

# DETECTION OF FAKE BANK CURRENCY USING MACHINE LEARNING ALGORITHMS

NUJELLA RAVI KUMAR<sup>1</sup>, K. VENKATESH<sup>2</sup>

1.PG STUDENT, D.N.R. COLLEGE, P.G. COURSES (AUTONOMOUS), BHIMAVARAM-534202.

Email id: [kumar888670@gmail.com](mailto:kumar888670@gmail.com)

2.ASSISTANT PROFESSOR IN NAME DEPARTMENT OF MASTER OF COMPUTER SCIENCE, D.N.R. COLLEGE, BHIMAVARAM 534202.

Email id: [kornalavenkatesh@gmail.com](mailto:kornalavenkatesh@gmail.com)

## ABSTRACT

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 note 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 we are using CNN algorithm on dataset available on UCI machine learning repository for detection of Bank currency authentication. To implement this we have applied machine learning algorithms are measured their performance on the basis various quantitative analysis parameter.

## 1. INTRODUCTION

In recent years, due to the explosive growth of digital content, automatic classification of images has become one of the most critical challenges in visual information indexing and retrieval systems. Computer vision is an interdisciplinary and subfield of artificial intelligence that aims to give similar capability of human to computer for understanding information from the images. Several research efforts were made to overcome these problems, but these methods consider the low-level features of image primitives. Focusing on low-level image features will not help to process the images. Image classification is a big problem in computer vision for the decades. In case of humans the image understanding, and classification is done very easy task, but in case of computers it is very expensive task. In general, each image is composed of set of pixels and each pixel is represented with different values. Henceforth to store an image the computer must need more spaces for store data. To classify images, it must perform higher number of calculations.

For this it requires systems with higher configuration and more computing power. In real time to take decisions basing on the input is not possible because it takes more time for performing these many computations to provide result. In [1], has discussed extraction of the features from Hyper Spectral Images (HSI) by using Convolutional Neural Network (CNN) deep learning concept. its uses the different pooling layer in CNN for extraction of the feature (nonlinear, Invariant) from the HIS which are useful for perfect classification of images and target detection. It also addresses the general issues between the HSI images features. In the perspective of engineering, it seeks to automate tasks that the human visual system can do. It is concerned with the automatic image extraction, analysis and understanding useful information with images. In last decade, several approaches for image classification was described and compared with other approaches. But in general image classification refers to task of extracting information from the image by labelling the pixels of the image to different classes. It can be done in two ways one is

Supervised classification, Unsupervised classification. In [2], has discussed the use of the Unsupervised learning algorithm in underwater fish recognition framework for classifying images. This technique the pixels of the image are clustered into groups without intervention of the analyst. Grounding on the clustered pixels the information is retrieved from the image. In real world the availability of labelled data is very less hence unsupervised classification is done in most cases. In [3], has discussed Supervised classification techniques that analysis and train the classifier on the labelled images and extracting features from them.

By using the learned information of the training, the newly provided image will be classified based on the features observed in the image. Now a days, Deep learning algorithms are providing successful results in the areas like computer vision. The Convolutional Neural Network, a machine learning algorithm is being used for the image classification. In [4], uses deep learning algorithm for classify the quality of wood board by using extracted texture information from the wood images. he also made the comparison with machine learning architecture. CNN is a type of feed-forward artificial neural network that has been successfully applied to analyze visual images. It is inspired by the biological processes and the neurons are connected as in animal visual cortex.

In [5], as discussed automatic recognition cattle images using CNN which helps to extract the necessary characteristic from the cattle images and Support Vector Machine (SVM) techniques is used for classification of those images. In [6], has uses high resolution images in ImageNet data set having 15 million labelled images with 1000 different classes used for classification with help of deep convolutional Neural Network.

CNN having three different layers such as input layer, hidden layers and an output layer. In general images is constructed as a matrix of pixels and these pixel values are given as input to input layer along with weights and biases (for non-linearity). The output layer will be a fully connected layer usually to classify the image to which class it belongs to. The hidden layer may be convolutional, pooling or fully connected. In [7], has discuss the manifold -learning techniques for classifying remotely sensed hyperspectral data. The Convolutional layer is core building block and has learnable filters as parameters. Each filter is spatially small (width and height) but extends across the depth of the input volume. The 2-dimensional activation map is produced by performing dot product between input and entries of filter for every filter. As a result, the network learns filter that activate when it detects specific feature in some spatial position in the input. The pooling layer is used in down sampling the image without losing any information from the image. Max pooling uses the maximum value from the cluster of neurons at prior layer. The fully connected layer connects every neuron in one layer to every neuron in other layer. CNNs use little pre-processing when compared to traditional classification algorithms which use filters that are hand engineered.

The independence of human intervention in learning filters is good advantage of CNN.CNN is supervised deep learning approach which requires large labelled data for training on the network. After training the model will learn the weights and the accuracy of the classifier is improved.

## 2. LITERATURE SURVEY AND RELATED WORK

Literature survey is the most important step in software development process. Before developing the tool it is necessary to determine the time factor, economy and company strength. Once these things are satisfied, then the next step is to determine which operating system and language can be used for developing the tool. Once the programmers start building the tool the programmers need lot of external support. This support can be obtained from senior programmers, from book or from websites.

Before building the system the above consideration are taken into account for developing the proposed system. The major part of the project development sector considers and fully survey all the required needs for developing the project. For every project Literature survey is the most important sector in software development process. Before developing the tools and the associated designing it is necessary to determine and survey the time factor, resource requirement, man power, economy, and company strength. Once these things are satisfied and fully surveyed, then the next step is to determine about the software specifications in the respective system such as what type of operating system the project would require, and what are all the necessary software are needed to proceed with the next step such as developing the tools, and the associated operations.

1.A.A. Mandankandy, K.E. Kannammal, Fake currency detection: a survey. *Gedrag en Organisatie* 33(4), 622–638 (2020).

Imitate something authenticate is called as counterfeit. In banking sector, counterfeit currency is a big threat still. There are lots of detection methods are available, but with the advent of freely available image operation tools, it's a serious issue in banking sector. There are lots of important regions which is present in currencies, finds out those for evaluation is the basic task. Classifiers can find out the extracted features either genuine or fake. Without classifiers we can cross check with the original note's region with the segmented currency image. But that alone can't help to identify the authentication of the particular image. Alignment and edges may not be same if we segment the important portions, so fake currency note image(s) may be considered as original in some cases. To avoid that extracted features has to be process by classifier(s) to get better results. In this paper, the comparative study of image segmentation or thresholding, feature extraction, classification and finally selection approaches also included. And also added some analysis work which is possible based on some existing methods.

2.S. Arya, M. Sasikumar, Fake currency detection, in 2019 International Conference on Recent Advances in Energy-efficient Computing and Communication (ICRAECC), Feb 2020.

Fake currency notes are increasing day by day, in order to overcome this we proposes a very helpful and efficient system to detect the fake currency. For detecting the fake currency note is done by counting the number of interruptions in the thread line. For predicting the note is real or fake on the basis of number of interruptions. If the number of interruption is zero, if it is real note otherwise it is fake. And also we calculate the entropy of the currency notes for the efficient detection of fake currency note. MATLAB software is used to detect the fake currency note.

3.A. Singh, K. Bhojar, A. Pandey, P. Mankani, A. Tekriwal, Detection of fake currency using image processing. *Int. J. Eng. Res. Technol. (IJERT)* 8(12) (2019).

In recent years a lot of fake currency note is being printed which have caused great loss and damage towards society. So, it has become a necessity to develop a tool to detect fake currency. This project proposes an approach that will detect fake currency note being circulated in our country by using their image. Our project will provide required mobility and compatibility to most peoples as well as credible accuracy for the fake currency detection. We are using image processing and cloud storage to make this app portable and efficient.

4.S. Shaker, M.G. Alawan, Paper currency detection based image processing techniques: a review paper

The currency has a great meaning in everyday life. Thus currency recognition has gained a great interest for many researchers. The researchers have suggested diverse approaches to improve currency recognition. Based on strong literature survey, image

processing can be considered as the most widespread and effective technique of currency recognition. This paper introduces some close related works of paper-currency recognition. This paper has explained a variety of different currency recognition systems. The applications have used the power of computing to differentiate between different types of currencies with the appropriate layer. Choosing the proper feature would improve overall system performance. The main goal of this work is to compare previous papers and literatures through reviews these literatures and identify the advantages and disadvantage for each method in these literatures. The results were summarized in a comparison table that presented different ways of reviewing the technology used in image processing to distinguish currency papers.

### 3. EXISTING SYSTEM

Indian is a developing country, Production and printing of Fake .In this article, recognition of paper currency with the help of digital image processing techniques is described. Around eight characteristics of Indian paper currency is selected for counterfeit detection. The identification marks, optical variable link, see through register and currency color code decides the currency recognition. The security threads, water mark, Latent image and micro-lettering features are used for currency verification. The characteristics extraction is performed on the image of the currency and it is compared with the characteristics of the genuine currency.

### 4. PROPOSED SYSTEM

In This System, fake currency detection is a major issue around the world, influencing the economy of pretty much every nation including India. The utilization of fake money is one of the significant issues looked all through the world now days. This paper deals with the matter of identifying the currency that if the given sample of bank currency is fake. Different traditional strategies and methods are available for fake bank currency identification. 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.

### 5. IMPLEMENTATION

#### MODULES

Data Collection Pre-Processing Feature Extraction

Detect Fake Currency

#### MODULE DESCRIPTION

##### Data Collection Module

The different categories of Indian currencies differs in value estimation and color usage, separated from the quality of printing ,material used for printing and other which makes for simple visual distinguishing proof. In any case, for the visually disabled person, the content and color will not give the assistance at all and measure can lead to disarray since of the comparable measurements of the different coins.

##### Pre-Processing Module

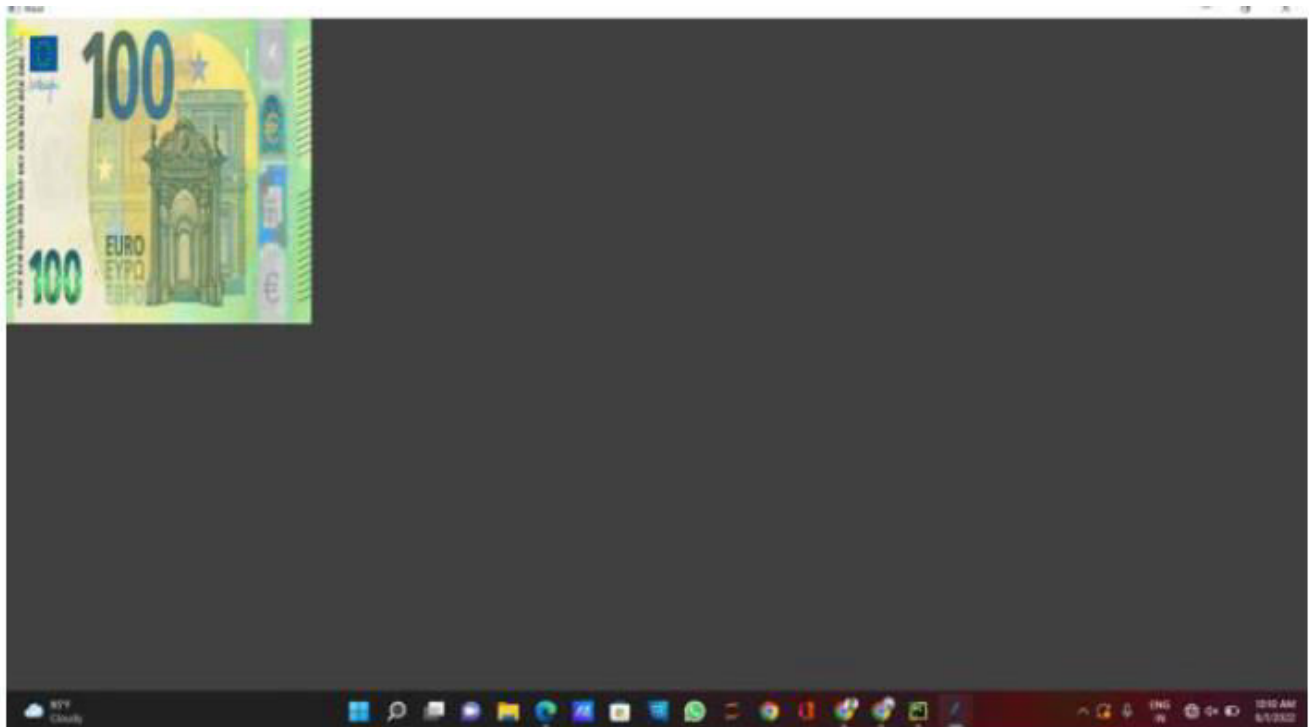
In pre-processing the operations normally initial to main data analysis and extraction of information. In this unwanted distortion are suppressed and enhance some image features that are important to further processing. It includes image adjusting and image smoothening. After these two pre-processing steps, the images of the currency were applied for feature extraction.

### **Feature Extraction**

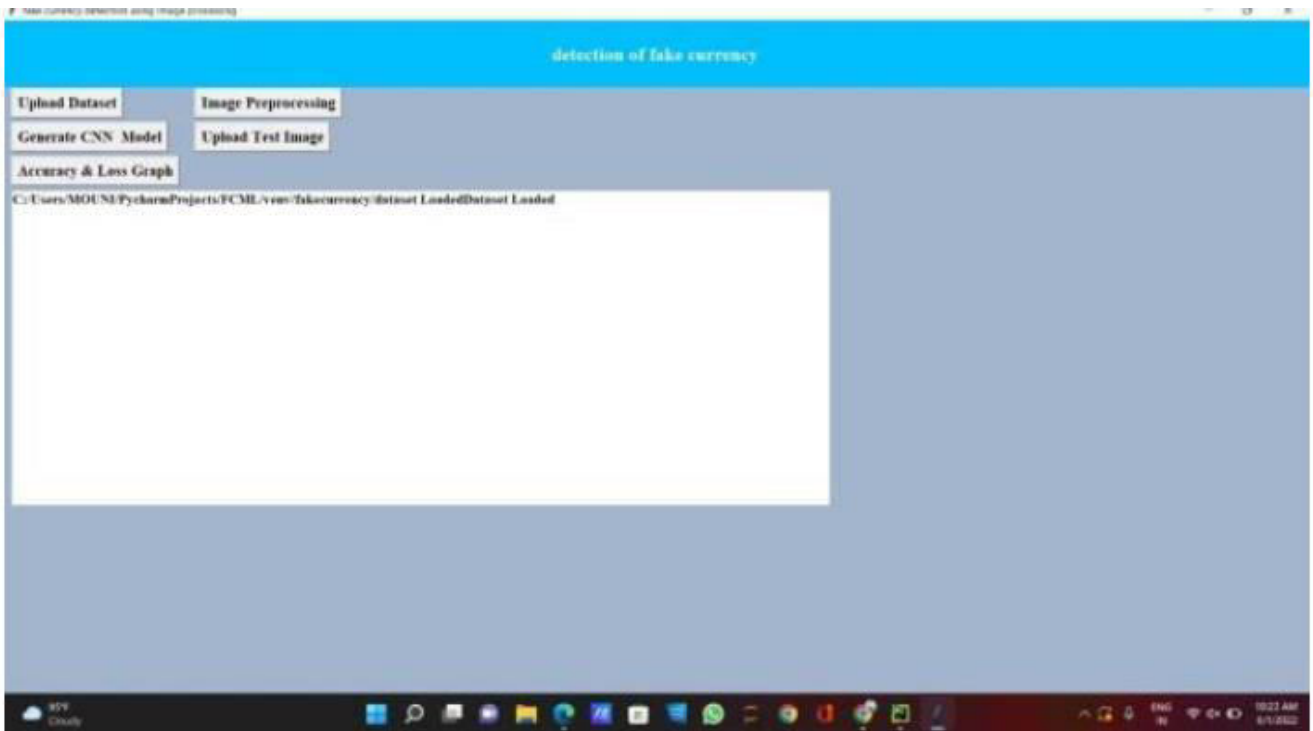
Feature extraction employs the selection and extraction of some of the Effective and important features, among the largest data set of the features which are extremely important for the recognition of fake currency. Some Features of an image are Latent image and Identification Mark. We first create a database of a number of authentic Indian notes and then extract their features. The extracted features are used for detection of fake currency.

### **Detect Fake Currency Module**

In this work 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 machine learning algorithms are measured their performance on the basis various quantitative analysis parameter. And some of ML algorithm are giving better accuracy for particular train test ratio.



## **7. RESULTS AND SCREEN SHOTS**



## 7. CONCLUSION AND FUTURE SCOPE

### CONCLUSION:

In this work, we have discussed that how our proposed system detects the fake bank currency using machine learning algorithms. The proposed system is also scalable for detecting the whether the currency is fake or not by image processing. The system is not having complex process to detect the whether the data contains fake bank currency like the existing system. Proposed system gives genuine and fast result than existing system. Here in this system we use cnn algorithm to detect whether currency is fake or not.

### FUTURESCOPE:

we used Convolutional Neural Networks (CNN) for image classification using images form handwritten MNIST data sets. This data sets used both and training and testing purpose using CNN. It provides the accuracy rate 98%. Images used in the training purpose are small and Grayscale images. The computational time for processing these images is very high as compared to other normal JPEG images. Stacking the model with more layers and training the network with more image data using clusters of GPUs will provide more accurate results of classification of images. The future enhancement will focus on classifying the colored images of large size and its very useful for image segmentation process

## 8. REFERENCES

1. Vidhate, Y. Shah, R. Biyani, H. Keshri, R. Nikhare, Fake currency detection application. *Int. Res. J. Eng. Technol. (IRJET)* 08(05) (2021). e-ISSN: 2395-0056.
2. A.A. Mandankandy, K.E. Kannammal, Fake currency detection: a survey. *Gedrag en Organisatie* 33(4), 622–638 (2020).
3. A.A. Mandankandy, K.E. Kannammal, Fake currency detection: a survey. *Gedrag en Organisatie* 33(4), 622–638 (2020).
4. A.Singh, K. Bhoyar, A. Pandey, P. Mankani, A. Tekriwal, Detection of fake currency using image processing. *Int. J. Eng. Res. Technol. (IJERT)* 8(12) (2019).
5. G. Navya Krishna, G. Sai Pooja, B. Naga Sri Ram, V. Yamini Radha, P. Rajarajeswari, Recognition of fake currency note using convolutional neural networks. *Int. J. Innov. Technol. Exploring Eng.* 8(5), 58–63 (2019).
6. K.D. Sudha, P. Kilaru, M.S.R. Chetty, Currency note verification and denomination recognition on Indian currency system. *Int. J. Recent Technol. Eng.* 7(6S) (2019). ISSN: 2277-3878
7. M. Laavanya, V. Vijayaraghavan, Real time fake currency note detection using deep learning. *Int. J. Eng. Adv. Technol. (IJEAT)* 9(1S5) (2019). ISSN: 2249-8958.
8. T. Kumar, T. Subhash, D. Regan, Fake currency recognition system for Indian notes using image processing techniques (2019).