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MACHINE LEARNING ALGORITHM EVALUATION FOR DETECTION OF FAKE BANK CURRENCY

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ABSTRACT

Bank currency is crucial in our country, but thieves often use fake notes to disrupt the money supply. During demonetization, fake money is difficult to distinguish from real ones due to their similar parts. This necessitates the implementation of automated systems in banks, particularly at ATMs, to help differentiate between fake and real notes. This research aims to develop an automatic system that can accurately identify real banknotes from fake ones using six supervised machine learning methods. The researchers used traditional methods like KNN, Choice Tree, SVM, Rough Forest, Logistic Regression, and Nave Bayes, but expanded their work by adding the Light GBM algorithm and comparing its performance to other algorithms. The goal is to create a system that can accurately differentiate between real and fake banknotes.

I. INTRODUCTION

Fake bills, which appear to be real bills, are being sold illegally to cause trouble in the financial world. Since the end of the 19th century, theft has become more common, and the rapid technological advancements in the 20th century make it easier for scammers to create fake bills that look so similar to real ones. This makes it difficult to distinguish between fake bills and real ones, making them a significant issue in today's financial landscape. The stock market may experience a decline due to counterfeit bank cash, which can be difficult to distinguish between real and fake. Government-made coins with unique features can help distinguish between real and fake notes, but scammers are creating fake notes with high accuracy. To prevent this, banks and ATMs must implement technology to differentiate between real and fake bills. This will ensure smooth transactions and prevent the stock market from falling to its lowest point. AI and computer learning play a crucial role in detecting phony bank notes and real cash. SML methods are increasingly used to solve categorization problems, particularly in health issues. However, few authors have used SML algorithms to verify bank cash legitimacy. To determine if a bill is real or fake, a program using automation is needed. The text uses a note photo as input and employs image-related techniques to identify its qualities. These images are then sent to SML algorithms for verification. However, there is limited work on this end.

II. LITERATURE SURVEY

The application of Multi Kernel Support Vector Machines (KSVMs) for classification and automatic identification of counterfeit notes has become increasingly popular due to the increasing use of digital imaging technology in creating high-resolution fake banknotes. This has led to concerns about the spread of fake money, with some countries reporting fake bills from ATMs, vending machines, and even during voting. A system called multiple-kernel assistance vector machines (KSVMs) is proposed to help find fake banknotes. The system involves cutting each bill into pieces and feeding brightness histograms into the machine. The linearly weighted combination technique is employed to combine multiple elements into a single matrix, while the semidefinite programming (SDP) method uses two methods to reduce time and space usage. One method ensures that kernel weights do not have negative values, while the other method makes the sum of all weights equal to 1.

When ROC curves meet, comparing the success of different classifiers can be challenging. A new comparison method model is explained when ROC curves show crossings. The analytical structure studies the relationship between ROC orderings and stochastic supremacy, and a large class of indicators is suggested that are consistent with dominance criteria even when ROC curves cross. A simulation study and real-world application to credit risk data demonstrate the practicality of this methodological technique.

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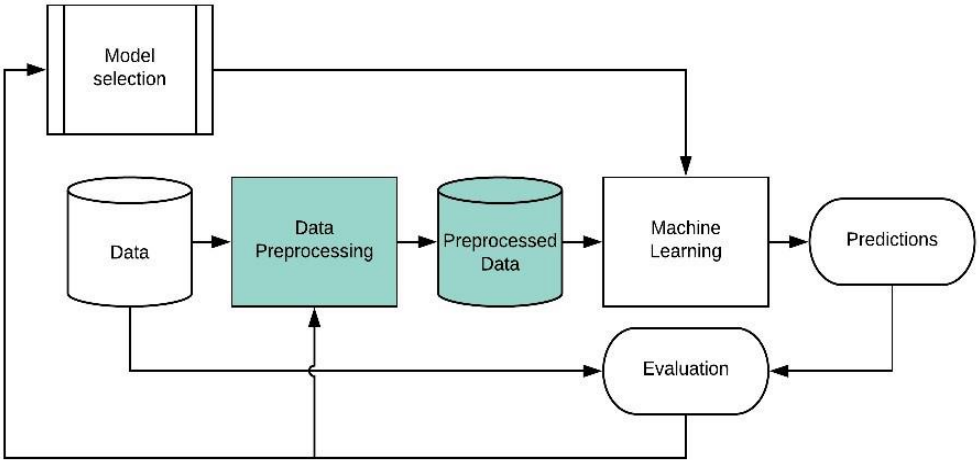
Hidden Markov Models are used to extract features for recognizing paper money using ROC curves for receiver operating characteristics. When ROC curves cross, it's difficult to choose the best predictor. This study explains a new way to compare models, focusing on the relationship between ROC orderings and stochastic supremacy. An analytical structure is used to study the relationship between ROC orderings and stochastic supremacy, and a large class is suggested as indicators consistent with dominance criteria. A simulation study and real-world application to credit risk data demonstrate the practical application of this methodological technique.

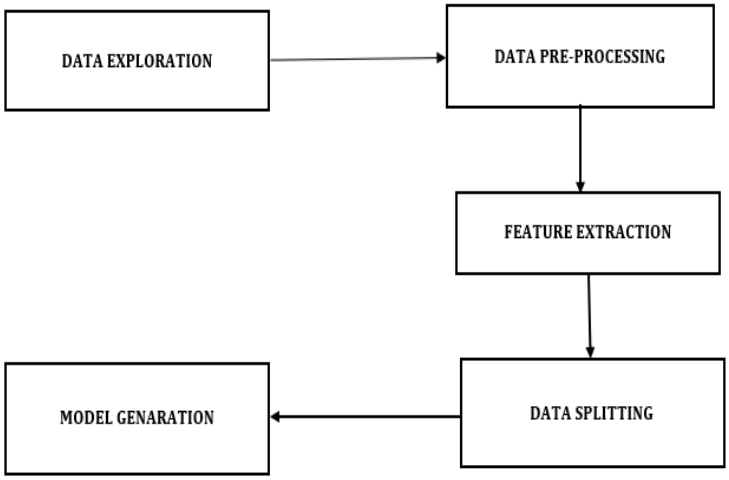
III. ARCHITECTURE

SYSTEM ARCHITECTURE



System architecture is the design and organization of components in a machine learning system, including layers, modules, algorithms, data flow, and infrastructure for efficient and effective implementation.

Pre-processing for classification process.



Pre-processing involves preparing and analysing data. The process of transforming raw data into a machine learning model involves pre-processing, sorting, and subjecting the data to conditions like word removal, tokenization, lower case letter removal, and punctuation removal. The suggested system downsizes money images to a NumPy array in the format 100x200x3, with RGB pixel values as the first dimension. The pre-processing stage normalizes pixel values to 0-1.

A data flow diagram (DFD) is a crucial planning tool for creating models of a system's components, including its functioning, data requirements, third-party interactions, and internal information flows. It helps in understanding the system's internal information flow and its interactions with external entities.

Fake currency detection using image processing on MATLAB involves extracting features like serial number, security thread, identification mark, and Mahatma Gandhi portrait from currency notes. The process starts with image acquisition and intensity calculation.

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IV. FUTURE ENHANCEMENT

Due to time constraints, numerous modifications, experiments, and inventions have been put on hold. Future research may focus on in-depth examination of mechanisms, new techniques, or curiosity. This study presents an effective method for extracting and identifying Indian rupee notes' characteristics, as well as identifying and authenticating false cash. The research will develop sophisticated image processing techniques for faster and more accurate counterfeit money detection, and the conversion of money denominations will be the future focus.

V. CONCLUSION

This work uses the UCI ML repository's dataset for currency recognition using various algorithms at three train-test ratios. The dataset contains 1372 records, with 4 features and 1 target variable. LIGHTGBM algorithms are used to provide more precise forecasts. The dataset includes serial number, security thread, identification mark, and Mahatma Gandhi portrait. The process starts with image acquisition and extracts the intensity of each image.

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