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AN EFFICIENT DETECTION OF FAKE CURRENCY KNN METHOD

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ABSTRACT: Aim of this project, deals with the matter of identifying the currency that if the given sample of currency is fake. Different traditional strategies and methods are available for fake currency identification based on the colors, width, and serial numbers mentioned. In the advanced age of Computer Science and high computational methods, various machine learning algorithms are proposed by image processing that gives 99.9% accuracy for the fake identity of the currency. Detection and recognition methods over the algorithms include entities like color, shape, paper width, image filtering on the note. This project proposes a method for fake currency recognition using K-Nearest Neighbors followed by image processing. KNN has a high accuracy for small data sets making it desirable to be used for the computer vision task. In this, the banknote authentication dataset has been created with the high computational and mathematical strategies, which give the correct data and information regarding the entities and features related to the currency. Data processing and data Extraction is performed by implementing machine learning algorithms and image processing to acquire the final result and accuracy.

1.INTRODUCTION

Fake Indian Currency Note (FICN) is a term used by officials and media to refer to counterfeit currency notes circulated in the Indian economy. In 2012, while responding to a question in parliament, the Finance Minister, P. Chidambaram, admitted that there is no confirmed estimate of fake currency in India. However, several central and state agencies are working together, and the Ministry of Home Affairs has constituted the Fake Indian Currency Notes Co-ordination Center (FCORD) to curb this menace. Automatic currency note recognition technology is specific to a country and can be generalized with standard banknotes of each country. If there is a system which can identify a currency note as fake through a camera image is one promising direction towards solving this problem. Convolutional neural network models have seen tremendous success in image classification tasks. And identifying a currency note as fake or real from its image is essentially a binary image classification task. Here we test the feasibility of CNN models for fake currency identification, which can be trained without manual feature extraction on raw images of currency notes with a simple, efficient and very accurate approach.

In the last eight years more than 3.53 lakh cases of counterfeit currency detection in India's banking channels is heighten according to latest government reports. The practice of counterfeiting became more refined with the arrival of paper currency. The Indian Government has taken a astonishing stride of demonetizing 500 and 1000 Rs. notes. Prime Minister Shree. Narendra Modi stated that one of the cognition for this policy was to counter the

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climbing menace of counterfeit Indian Currency notes. However, the Indian banks acknowledged an all-time peak amount of fake currency and also noticed an over 480% increment in doubtful transactions after demonetization, a first ever report on questioning credits ended in the wake of 2016 notes ban has discovered [9]. The Reserve Bank of India(RBI) is the only one which has the singular authority to issue bank notes in India. The RBI being the highest monetary authority in the country, prints the currency notes of all denominations from Rs.2 to 2000. Several security features [8] have been published by the RBI so that the counterfeit notes can be detected by the general public. However, distinguishing a counterfeit note just by visual per lustration is not an easy task. Moreover, an average person is unaware of all the security features. Developing applications which can detect a currency note to be counterfeit by a camera image can help solve this problem. Deep learning models have witnessed a tremendous success in image classification tasks [4]. Our model proposes a binary image classification task with two classes-fake or real. The Deep CNN model we have built helps us detect the counterfeit note without actually manually extracting the features of images. By training the model on the generated dataset, the model learns on it and helps us detect a counterfeit note.

2.LITERATURE REVIEW

Sawant et al. [5] used image processing techniques and minimum distance classifier techniques of scanned currency images. The research used stand color extraction, segmentation, feature extraction using Fourier Descriptors and identification of the shapes through the extraction of the unique identification marks and latent image numbers using the Minimum Distance Classifier. The method reported accuracy close to 90%.

Manikandan [6] proposed a currency recognition system for mobile application for visually challenged people based on currency localization techniques. The study used the Matlab image processing toolbox libraries. The system captured images with the mobile camera and uses morphological techniques, to identify the different currency notes. The currency recognition system provided an accuracy of 93% based on a data set of 165 images.

The authentication of Currency Notes using printing technique verification has also been shown to be a valid method. Roy et al. [7] verified the notes checking physical dimensions, paper quality, design, and the printing technique. A K-mean algorithm was used to check whether the cluster was linearly separable. The classification accuracy was also checked using a Neural Network (NN)-based classifier Other techniques such as edge detection of grayscale images of the currency have proved to be satisfactory. A study by Prasanthi et al. [8] proposed a system which used six different characteristic features of the paper currency. The characteristics of the paper were extracted from these attributes. Comparison of notes was carried out with the original pre-stored image in the system. If the conditions were satisfied, then the currency was said to be genuine otherwise counterfeit.

Shyju et al. [9] proposed solution based on three shape recognition, feature extraction, and digital recognition. The system used ROI (Region of Interest) extraction method based on solidity, minor axis length, extent, and eccentricity. The Gray Level Co-occurrence Matrix (GLCM) was used to extract the second order statistical texture features. The system also used mean, skewness and kurtosis features to represent

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color. The SVM (Support Vector Machine) with polynomial kernel function was used as the classifier.

Satish et al. [10] described a system which could detect if notes deposited into an account in ATM were counterfeit notes. Two methods including advanced mixed signal and an advanced pattern recognition system were used in the system. The first method used 1-D analog signals were acquired from infrared and laser sensors followed by the processing of the discrete, analog and mixed signals. The second method used a mixed signal processing, pattern recognition, and image processing to develop an expert system based on generation on Go or NoGo signal which then would determine if the currency is accepted or rejected.

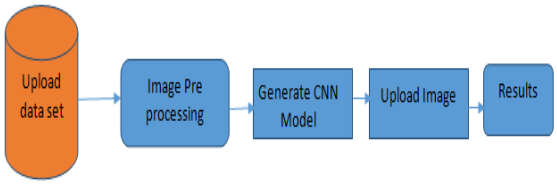
3.EXISTING SYSTEM

The latest government report shows that there has been a 400% increase in such counterfeit transactions. According to the Indian law, possessing fake notes is a punishable offence. Fake Indian currency note (FCIN) is a term used by officials and media to refer fake currency notes circulated in the Indian economy. The fake notes of newly introduce INR 2000 and INR 500 series are so perfect that it is hard to identify them from the real notes.

4.PROPOSED SYSTEM

It is a common name for operations with images at the lowest level of abstraction; both input and output are intensity images. The aim of pre-processing is to improve the image data that suppresses unwanted distortions or enhances some image features important for further processing. Image pre-processing methods use the considerable redundancy in images.

5. ARCHITECTURE DIAGRAM



6. IMPLEMENTATION

Preprocessing of Data:

The simplest way to get the data without over- fitting and under fitting is to pre-process the data- set. The main aim behind the data pre-processing is that to add a value to the base value which is the data-set generated. The main advantage of data pre-processing is to get a better training-set. For these purposes, we use Keras library for pre-processing the images.

Feature Extraction:

In this part, the network will perform a series of convolutions and pooling operations during which the features are detected. If you had a picture of a zebra, this is the part where the network would recognize its stripes, two ears, and four legs.

Result Analysis:

Here the accuracy of classification is shown among accuracy is the fake or real.

Visual Representation:

Our final results are plotted as graphs which contains different fields such as CNN Training Model Accuracy. Pictorial representation is the best way to convey information without much efforts.

7. ALGORITHM

Decision tree classifiers

Decision tree classifiers are used successfully in many diverse areas**.** Their most important feature is the capability of capturing descriptive decision making knowledge from the supplied data**.** Decision tree can be generated from training sets**.** The procedure for such generation based on the

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set of objects **(**S**)**, each belonging to one of the classes C1, C2, **…**, Ck is as follows**:**

Step 1. If all the objects in S belong to the same class, for example Ci, the decision tree for S consists of a leaf labeled with this class

Step 2. Otherwise, let T be some test with possible outcomes O1, O2,**…**, On**.** Each object in S has one outcome for T so the test partitions S into subsets S1, S2,**…**Sn where each object in Si has outcome for T**.** T becomes the root of the decision tree and for each outcome we build a subsidiary ecision tree by invoking the same procedure recursively on the set Si**.**

Gradient boosting

Gradient boosting is a machine learning technique used in regression and classification tasks, among others. It gives a prediction model in the form of an ensemble of weak prediction models, which are typically decision trees.[1][2] When a decision tree is the weak learner, the resulting algorithm is called gradient-boosted trees; it usually outperforms random forest.A gradient-boosted trees model is built in a stage-wise fashion as in other boosting methods, but it generalizes the other methods by allowing optimization of an arbitrary differentiable loss function.

K-Nearest Neighbors (KNN)

- Simple, but a very powerful classification algorithm
- Classifies based on a similarity measure
- Non-parametric
- Lazy learning
- Does not **"**learn**"** until the test example is given
- Whenever we have a new data to classify, we find its K-nearest neighbors from the training data
- Training dataset consists of k-closest examples in feature space
- Feature space means, space with categorization variables **(**non-metric variables**)**
- Learning based on instances, and thus also works lazily because instance close to the input vector for test or prediction may take time to occur in the training dataset

SVM

In classification tasks a discriminate machine learning technique aims at finding, based on an independent and identically is tribute training dataset, a discriminate function that can correctly predict labels for newly acquired instances**.** Unlike generative machine learning approaches, which require computations of conditional probability distributions, a discriminate classification function takes a data point x and assigns it to one of the different classes that are a part of the classification task**.** Less powerful than generative approaches, which are mostly used when prediction involves outlier detection, discriminate approaches require fewer computational resources and less training data, especially for a multidimensional feature space and when only posterior probabilities are needed**.** From a geometric perspective, learning a classifiers equivalent to finding the equation for a multidimensional surface that best separates the different classes in the feature space**.**

SVM is a discriminate technique, and, because it solves the convex optimization problem analytically, it always returns the same optimal hyper plane parameter—in contrast to genetic algorithms **(**GAs**)** or perceptions, both of which are widely used for classification in machine learning**.** For perceptions, solutions are highly dependent on the initialization and termination criteria**.**For a specific kernel that transforms the data from the input space to the feature space, training returns uniquely defined SVM model parameters for a given training

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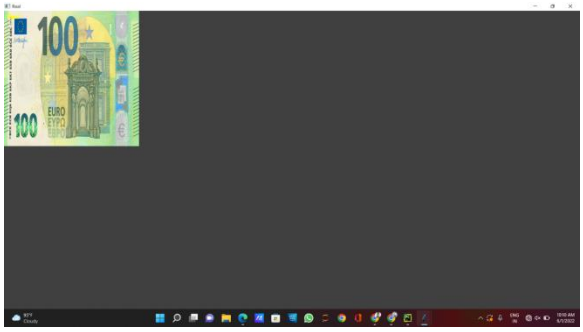
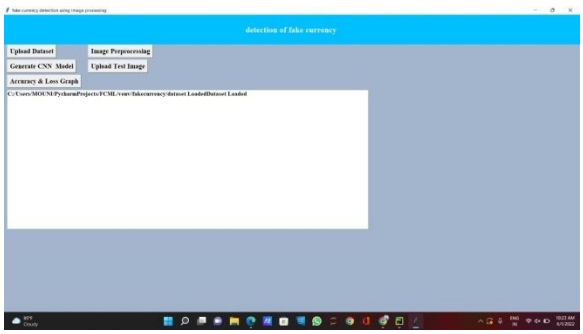
set, whereas the perception and GA classifier models are different each time training is initialized**.** The aim of GAs and perceptions is only to minimize error during training, which will translate into several hyper planes**'** meeting this requirement**.**

8. SCREEN SHOT





9. CONCLUSION

Deep learning has gained tremendous success in image classification tasks. Our architecture which is based on Deep CNN works as feature extractor eliminating the need to apply image processing technique and manually checking the presence of security features in the note. The generated dataset has successfully helped conduct experiments and tried to mimic the real-world scenario. The application built will be useful to any common person to detect a counterfeit note. Future scope includes trying out new Deep CNN architectures to increase the accuracy of the model. Increasing the data-set, so that the model gets trained better and produce better results

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