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Efficient Detection of Fake Currency Using MATLAB

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ABSTRACT: We offer a method based on computer vision and machine learning for determining the legitimacy of Indian paper money. This method extracts currency attributes and generates unique datasets for currency detection. In order to better accurately identify the banknote's denomination on both the front and reverse, we used an ML-CNN-based classifier technique on the front and rear surfaces of the Rs. 200 denomination security feature of Indian currency notes. Our system, which is based on the vgg19 architecture, uses a CNN model to classify Indian rupee notes according to their legitimacy.

KEYWORDS: Accuracy, Data extraction, Features extraction, Image processing, Machine learning, Currency Detectio, ML-CNN.

I. INTRODUCTION

These days, technology is developing quite quickly. As a result, the banking industry is likewise becoming more contemporary every day. As a result, automated fake cash identification in automatic teller machines and automatic services seller machines becomes extremely important. The development of reliable and effective automatic cash identification machines has been supported among several academics. Nowadays, it's common to see automatic machines that can recognise banknotes in the dispensers of contemporary goods like candy, soft drink bottles, and bus or train tickets. The primary goal of money identification technology is to recognise and extract both the visible and unseen characteristics of currency notes. Numerous methods have been suggested up until this point to identify the currency note. The note's visual characteristics are the best method, though. Size and colour are two examples. However, if the letter is soiled or damaged, this method is ineffective. If When a note is soiled, major changes are made to its colour characteristics. Thus, it is crucial that How can we properly extract the characteristics from the money note's image? algorithm to increase note recognition precision

II. RELATED WORK

The author of this paper offers a very practical and successful method for identifying counterfeit money. To identify bogus currency, count the number of disturbances in the thread line. A note's authenticity can be determined by counting the number of interruptions. It is real if there are no breaks; otherwise, it is untrue. To more accurately identify fake cash notes, they also calculate the entropy of currency notes. MATLAB software is used to find the fake banknote[1].

The approach described in this article is based on the physical features of Indian currency. Using image processing techniques, the security thread, intaglio printing (the RBI logo), and identifying mark that have been employed as security components on Indian currency have been retrieved. The three aspects' essential importance have

been combination to distinguish between legitimate currency and counterfeit money, making the technology

more trustworthy and precise. The proposed approach has a 100% accuracy in identifying counterfeit money. Error in the mean square, Another factor used to evaluate the efficacy of the proposed system is the error rate, which is roughly 1%. It could be accepted by normal people as well, who sometimes find it difficult to tell the difference between the actual thing and a fake currency[2].

This page presents many fake money detecting techniques created by various researchers. The review focuses on the methods for identifying counterfeit money using certain features, as well as the possibility that each method will be successful. The paper also examines a widely employed analytical tool a system of classification for evaluating the reliability of money. The most effective model for currency validation (LDA) was determined through a comparison of Logistic Regression and Linear Discriminant Analysis. It was shown that a multinomial logit-based segmentation method outperforms LDA by 99 percent. Readers will gain from by selecting the most workable approach to take in light of the study's findings[3].

The identification procedure involves a number of steps, including edge detection, feature extraction, image capture, grayscale transformation, and image comparison. This report details the growth of various money identification technologies and other associated initiatives on paper currency recognition. The system's overall performance would improve if the right feature was selected. The objective of the suggested effort would look at previous writings and books to weigh the benefits and drawbacks of each strategy[4].

The model put forward in incorporates the Hough Transformation Algorithm, Face Identification, and OCR. In order to determine if Bangladeshi banknotes are authentic, the microprinting, watermark, and ultraviolet lines features are extracted. The testing results for the proposed model demonstrate that it has With a 93.33 percent accuracy, it may be used in a mobile app. The resulting data are further different OCR, Facial Identification, and Hough conversion algorithms were used to examine the data to demonstrate that the maximum level of precision is delivered by the suggested approach[5]

.This study's automated method is designed to recognise Indian rupee notes and assess whether or not they are fake. The automated system is very helpful not only in other industries but also in the financial system. In India, there are now more counterfeit 100, 500, and 1000 rupee bills. in light of counterfeit issue has improved thanks to technological developments like scanning, colour printing, and replication grown. With the help of a photograph, this technique successfully identifies fake Indian rupee notes processing strategy[6].

It might be challenging to distinguish between counterfeit bank notes and real bank notes. Therefore, an automated procedure that is accessible via ATM and bank machines will be necessary. A powerful algorithm that can predict if a money is real or fake must be developed in order to construct such an automated process cash, as fake notes are carefully crafted. Six supervised machine learning techniques are examined in this study. employing information from the UCI machine learning library to determine the veracity of Bank money. For this, we utilised Decision Trees, Nave Bayes, Logistic Regression, Support Vector Machines, Random Forests, and K-nearest With three train test ratios of 80:20, 70:30, and 60:40, closest neighbor's performance was evaluated utilising parameters for quantitative analysis criteria such FI-Score, MCC, Precision, Accuracy, and Recall. Furthermore, For a certain train test ratio, certain SML algorithms offer 100% accuracy[7].

The objective of this study is to develop a convolution neural network (CNN) model using Deep Learning for mobile devices like smartphones and tablets. The model was trained and tested using data that was self-generated. The CNN network gets pictures taken with a mobile device's camera. The results are encouraging, and they may be enhanced with more research and design changes to the Deep CNN model. The calibration and testing preciseness were 98.57 and 96.55 percent, respectively, while the testing accuracy was 85.6%[8].

The need of automatic systems for money recognition has increased in recent years due to the economy's increasing usage of counterfeit notes. This includes fundamental image processing techniques such image acquisition, image pre-processing, feature extraction, and segmentation using support vector machines recognising technology. The pre-processing of the money images used a different approach and distinct local binary pattern approach was used to remove some aspects of the image. after the characteristics were removed, it became required to identify the



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money using a useful classification system known as the Vector support apparatus. Eventually, a model with a 98 percent recognition rate for Ethiopian paper cash was developed. displays a high-performance segmentation technique for identifying paper money, as well as confirming the legitimacy93 percent accuracy on average was used to confirm the realness of the given banknotes.[9]

.It offers a technique for identifying fake currency using K-Nearest Neighbours and image processing. KNN offers a high accuracy for small data sets, making it excellent for computer vision tasks. To give precise data and information on the entities and qualities of the money, the banknotes authentication dataset was created utilising cutting-edge computational and mathematical approaches. to determine the outcome andMachine learning techniques and image processing are used for accuracy, data processing, and data extraction[10].

III. METHODOLOGY

This paper offers a system that uses convolutional neural networks using deep training to detect and recognize banknotes of various denominations. It entails determining the difference between phony and genuine bank notes. It entails the following phases in the operation.

- CNN model training
- VGG Net
- Detecting the currency
- Data set

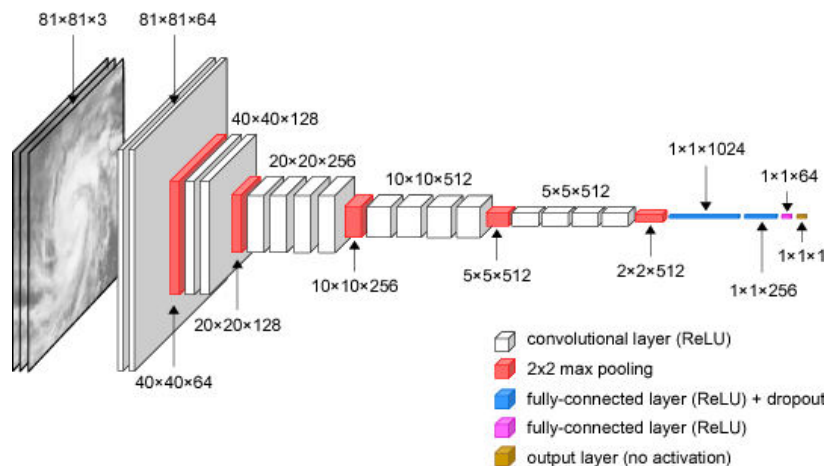
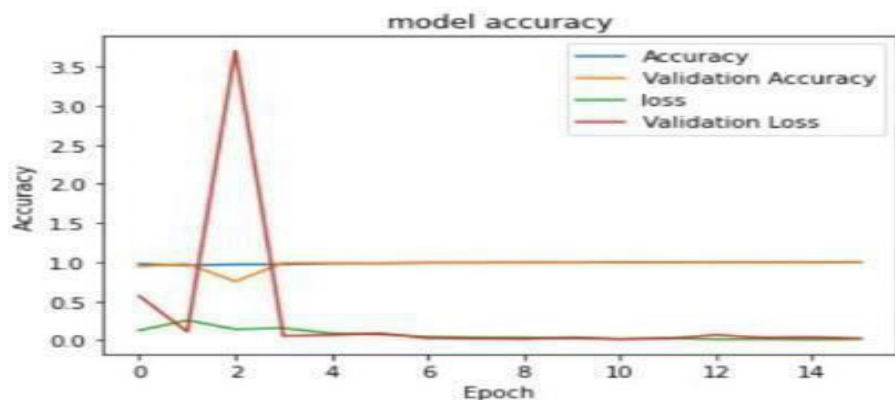
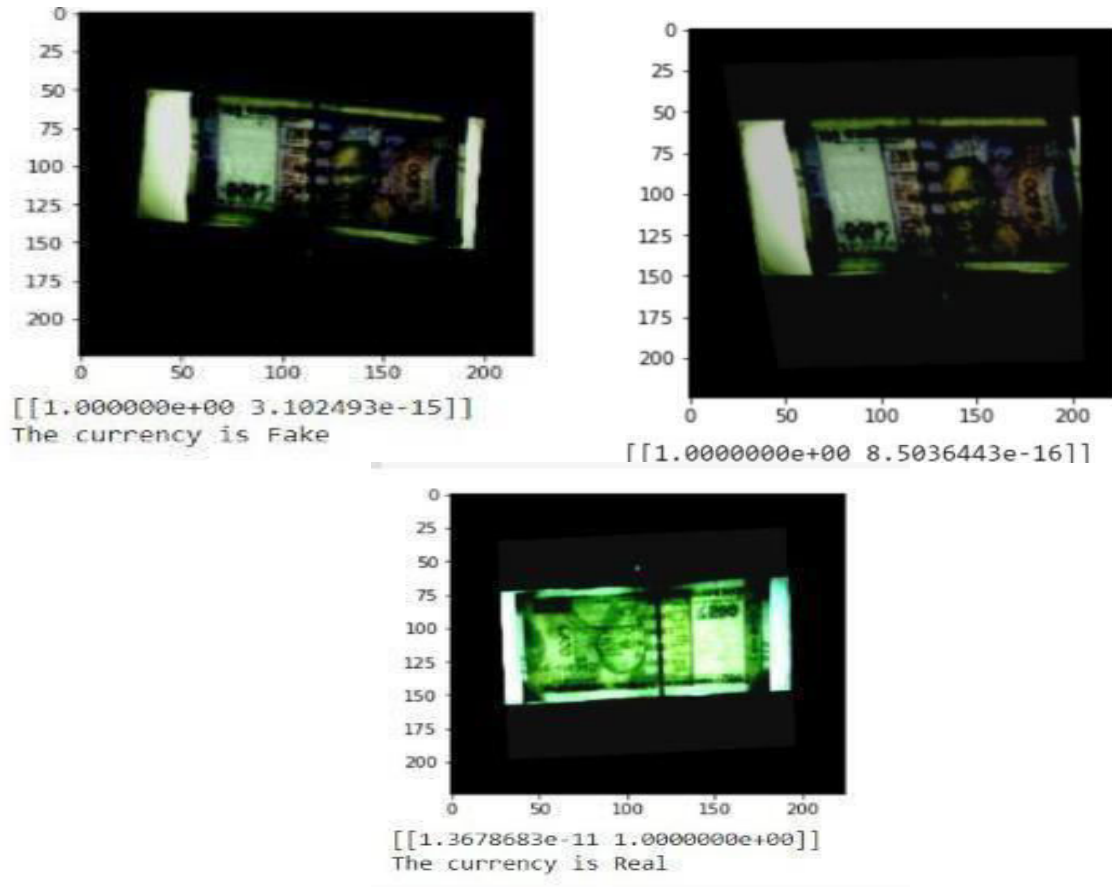


Fig-A Hybrid frame work for efficient detection of fack currency notes

IV. EXPERIMENTAL RESULTS





V. CONCLUSION

Machine learning has been quite successful in tasks involving the classification of images. As a feature extractor, our ML-CNN-based design eliminates the processing of images and manually confirming the existence of In the note, security features. The generated dataset has demonstrated value in executing tests and replicating actual-world situations. any typical People will be able to use the application to identify a fake note. The By experimenting with different ML techniques, the model's accuracy will increase.-CNNFuture architectural designs. expanding the data pool to improve model training and provide greater results.

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