# FAKE CURRENCY DETECTION USING MACHINE LEARNING

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## I.ABSTRACT

As technological advancements and scientific research have improved our daily lives, human-computer contact has grown to become a need. The use of these technologies will enable people who are blind to participate in some social activities. Therefore, this initiative has been started as a good start for the blind people in order to help them blend with their surroundings and society and also to be independent in conducting their daily routine chores. In order to enable blind persons to easily browse or use the gadget's functionalities to interact with others in society, there should be an assistive device for the visually impaired. For visually impaired people, cash recognition and fraudulent note detection is an effort to improve living conditions for blind people. Deep learning has overtaken all other study areas in recent years in popularity. The dataset is primarily trained using neural networks. This research endeavor can make use of a wide variety of models. Correctness of currency recognizing can be increased using these models. Such study techniques are, of course, consistent with what we would expect. In this study, we primarily use the Single Shot Multibox Detector (SSD) model, which is based on deep learning, as the framework. We then use the Convolutional Neural Network (CNN) model to extract the characteristics of paper money, allowing us to more precisely identify the denomination of the cash on both the front and back.

***Key Words*:**
Convolution neural network, Currency detection, Deep learning, Feature extraction, Image processing.

## II.INTRODUCTION

Based on the most recent studies, the World Health Organization estimated that there are around 285 million visually impaired persons globally, of which 246 million have some degree of visual impairment and 39 million are completely blind. Additionally, it was calculated that the Eastern Mediterranean Region accounts for 12.6% of global blindness. Due to the similarities in paper texture and size between the various categories, one of the biggest issues for those with visual impairments is their inability to distinguish paper money. As a result, technology's duty is to create a solution to this dilemma so that blind individuals can feel secure and confident in their financial interactions. Scanner-based and camera-based are the two current trends in the field of money recognition research. Systems based on scanners presumptively capture the entire piece of paper. These methods work well with money counter machinery. While camera-based systems rely on a camera to take a picture of the paper, which might only capture a portion of it. The scanner-based type is covered in the majority of connected literary works. Users with visual impairments should be able to take a picture of any area of paper with their smartphone and have the system identify it and display the cash value for them.

A currency recognition system is necessary for modern automation systems in the real world. It could be used for a variety of things, such as banknote counters, currency exchange machines, electronic banking, currency monitoring systems, helping the blind, etc. For blind and visually challenged people, understanding money is a crucial need.

They are unable to appropriately distinguish between various currencies. They can be duped by the others rather easily. Therefore, it is vital to create a system that recognizes the worth of currencies regardless of rotation, lighting, scale, and other elements that could degrade the currency's quality, such as noisy, wrinkled, and striped currencies.

## III.LITERATURE SURVEY

The paper provides a summary of various machine learning techniques for note fraud detection and currency recognition. The writers examine the various stages of currency recognition, such as feature extraction, categorization, and verification, and they emphasize the difficulties in identifying fake money.

The study discusses a variety of machine learning algorithms that have been applied to recognize currencies, such as convolutional neural networks, decision trees, support vector machines, and artificial neural networks. Other feature extraction methods covered by the authors include wavelet transforms, histograms of directed gradients, and local binary patterns.

The paper's evaluation of the shortcomings of present methodologies and recommendations for future research avenues for enhancing money recognition accuracy come to a close. Overall, the study serves as a valuable resource for academics and industry professionals interested in the use of machine learning to the identification of fake currencies.

## IV.SYSTEM IMPLEMENTATION

### A. EXISTING SYSTEM

Trading has, as far as we can tell, evolved over the past 10 years to become one of the tenets of social existence. As a result, it has emerged as a crucial element for effectively using the available resources, hence enhancing ability to advance and thrive. As a result, humans created money as a medium, which comprises of many different coins and currencies. Currency fraud causes numerous problems when doing transactions. Image processing is a fantastic method for both detecting the currencies and identifying the denominations of the currency. In earlier articles, all of the authors presented a variety of techniques for identifying, categorizing, and determining whether counterfeit cash exists using image processing algorithms such feature extraction, pattern recognition, FAST, SIFT, LBP, neural networks, recognition, etc. In addition to these algorithms, this article suggests a novel method for determining the currency's authenticity. To match or determine the worth of each one's currency, neural networks and pattern recognition are applied.

### B. PROPOSED SYSTEM

In order to train him to recognize a cash or object, our system has to be shown what it looks like. Before the system can recognize a Rs. 10, Rs. 100, or Rs. 1000 money note, we must educate it what they look like. The more labelled photos the system uses to train the classifier, the more accurate the system will become. Supervised learning is the name for this style of education. The collection of appropriate data for the model to train on is a crucial step before beginning the process of preparing the architecture of the system's model. In this context, data refers to a collection of photos from various categories that the system must be able to identify.

While a computer is capable of performing mathematical calculations, it is unable to People do. Therefore, we must translate the visuals into numbers for the system to comprehend. There are two typical approaches used in image processing for this:

#### B.1 GREY SCALE

The original image is transformed to a grey scale image, and then the computer gives each pixel in the image a value based on how dark it is. The computer receives this set of integers in an array and does additional calculations on them.

#### B.2 RGB VALUE

The computer determines the RGB value of each pixel, which is a mixture of 0 and 255 for red, green, and blue. They are transmitted in the form of an interpretation array.The same method will be used to transform a fresh image to an array when the computer interprets it, which will then compare the numerical patterns to the objects that are previously known. Then the computer assigns confidence scores to each class. The projected class is often the one with the highest confidence score.

#### B.3 MODEL GENERATION

Convolutional neural networks (CNNS) are one of the most widely used methods for increasing the accuracy of picture classification. It is a unique kind of neural network that functions similarly to a standard neural network, with the exception that it starts out with a convolution layer.

Instead of supplying the entire image as an array of integers, the image is divided into a number of tiles, and the system attempts to guess what each tile represents. After predicting all the tiles, the computer is now attempting to anticipate what is in the image. This enables the computer to do tasks in parallel and detects the object regardless of where it is located in the image.

## V.ARCHITECTURE

There are various processes involved in putting a machine learning system for detecting counterfeit money into place. Here is a description of the procedure:

### DATA COLLECTION

The initial stage is to gather a sizable dataset of both genuine and counterfeit banknotes. This collection ought to include several kinds of currency notes, in various denominations, from many nations. To ensure that the model can learn to distinguish between authentic and fraudulent notes, the dataset needs to be balanced and diversified.

### DATA PRE-PROCESSING

Preprocessing the data comes after the dataset has been gathered. To prepare the data for machine learning algorithms, this entails cleaning the data, eliminating any noise, and normalizing the data.

### FEATURE EXTRACTION

In this stage, we must take the preprocessed data and extract the pertinent features. These characteristics could consist of the note's size, shape, texture, security threads, watermarks, and other pertinent characteristics.

### MODEL SELECTION

To train our system, we must select a suitable machine learning model. Models like decision trees, random forests, support vector machines (SVM), and artificial neural networks (ANN) are among the many options available to us. The intricacy of the data and the needed level of system accuracy will determine which model is to be used.

### MODEL TRAINING

We train the chosen model on the preprocessed data in this stage. To train the algorithm, we use the labelled dataset of authentic and fraudulent notes. Based on the retrieved attributes, the model develops the ability to distinguish between authentic and false notes.

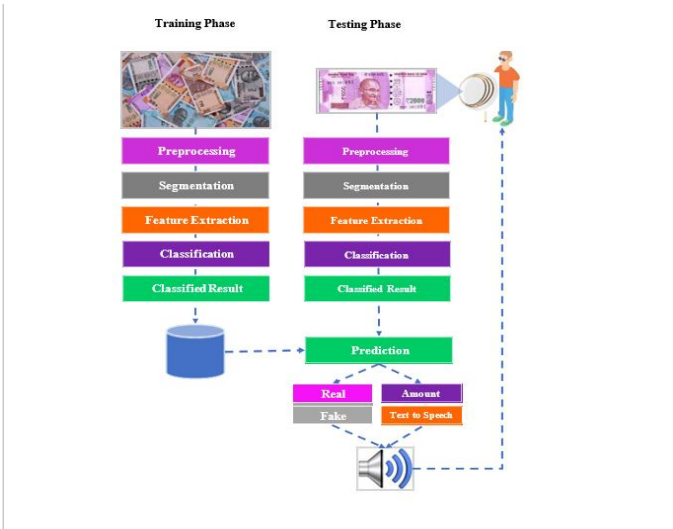
### MODEL EVALUATION

Using a test dataset, we assess the model's performance once it has been trained. The test dataset includes new instances of actual and false notes for the model. We assess the model's precision by seeing how well it distinguishes between authentic and fraudulent notes. Based on the testing and the entire process.

The model can be used in a real-world system after it has been trained and tested. The technology, which can scan money notes and evaluate their authenticity, may be a machine or a smartphone app.

### DEPLOYMENT

The model can be used in a real-world system after it has been trained and tested. The technology, which can scan money notes and evaluate their authenticity, may be a machine or a smartphone app.




## VI.CONCLUSION

This essay's primary goal is to conduct out money recognition. In actuality, it contains the currency's denomination. We tested four distinct models using the SSD framework, trained it, and then chose the best one. These models have an empirical methodology foundation. Additionally, the outcomes are satisfactory. Following currency recognition, we also outlined this paper's significant contributions. In order to extract features, we decided to build a 6-layer CNN model. Following feature extraction, we decided to train our currency detection algorithm using quadrilateral box1, with initial weights set to 1.0. Finally, the trained model could achieve 98% accuracy, demonstrating that it has thoroughly trained on our dataset. We can observe from the loss function that our

model did not overfit during training. The end research findings are acceptable, and they include identifying the currency range in the classification label, currency denomination, and currency front and back.

The accuracy of currency recognition might also be characterized as being extremely high. Following study, we discovered that our recognition speed and precision are higher when the currency is in a clean state over the full screen and the angles are parallel.

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