

# Fake Currency Detection Using Image Processing

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**Abstract-** Counterfeit currency notes are being mass produced at an accelerated rate due to the advancements in color printing technology. A simple laser printer may now be used by anyone to print currency notes with the highest level of accuracy. A few years ago, printing could only be done in a print shop. As a result, the problem of phone notes being used in place of real ones has greatly escalated. India has unluckily been plagued by issues like corruption and black money. Also a significant issue is money note counterfeiting. This prompts the development of a technology that more quickly and effectively detects fraudulent money notes. The suggested strategy offers a method for examining Indian currency notes. The principles of image processing are used to verify money notes. In this article, several properties of Indian currency notes are extracted. The advantages of the suggested system include its simplicity and excellent performance speed. The outcome will indicate whether or not the money note is phone.

**Keywords—** CNN, Fake currency, Open CV, Deep Learning.

## I. INTRODUCTION

There are around 50 distinct currencies in use today, all of which have completely unique appearances. For instance, the paper's size, color, and design are all different. It is a difficult task for the employees of money exchange companies like Forex Bank to identify between various currencies. They need to keep in mind what each currency's symbol is. They require a reliable and accurate system to assist them in their work because this could lead to issues (such as incorrect recognition). As we've already explained, the purpose of our system is to assist those who need to recognize various currencies and conduct business conveniently and effectively. A "Currency Sorting Machine" aids bank employees in identifying various types of currency. Image capture and recognition are the "Currency Sorting Machine's" primary operational procedures.

"Optical, mechanical, and electronic integration" is a technique that utilizes a combination of

multidisciplinary methods, such as high-speed image processing, currency anti-fake technology, and calculation, among others.

Despite the precision and effectiveness of the "optical, mechanical, and electronic integration" technique, staff members still need to remember various distinctive qualities and anti-fake labels for widely used currencies, and even though manuals are available for less commonly used currencies, manual recognition cannot be relied upon with complete confidence. Otherwise, Our system is based on image processing techniques that employ methods such as filtering, segmentation, and edge detection.

## II. LITERATURE REVIEW

[1] A Review on Fake currency detection using feature extraction Author: Deepak N R, Nikhat Yasmeen, Nishanth Fathima and Mohammed Aftab

Year: 2022

The global impact of counterfeit currency identification is a significant issue that affects the economy of nearly every country, including the United States. India. The potential agreements are to use either the synthetic properties of the currency or its outward appearance. The method used to communicate the study's findings depends on the participants' physical health. The design of Indian money The information that computations are being made has been received. Remove the features that have become recognised as being part of Indian currency, such as the security string, intaglio printing (RBI logo), and specific characteristics proof impressions. security features to achieve this, a system that is growing more robust and precise, the scores for all three highlights are conclusive.

[2] Title: A new approach to fuzzy logic analysis of Indian currency recognition.

Author: Sonia Sarkar and  
Arun Kiran Pal. Year: 2022

The development and enhancement of scanning and printing technology is accelerating quickly day by day in today's world. As a result, the economy starts to produce counterfeit money no logic.

This essay explores the application of fuzzy logic to Indian rupee notes. It has been created to recognise banknotes using an integrated system that uses a fuzzy-based classifier for security features. The critical security aspects have been considered based on the Indian denominations used as well as those included in foreign currency notes.

[3] Title: Currency Recognition System using Image Processing . Author: Nayna Ramvanshi, Harshada Shelke Damini Tile, VaishnaviBadgujar, Prof. S. N. Bhadane.

Year: 2022

Imagine that an ordinary person went to a bank to deposit money only to discover that part of the notes are phoney. In this scenario, he is responsible for the fake currency circulation problems and the difficulty in spotting fake currency. Because banks won't assist that guy Inflation and a decline in the value of real money are two repercussions of the use of counterfeit money on society. These effects disrupt our economy and expansion of some criminal authority, while also increasing the supply of money artificially. a decline in paper money's acceptance and losses. We are creating a machine learning and image processing algorithm that will extract the features of the currency and compare them to the features of the original note image. This approach is more affordable and can accurately convey the essential visual components of a note. People will therefore receive information regardless of whether the note image is authentic or a copy.

[4] Title: Counterfeit currency Detection based on AI.

Author: Prof. Deepika P. Patil, Girija Varma, Shweta Poojary, Shraddha Sawant, Aditya Sharma.  
Year: 2022

The usage of technology has increased significantly over the past few years, making it simpler for professionals to obtain cutting-edge printing equipment, which has led to the colour printing of currency to create fake notes around the nation. It is

necessary to create a system that detects the phoney currency in order to stop such unethical acts of printing counterfeit money. Counterfeit currency notes need to be identified before exchanges can take place in systems like money exchangers like ATMs and vending machines. comparable systems have been created in the past using techniques like image processing performed on the MATLAB platform and other comparable platforms. These techniques have several drawbacks, such as being time-consuming and less effective.

[5] Title: Fake Currency Detection Using Image Processing. Author: Mrs. Jyothi Sangogi, Ms. Prachi Patil, Ms. Anuradha Jadhav.

Year: 2022

Given its incredible potential uses, programmed recognition and acknowledgment of Indian currency notes has recently attracted a lot of study attention. Technology development produces a large number of automated systems that can do activities without the involvement of humans. One of these automated devices is a money deposit machine or an automatic ticket machine. Programmed recognition and acknowledgment of Indian currency notes The usage of technology has increased significantly over the past few years, making it simpler for professionals to obtain cutting-edge printing equipment, which has led to the colour printing of currency to create fake notes around the nation. It is necessary to create a system that detects the phoney currency in order to stop such unethical acts of printing counterfeit money. Counterfeit currency notes need to be identified before exchanges can take place in systems like money exchangers like ATMs and vending machines. comparable systems have been created in the past using techniques like image processing performed on the MATLAB platform and other comparable platforms. These techniques have several drawbacks, such as being time-consuming and less effective.

### III BACKGROUND

**3.1 Deep Learning:** The kernel, or collection of learnable parameters, and the limited receptive field are the two matrices that are produced when deep learning is used. Though lower in

size than an image, the kernel is deeper. By including multiple hidden layers between input and output layers, neural networks have achieved a significant level of complexity, enabling them to interpret and represent non-linear relationships. It uses big datasets and is heavily dependent on powerful computers. Relevant features are automatically extracted from images. It is a thorough learning process. One of the key benefits of deep learning is its capacity to build efficient models using enormous volumes of data. These models can then be used to complete challenging tasks like comprehending spoken language or recognizing items in photographs. CNNs are more effective than other types of neural networks in this area since they were developed expressly for processing image input. After that, the pooling layer reduces these traits into a smaller set of parameters. From the input data, the convolutional layer retrieves features. The effectiveness and learning potential of the network are enhanced as a result. The fully linked layer also has the ability to identify the relationships between these attributes, which enables the network to produce insightful outputs.

### 3.1.1 CNN

Convolutional neural network (CNN) is a particular kind of multi-layered neural network. It studies data that is organised in a grid and then picks out the important information. Utilizing CNNs has the enormous benefit of requiring little to no image pre-processing. Convolutions and pooling are used to break down images into their constituent parts, allowing for accurate identification of the images. You won't need as many hidden layers as you may expect because convolutions can handle a lot of the hidden layer searching for you. person is responsible for receiving the image data. The convolutional layer is the following layer, where the input data are merged. This layer is followed by the pooling layer, which pools the input data. Below that stratum is the An input layer, hidden layers, and an output layer make up a convolutional neural network. Any middle layers in a feed-forward neural network that have their inputs and outputs concealed by the final convolution and activation

function are known as hidden layers. The hidden layers of a convolutional neural network contain convolutional layers.

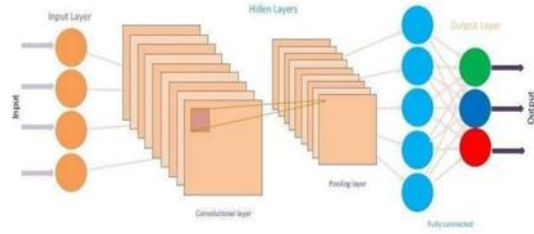


Figure 1: CNN layers architecture

### 3.1.2 DNN

Deep neural networks (DNNs) are artificial neural networks (ANNs) that include multiple hidden layers situated between input and output layers, and are capable of representing complex non-linear interactions similar to shallow ANNs. These networks are designed to take in inputs, process them through complex calculations, and output results to solve real-world problems such as classification, and are typically limited to feedforward neural networks. Nodes are tiny elements within the system that resemble neurons in the human brain. These nodes undergo a process when a stimulus is applied to them. Nodes are typically divided into layers, some of which are connected and labelled and others which are not. The number of layers the system needs to process between input and output determines how complex the task is. The more layers the system has to process, the deeper the network is considered. The Credit Assignment Path (CAP) index is a useful metric that determines the number of levels required for the system to accomplish the task. If the CAP index is greater than two, the neural network is considered deep.

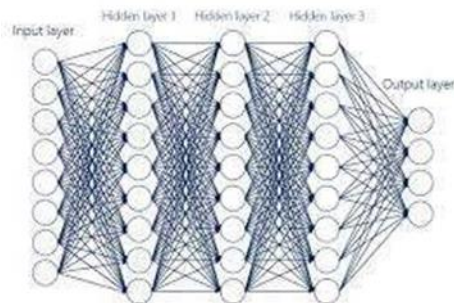


Fig 2: Deep Neural Network Model

### 3.1 Image processing:

Digital image processing involves the utilization of algorithms and mathematical models to process and analyze digital images, with the goal of improving image quality, extracting useful information from images, and automating image-related operations. By using computer-based techniques to manipulate and analyze images, digital image processing has numerous applications in areas such as medical imaging, remote sensing, robotics, and more.

#### 3.2.1 Open CV

Computer vision has always been a passion for machine learning aficionados. Practical activities using computer vision necessitate a foundational understanding of image processing. The stages of computer vision applications that involve image processing include pretreatment, deep learning modeling, and post-processing. Compared to image datasets, video datasets make considerable use of image processing. With the number of image and video data increasing along with the demand for digital solutions, image processing plays a significant role in the deep learning space. One of the most well-known open-source Python libraries created specifically for computer vision is called OpenCV. Users may do image processing with just a few lines of code thanks to the modules and methods offered by OpenCV. In this course, we go over various OpenCV image processing methods using practical Python routines.

## IV.METHODOLOGY

Based on the following processes, the proposed system provided a novel way for image processing:

1. Picture security
2. Pre-handling
3. Picture restriction.
4. Highlight removal.
5. Coordinating the layout.
6. Limit values Examination.

### IMAGE SECURING:

Image securing is the process of obtaining an image using a device, and the produced picture is stored for future use. Here, a sophisticated web camera was used to take the photo.

Before taking any pictures using a web camera, it is important to develop a functional code for it.

Once the code is created, the web camera can be configured to capture a specified number of images in either color or grayscale, based on the settings provided in the code.

### PRE HANDLING:

Pre-handling of images is done to enhance some image details that are important for subsequent planning and research. The size of the picture is reduced and any noise that might have appeared in it during capture is eliminated during photo pre-handling. Resizing: By using the Python function "imresize" the size of the image is reduced. Removing clamour: After capturing an image, it is common to observe distortion and noise. Therefore, it is essential to apply image processing techniques to eliminate such noise and enhance the image quality.

### PICTURE LIMITATION:

When a web camera takes a picture of money, foundation is often present underneath the cash. In order to prepare a picture and get the best results, the foundation must be removed while maintaining the integrity of the currency image. Edge recognition and sweep line computations in Python can be used to achieve this.

### HIGHLIGHT EXTRACTION:

It is possible to isolate the elements from the available image using a highlight extraction technique, and these elements are then compared to known elements to spot phoney currency and other irregularities.

### LAYOUT COORDINATING:

The layout coordinating approach is used to identify the type of money. If the format and the amount of money match, the layout coordination computation will shift the format onto the available image and return the incentive as true; otherwise, the value will be false. Cash can be effectively recognised by this section.

### EXAMINATION WITH LIMIT VALUES:

Once all the features of the currency note have been extracted through computations, they are compared to edge values using the Limit system, where a range is set and the obtained results are

evaluated to determine if they fall within the range or not.

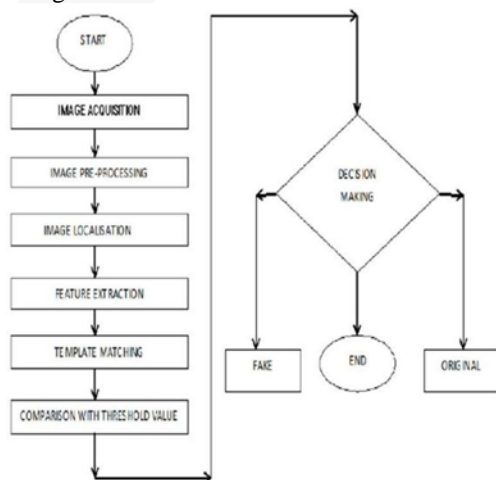


Fig3: Flowchart of Proposed System

## V. CONCLUSION

Employing image processing for the identification of counterfeit money. The image processing algorithm can extract various features of a currency note, including the serial number, security thread, identification symbol, and Mahatma Gandhi picture. A picture is acquired at the start of the process, and each extracted feature's intensity is computed at the end. Despite the presence of scribbles on a memo, the algorithm utilized in this technique is capable of extracting features from it, and has proven to be effective with the newly introduced denominations of 500 and 2000. To boost the speed of detection, the proposed system can alternatively be implemented in hardware utilising the appropriate CPU. It is also feasible to offer an automated system for purchasing train tickets. that includes money detection as one of its features.

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