

IMPLEMENTATION OF MACHINE LEARNING ALGORITHMS TO DETECT FAKE BANK CURRENCY

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ABSTRACT:

Criminals have put into the financial system fake bills that look like the real thing. They did this to hurt the value of our currency. During the process of demonetization, there is a lot of fake cash on the market. Because many parts of a fake note are the same as those of a real one, it can be hard for a person to tell the difference between the two. It could be hard to tell the difference between a real bank note

and a fake one. So, there needs to be an automatic method that can be used at ATMs or banks. To make this kind of automatic system, you'll need to come up with a program that can tell exactly whether a coin is real or fake. A sample from the UCI machine learning library was used with six supervised machine learning algorithms to figure out if bank currency was real.

1. INTRODUCTION

A lot of money changes hands every second, and bills are the most important object in our country [3]. Even though they look like real bills, fake bills are put on the market to make the financial world confused. They are made to do certain jobs that are against the law [12]. In 1990, forgery is not a big problem, but it was a lot more common in the late 1800s [13]. In the twenty-first century, technology is changing quickly, making it easier for scammers to make fake bills that look like real ones and harder to find them and punish them [1]. Because of this, the stock market will fall to its lowest point. This needs to stop, and the flow of transactions needs to be kept smooth [16]. It can be hard to tell the difference between real and fake bank notes. The government has put things on bills that make them easy to spot as real money [9]. Fraudsters, on the other hand, are making fake money with an amazing level of accuracy that is almost similar to real money [5]. So, banks or ATMs need to have some kind of

technology that can tell the difference between real and fake bills [12]. AI and machine learning (ML) could be used to make a system that can tell the difference between real and fake bills to figure out if the banknote is legal [6,7,12]. Methods called supervised machine learning (SML) are often used to solve sorting problems these days. Even physical problems could be helped by it [2]. Only a few authors [6, 7, 8, 9, and 12] have used SML algorithms to check bank cash. We need to make a machine that can tell if a letter is real or not. The input is first a picture of a note, and we can use different image processing methods to figure out what the note looks like. Also, these characteristics are used by the SML programs to figure out if a note is real or fake. Taking a look at the site shows that not much work is done there. The paper has the following: First, we preprocessed the data and used different charts to show the dataset we got from the UCI ML library. Also, the SML

methods Decision tree (DT), KNN, and SVM are used on the data set that includes the traits of the bank money to figure out if they are real or not. We used SML algorithms on a dataset with three different train-to-test ratios so we could look at the results. We compared the results using MCC, F1 Score, NPV, NDR, accuracy, and other standard evaluation measures for SML algorithms.

2. LITERATURE SURVEY

Using image analysis to make fake cash IDs, 14th ICSET-2017, Tushar Agasti, Gajanan Burand, Pratik Wade, and P Chitra

Fake money has been a worry for a long time, which has caused a number of problems on the market. Technology changes have made it easier to make and spread fake money, which hurts the business as a whole. Banks and other places of business have tools to check if the money is real. But most people don't have access to these systems. Because of this, there is a need for tools that regular people can use to spot fake money. The suggested way uses picture processing to tell the difference between real and fake money. All of the system's creation is done with Python code. It includes things like color conversion, line recognition, segmentation, etc., which are done with the right tools.

Bhavika Arora, Eshita Pilania, Using the security thread on the coin, fake money can be found. ISSN: 2319-7242 Engineering and Computer Science: An International Journal

Because color printing, copying, and scanning have gotten a lot better in recent years, faking has gotten worse. In the past, only approved printing places were allowed to make currency paper, but now anyone with a computer and a

laser printer can make fake bank notes. Almost everywhere in the world, fake money is a hot topic. Even though fake money is a problem in almost every country, India has been hit especially hard and has a big problem. Fake 100, 500, and 1000 rupee bills from India seem to be flooding the system, and most people don't know how to deal with them properly. There needs to be a way to quickly and easily tell which paper money notes are which. In our way, we explain how to check cash bills from India and other countries. Using picture processing, the cash will be proven to be real.

Susan Jose, Shermin Siby, Mrudula Das, and Nayana Juby Mathew April 2015, Volume 2, Issue 4 of the International Journal of Engineering Research in Computer Science and Engineering (IJERCSE). Blind people can use an Android-based system to recognize money.

In the past few years, many illegal forging networks have made and sold fake coins and bills, which has caused a lot of damage to society. So, it's important to know how to spot fake money. We come up with a new way to tell fake Indian coins from their pictures. The cash image is shown in the dissimilarity space, which is a vector space made by comparing the picture to a set of samples. Each measurement gives a number that shows how different the picture being judged is from a model. To figure out the difference between two pictures, the local key points on each picture are found and described. Using the features of the currency, it is easy to find the key spots in the two pictures that match up. Also, a step after processing is recommended to get rid of important spots that don't match. Because there are so few fake bills in circulation, the algorithm can only be trained with real money.

Ami Shah, Jay Mehta, and Komal Vora, "A Review Paper on Currency Recognition System," International Journal of Computer Applications (0975-8887), Volume 115, No. 20, April 2015, p. 20.

In this study, the frequency domain feature extraction method is used to talk about a system for identifying cash. Using the picture's local spatial features, this method is able to spot a money picture. The whole system has been pre-processed so that the most effective and efficient two-dimensional discrete wavelet transform (2D DWT) can be used to make a money recognition system. The calculated efficient matrix is then used to get a set of statistical moments for the coefficients. Using the collected traits, money notes can be recognized, put into groups, and found. The categorization will make it easier to spot fake money, especially when OCR is used to pull out serial numbers. It turns out that the approach that was suggested works better.

3. SYSTEM ANALYSIS

Review the machine learning methods that are being used in current projects to see if they are new or not. Yeh et al. made SVM based on multiple kernels and compared it to SVM (single kernel) to figure out which networks were real and which were fake. Hassanpour et al. used the Markov chain idea to describe texture and a texture-based feature extraction method for identification. This method could help people tell the difference between the currencies of different countries. During the training process of an Artificial Neural Network (ANN), global optimization methods are used to classify whether or not a note is fake. These techniques have worked very well for classifying notes.

Drawbacks:

- Low accuracy;
- As technology moves quickly forward, scammers will be able to make fake bills that look so much like real ones that it will be hard to tell which is which.

PROPOSED SYSTEM:

We need to make a computer program that can tell if a message is real or fake. First, a picture of interest is given as input. We can then use different image processing methods to pull out the picture's characteristics. Also, the computers use the data from these pictures to figure out if the letter is real or not. Taking a look at the situation, we can see that this side hasn't been very busy.

Advantages:

- It is very accurate.
- It is easy to tell the difference between real and fake bills.

4. IMPLEMENTATION

Here's how to explain the data set: A dataset is taken from the UCI machine learning library [18] and used to train the models. Photos of real and fake bills were used to figure out what the info is about. There are a total of 1372 cases in the sample, and there are 5 traits to choose from. Both the goal and the traits are in dataset 4. The data set is divided into two categories: fake and real, with a mix of 55:45 between the two. The two possible numbers for the goal feature are 0 and 1, where 0 means a real note and 1 means a fake note. In this part, we take a close look at the results of several SML methods. With bank cash verification data, SVM, KNN, and DT are used to figure out if a note is true or fake. This task takes into account three train-test ratios: 80:20, 60:40, and 70:30. Other methods are used to check that they are

right and to build other numeric analytical factors for judging how well the ML models work. When several SML methods are used, the following things happen:

A description of how ROC and learning curves can be used with an 80:20 train-test ratio to measure the accuracy of SML algorithms.

SVM: An SML model that uses pattern recognition is being used to sort the data. To separate the two groups, a fake decision line is built into the data. Items from the dataset are put on a graph, and then the hyperplane idea is used to tell the difference between the two groups. The kernel function changes data that can be separated in a linear way from data that can't be separated in a linear way. When there aren't many traits, a linear kernel is used to classify a large number of test cases [6]. When SVM is used on the information to figure out if the bank notes are real or fake, three different train-test ratios (80:20, 60:40, and 70:30) are taken into account. For the train test ratio, graphs of the 80:20 ROC curve and the learning curve are made. using Fig. 1. It is thought that SVM is 98% accurate; see Fig. 1.

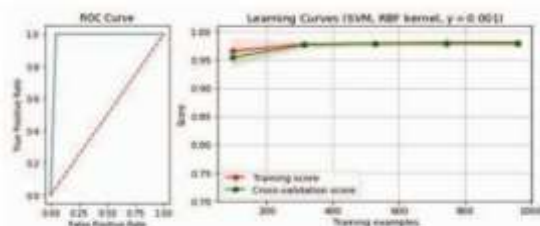


Fig. 1. SVM ROC and Learning curve for training test ratio 80:20

DT: It's a tree-like structure classification model. DT is refined over time by first developing on smaller and smaller parts of the original data. There are two distinct sorts of nodes produced by DT. Connectivity nodes that make choices and terminal nodes. Take the case of a decision node named "Outlook," which has subnodes labeled

"Rainy," "Overcast," and "Sunny," each of which stands for a different possible value of the feature under scrutiny. Hours When it is used as a leaf node, for example, it decides on a certain numerical value. Data types that may be handled by DT include both numerical and categorical [8]. Three potential train test ratios (80:20, 60:40, and 70:30) are considered when applying DT to the dataset to make a prediction on the authenticity of the banknotes. The ROC curve and the learning curve for the 80:20 train:test split are presented. Figure 2. Approximately 99% accuracy in DT has been recorded (see Fig. 2).

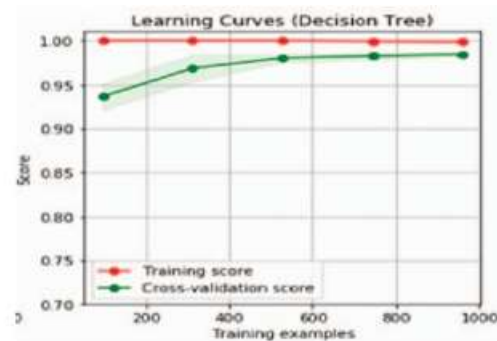


Fig. 2. DT ROC and Learning curve for train test ratio 80:20.

KNN is an SML model used mostly for classification issues in the business world, while it may also be used to regression problems including prediction. KNN is a slow-learning algorithm since it considers the whole dataset while training for classification. Because it makes no use of information in the training data, this technique is sometimes called a parametric learning algorithm. Assigning a value to a new data point in KNN is dependent on how well it matches values in the training set, according to the idea of feature similarity [9]. Using three distinct train test ratios (80:20, 60:40, and 70:30), KNN is applied to the dataset to make a prediction on the authenticity of the banknotes. See Fig. 3 for a ROC curve and learning curves depicting the 80:20 train test ratio. As may be seen in Fig. 3, KNN achieves near perfect accuracy.

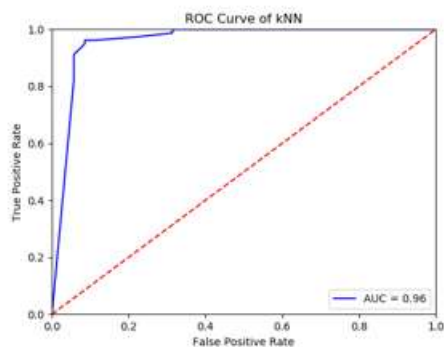


Fig. 3. ROC Curve for KNN

5. CONCLUSION

The UCI ML repository's banknote authentication dataset is used in this research, and the SVM, DT, and KNN SML algorithms are applied to it using 80:20, 60:40, and 70:30 train test ratios. The dataset comprises 1372 rows and 5 properties, of which 4 are features and 1 is the target attribute, which may be either "real" bank money or "fake."

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