly can distinguish the denominations of banknotes by looking at them say, for example, 10, 20, 50, 100, 500, 200, and 2000 Rupees. But visually impaired people face difficulty in differentiating the denominations as the notes are not visible to them clearly. Based on current stats of the population of Indian country, there are about 70 million visually impaired people.

These visually impaired face difficulty in determining whether the banknote is real or fake. Even people with good vision are not able to differentiate them. India has a higher rate of currency circulation, and one frequently hears news reporting about massive seizures of fake money.

The amount of counterfeit money being seized is not known in accurate figures. False money decreases the value of real money, affects consumers through inflation, which raises the price of many things owing to increased demand, and causes financial losses for businesses. To identify the correct denominations of the banknotes, there is a need to use machine learning based algorithms which perform operations and identify the denominations. To reduce the circulation and decrease the inflation there is a need to recognize the fake notes. This process is done with the help of Alexnet model which is an extension of convolutional neural network. If the output result is the fake note, then the use of it can be stopped and thus reduces the problem of circulation of counterfeit money.

### 2. LITERATURE REVIEW

Sawant et al. [5] used image processing techniques and minimum distance classifier techniques of scanned currency images. The research used stand color extraction, segmentation, feature extraction using Fourier Descriptors and identification of the shapes through the extraction of the unique identification marks and latent image numbers using the Minimum Distance Classifier. The method reported accuracy close to 90%.

Manikandan [6] proposed a currency recognition system for mobile application for visually challenged people based on currency localization techniques. The study used the Matlab image processing toolbox libraries. The system captured images with the mobile camera and uses morphological techniques, to identify the different currency notes. The currency recognition system provided an accuracy of 93% based on a data set of 165 images.

The authentication of Currency Notes using printing technique verification has also been shown to be a valid method. Roy et al. [7] verified the notes checking physical dimensions, paper quality, design, and the printing technique. A K-mean algorithm was used to check whether the cluster was linearly separable. The classification accuracy was also

checked using a Neural Network (NN)-based classifier Other techniques such as edge detection of grayscale images of the currency have proved to be satisfactory. A study by Prasanthi et al. [8] proposed a system which used six different characteristic features of the paper currency. The characteristics of the paper were extracted from these attributes. Comparison of notes was carried out with the original pre-stored image in the system. If the conditions were satisfied, then the currency was said to be genuine otherwise counterfeit.

### **3.SYSTEM ANALYSIS**

#### **3.1 EXISTING SYSTEM**

The existing system addresses the challenge faced by visually impaired individuals in distinguishing banknote denominations and detecting counterfeit currencies. With the rise of fake cash circulation following demonetization, the project aims to mitigate economic issues by implementing machine learning algorithms for accurate banknote denomination identification. Additionally, a deep learning method, The project recognizes the importance of preventing the circulation of counterfeit currency to curb inflation and currency devaluation. Through a diverse dataset, the system undergoes training and testing to evaluate the performance of each algorithm.

#### **LIMITATIONS OF EXISTING SYSTEM**

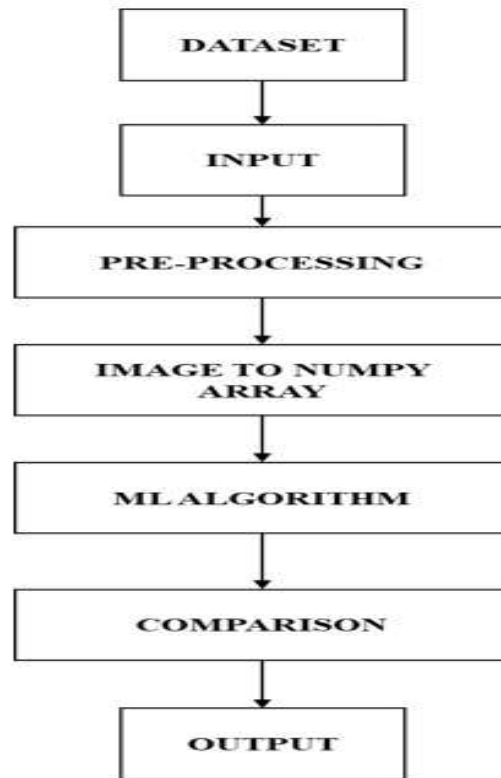
**Dependency on Visual Features:** The existing system heavily relies on visual features for banknote classification, which may pose limitations in scenarios where the physical condition of the banknotes or the image quality is compromised.

**Sensitivity to Environmental Factors:** Variations in lighting conditions and background textures during image capture could affect the model's performance, making it sensitive to environmental factors and potentially leading to misclassifications.

#### **3.2 PROPOSED SYSTEM**

It is a common name for operations with images at the lowest level of abstraction; both input and output are intensity images. The aim of preprocessing is to improve the image data that suppresses unwanted distortions or enhances some image features important for further processing. Image preprocessing methods use the considerable redundancy in images.

#### 4.SYSTEM ARCHITECTURE



#### 5.MODULES

##### Pre processing of Data:

The simplest way to get the data without over- fitting and under fitting is to pre-process the data- set. The main aim behind the data pre-processing is that to add a value to the base value which is the data-set generated. The main advantage of data pre-processing is to get a better training-set. For these purposes, we use Keras library for pre-processing the images.

##### Feature Extraction:

In this part, the network will perform a series of convolutions and pooling operations during which the features are detected. If you had a picture of a zebra, this is the part where the network would recognize its stripes, two ears, and four legs.

##### Result Analysis:

Here the accuracy of classification is shown among accuracy is the fake or real.

### Visual Representation:

Our final results are plotted as graphs which contains different fields such as CNN Training Model Accuracy. Pictorial representation is the best way to convey information without much efforts.

### 6.RESULT



### 7.CONCLUSION

Deep learning has gained tremendous success in image classification tasks. Our architecture which is based on Deep CNN works as feature extractor eliminating the need to apply image processing technique and manually checking the presence of security features in the note. The generated dataset has successfully helped conduct experiments and tried to mimic the real-world scenario. The application built will be useful to any common person to detect a counterfeit note. Future scope includes trying out new Deep CNN architectures to increase the accuracy of the model. Increasing the data-set, so that the model gets trained better and produce better results.

**FUTURE SCOPE:** The future scope for AI-based fake banknote classification and detection is quite promising. As technology advances, so does the sophistication of counterfeiters, making it imperative to employ cutting-edge solutions for detection and prevention. Overall, the future of AI-based fake banknote classification and detection lies in the continuous innovation and integration of advanced technologies to stay ahead of counterfeiters and ensure the integrity of financial systems.

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