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Examining Financial Markets Using Convolution al Neural Networks

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Abstract:

Counterfeit currency used to deceive people is one of the biggest problems facing every country. One solution is to use machine learning techniques to detect false prices. This information is generated by collecting high-quality images of real and counterfeit coins using commercial cameras. Apply a wavelet transform to an image to extract features from an image. The variance, skewness, kurtosis and entropy attributes obtained from these images using the wavelet transform. Tremendous technological advances in the printing and scanning industry have exacerbated the problem of counterfeiting. As a result, counterfeit currency affects the economy and lowers the value of the original currency. Therefore, the detection of counterfeit money is the most desirable. Most of these previous methods are based on hardware and image processing methods. Finding fake results using this method is ineffective and time consuming. To overcome the problems, we propose to detect counterfeit money using deep neural networks. This document identifies counterfeit money by analyzing currency images.

Keywords: convolutional neural network, wavelet transform, Counterfeit currency, image processing.

I.Introduction:

Fake Indian Currency Note (FICN) is a popular and popular term used to refer to counterfeit notes circulating in the Indian market. In 2012, Finance Minister P. Chidambaram acknowledged in response to a question in Parliament that India has no precise estimate of counterfeit currency. But various central and state agencies are working together and the Home Office has set up the Indian Crime Control Bureau to combat this crime. Automatic banknote recognition technology is country-specific and can be used in many countries in conjunction with standard banknotes.A system that can detect fake invoices from camera footage would be a promising solution to this problem. Convolutional neural network models have been successful in image classification. Recognizing the authenticity of financial documents from images is an important feature of binary image classification. Here we test the feasibility of the CNN model to detect false positives, which can be learned simply, efficiently and highly accurately without extracting features from the original image of the paper money.

II. Fraud detection analysis:

Forged certificates have been a problem in many countries for years. As technology advances every year, the likelihood of counterfeiting money without government permission increases. India is one of the countries facing this problem and hence India's deteriorated economy. After demonization, new 500 and 2000 banknotes were introduced in India. But using this technology, these valuable banknotes

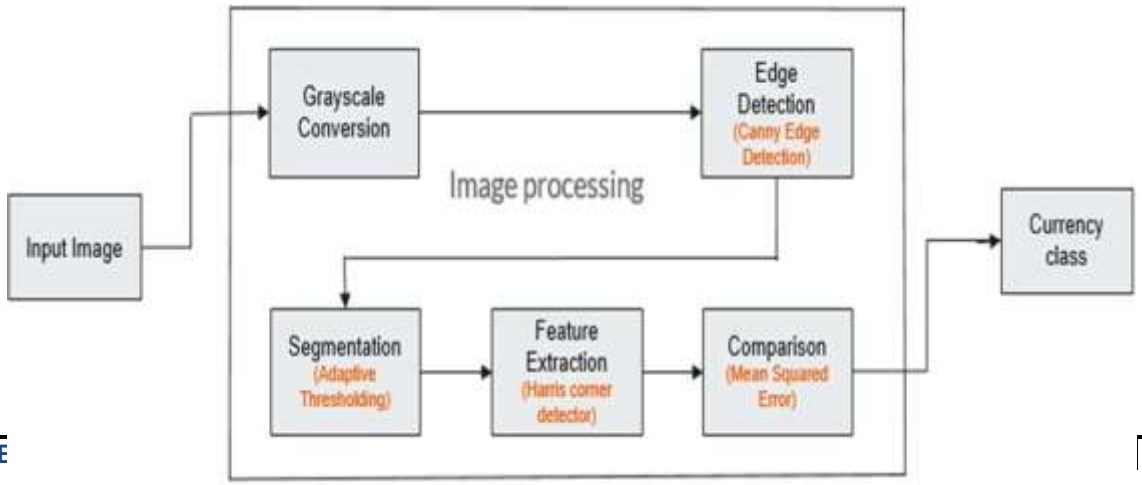
are being scammed by ordinary people.Identifying fake ID cards is a difficult task, so to overcome this, many researchers have developed various methods or automated methods that can complement the process with a good financial analysis. The article titled Indian Banknote Detection [1] focuses on the design and implementation of counterfeit money detection required to obtain the image of the desired banknote. Article titled Multimedia Security Research: Multimedia Forgery Detection and Historical Survey [2] on the body of Indian currency by Arun Anoop M, Poonkuntran S. Cartographic calculation has been certified to remove anti-counterfeiting lines, gravure printing (RBI logo), markings and other important features in Indian currency counterfeiting. Arun Anoop M, Poonkuntran S published a paper titled DFE Approach to CMFD of Digital Images - Analysis and Performance Evaluation[3] using a convolutional neural network, based on the deep learning-based Single Object Multiple Box Detector model. (CNN) model to extract the features of the bill so that we can verify the authenticity of the bill including the front and back.Recent research results are interesting, including identifying outcomes, benefits, and anterior and posterior outcomes in the scatter map; The accuracy of currency recognition can be demonstrated and the accuracy rate is very high. The article Copy Move Forgery Detection on Digital Images - Primary Research [4] was evaluated for uneven precision and returned with improved results. Thus, it is claimed that the CMFD can control all display functions. Finally, a comparison is made based on the analysis of some integration algorithms and applications, their shortcomings and forensic tools. Therefore, this document addresses the issue of image authenticity using a print-oriented discovery application.The research work of the thesis is to determine the effects in the image.

The article Fake Currency Detection using Basic Python Programming and Web Framework [5] recommends using web Flask (Flask is a micro web framework for python and web programming) written in the python programming language. It involves image processing using a brute force matcher (the brute force matcher is simple, it takes the identifier of a particular feature in the first layer and matches it with all other features using some distance calculation in the second layer and returns the closest match). A report entitled Detection of Counterfeit Indian Currency Using Image Processing [6] describes the detection of counterfeit Indian banknotes using image processing. Searching for fake Indian letters using pictures works.Our topics in this article are; The hidden image of the RBI, the numbers including the logo and the rupee symbol, and the color of the banknote. Using these three features, they used a technique to identify counterfeit Indian currency notes. The algorithm includes: image acquisition, which involves capturing images with a digital camera. The image is pre-processed, resizing the image according to the standard format and removing the noise (if any) from the image. The grayscale conversion of the image is done by converting the RGB color of the music to a black and white image, providing more detailed information about the music.To show the edge of the picture, the process of showing the border of the object according to the difference in brightness to adjust the curve. The article titled Indian Paper currency discovery [7] introduces a new system for distributing Indian currency with better recognition and faster transactions. Including functions such as recognition, segmentation, and recognition mainly include the use of the OpenCv computer programming library for real-time computer vision, and Python's NumPy module for arithmetic, argparse for OpenCV parsing scripts without cv2 bindings. Both are referred to as a new method for testing recognition and image processing capabilities. The 2018 article "Insurance Certificates and Authentication" [8] discussed the identification and authentication of fraudulent certificates to reduce employee headcount.In 2018, fake financial analysis and number verification reduced the number of employees. The system is usually divided into two parts, analysis of results and changes. They use software interfaces that work with different currency models. The system focuses on keeping the visible and secret notes inside the money. Annotated feature extraction, system flow exchanges for preprocessing. This document is called Counterfeit currency detection using Image processing[9] Recommended Performance Matrix for Counterfeit currency detection using MATLAB image processing system. Neural networks and pattern-based reasoning are two trends behind the technology. This paper uses a variety of methods to identify counterfeit money, including watermarks, optically variable ink, and fluorescence. An article called

Banknote Authentication Using Decision Tree rules and Machine Learning Techniques [10] introduces machine learning to evaluate the authenticity of banknotes.Supervised learning algorithms such as Back Propagation Neural Networks (BPN) and Support Vector Machines (SVM) are used to distinguish between real and fake credentials. This study also presents a comparison of algorithms for bank allocation. The article Automated Cash Deposit Machine with Money Detection Using Fluorescent and UV Light [11] proposes a snapshot-based hyperspectral imaging (HSI) algorithm that converts RGB images to HSI images using a Raspberry Pi peripheral design. A Windows-based Python application has also been created to control the Raspberry Pi camera and processor. This application controls the interface of the webcam used by the Raspberry Pi computer.The findings showed that the MGV values for all groups were in the 90% confidence interval (CI). Comparison of support vector machine (svm) and backpropagation network (bpn) methods for predicting protein virulence factors [12] recommends machine learning to evaluate the accuracy of money. Supervised learning algorithms such as Back Propagation Neural Networks (BPN) and Support Vector Machines (SVM) are used to distinguish between real and fake credentials. This article, Using Multi-core Support Vector Machines for Automatic Recognition and Distribution of Certificates [13], describes the authentication of fake certificates based on multi-core support vector machines. Each bank is divided into sections and the gloss histogram of the material is used as input to the system.Multiple cores are combined into a single combination using a linear weighted combination. Both techniques are used to reduce the time and space required by the semi-precise programming (SDP) method. This article, Fraudulent currency detection using image processing kernels [14], presents SML algorithms SVM, DT and KNN applied to banknote authentication dataset obtained from UCI ML warehouse using three different train test ratios 80:20, 60:40 and 70:30. suggested . suggested. This file has 1372 attributes and 5 attributes, 4 attributes and 1 is the target attribute which has the value of real bank accounts or fake certificates. The proposed system provides a way to identify Indian currency notes.Analysis of financial statements is done through the concept of image processing. The article Fraudulent Currency Analysis attempts to exploit currency extraction [15-19] presents a corpus of Indian currency. Cartographic calculation has been certified to remove anti-counterfeiting lines, gravure printing (RBI logo), markings and other important features in Indian currency counterfeiting. Cartographic calculation has been certified to remove anti-counterfeiting lines, gravure printing (RBI logo), markings and other important features in Indian currency counterfeiting.

III.Proposed Method:

In this method, the deep learning model Convolutional Neural Network (CNN) is used. Deep learning techniques are capable of detecting relationships between millions of pixels. CNNs are mainly used in computer vision, but more recently they have been used for many types of image classification. detected. If you have a picture of a zebra, this is where the web has information about its stripes, two ears and four legs. Classification: Here, all layers will act as classifiers on the extracted features.They will provide probabilities predicted by algorithms for objects in the graph. The solution provides a fake detection that



understands various values such as watermark, image, compatibility, Mahatma Gandhi's image, translucent reflection, and thread safety. The purpose of the system is to provide better discovery based on financial records. These systems use deep learning techniques Convolutional Neural Networks (CNNs) to process data and provide relevant predictions to users. Some of the main challenges in developing the system are detecting false results and constantly updating the system to accommodate changes in results.Image processing techniques have some limitations, so to circumvent them we use convolutional neural networks (CNNs) that are successful in image classification. The process is as follows. Rotate range, wide offset range, high offset range, rescaling, horizontal flip, etc. Select the Binary Classification Array Pattern. Deep learning models use deep neural networks and convolutional neural networks to train the models.The training model will be tested and validated. The model will be optimized for better performance. Figure 1 shows the architecture.

Figure 1:Architectural Design.

GRADIENT BOOSTER CLASSIFIER (GBC):

Gradient Boosting Classifier (GBC) is a widely used machine learning algorithm for classification and regression. GBC works by creating a decision tree in which each new tree tries to correct the errors of the previous tree.During training, GBC focuses on examples where previous trees were misunderstood to produce a more accurate final estimate. GBC is a powerful algorithm that can handle large datasets with complex and unrelated features. GBC is an effective method that can improve the accuracy of machine learning models from decision trees, thereby improving the performance of machine learning models.

Logistic Regression Classifier:

Logistic regression is the name of the study after using the logistic function, which is the basis of the method. It is the sigmoid cuve that can take a true value and show a value between 0and 1, but does not include the lung area exactly in this line, the background also includes the heart, liver, and other organs. The main purpose of this regional lung extraction method is to identify lung regions and re gions of interest (ROIs) from CT scan images.

IV. Research Analysis and Discussion:

Compare Ada Boost and Gradient Boosting

Figure 2: Real Currency

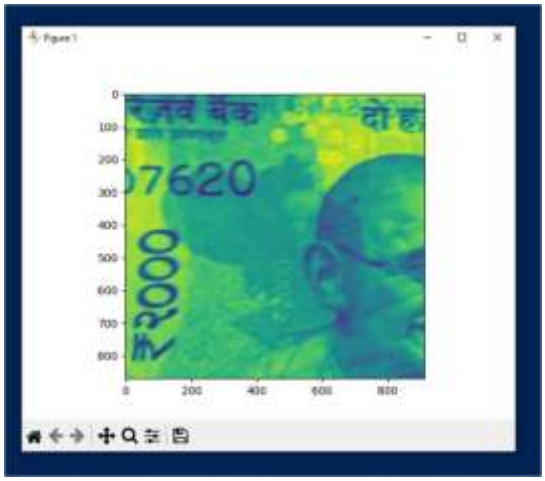


Figure 3: Edge based segmentation of Mahatma Gandhi portrait in real currency

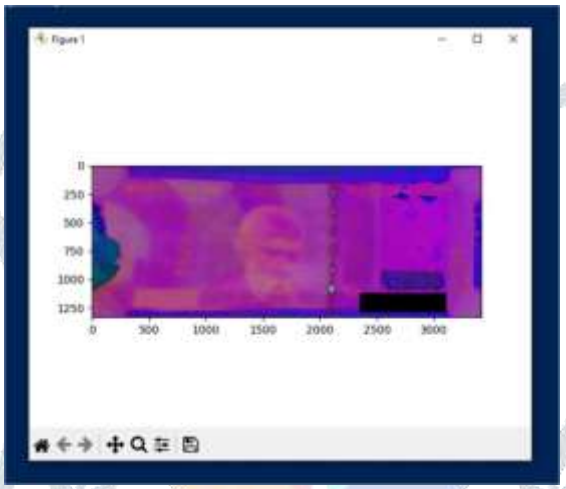


Figure 4: HSV image of real currency

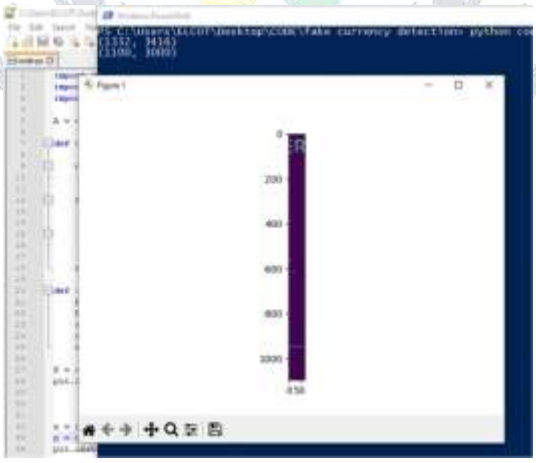


Figure 5: Edge based segmentation of security thread in fake currency

Both AdaBoost and Gradient Boosting take turns learning from poor learners. A strong student is derived from the additive model of a weak student.The main goal here is to learn from the shortcomings of each step in the iteration. Adaboost requires the user to introduce the weak learners' process (or does the weak learners before the actual learning process). It increases the weight of wrong events and decreases the wei ght of correct predictions. Therefore, weak students pay more attention to difficult situations. After traini ng, weak students are added to strong students based on their performance (called alpha weight).The high er the character, the stronger the students. Figure 2 shows real money. On the other hand, gradient boosti

ng does not change the distribution pattern. Instead of training on the new classification, weak learners re port the mistakes of strong learners. This is another way to put more weight on difficult situations.At eac h iteration, pseudoresidues are calculated and the learning curve is fitted to pseudoresidues. The weak stu dent's contribution to the strong student is then calculated from the new distribution using the gradient de scent method nice, not its performance on the model. Accounting is one of those things that reduces the o verall error rate of a strong student. Figure 3 shows the edgebased segmentation of the Mahatma Gandhi portrait on real money. Figure 4 shows HSV images of real money.Figure 5 shows the edgebased segmen tation for counterfeit coins.

V. Conclusion:

Thedataset contains a total of 1372 samples. The authenticity of Indian banknotes is explained usi ng some painting methods. In Primer's study, only three types of bleeding lines, signal lines and false gua rd lines were extracted from the currency image according to the Canny edge detection method.The proce ss that starts with image acquisition ends with the classification process. The operator knows to use edgeb ased segmentation to extract features while it only works for some images. This will be beneficial becaus e counterfeit money is increasing day by day. So there must be a system to prevent this from happening.

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