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MACHINE LEARNING APPROACH FOR HYBRID FAKE CURRENCY DETECTION SYSTEM

Rikhitha.N[1], Hemanth Kumar B.N[2]

PG Scholar, Dept. of MCA, Vidya Vikas Institute of Engineering and Technology, Mysuru, Karnataka, India [1]

Associate professor, Dept. of MCA, Vidya Vikas Institute of Engineering and Technology, Mysuru, Karnataka, India[2]

Abstract: Malpractice has always been a serious challenge that results in problems for society. The increasing use of technology has led to an increase in counterfeit currency, which negatively impacts a country's economic growth. Therefore, it is crucial to have reliable and consistent note detection. The process of identifying paper currency involves several steps such as edge detection, feature extraction, image segmentation, grayscale conversion, and image comparison. This paper includes a literature survey that presents different methodologies for detection.

The review concludes that applying efficient preprocessing and feature extraction techniques improves the algorithm and the detection system. Machine Learning techniques help in building tools that are necessary for research work, allowing us to develop computer learning design, implementation, and methods to differentiate between fake and genuine currency. The utilization of pattern recognition and image processing learning and analyzing methods helps to identify distinguishing features.

I. INTROUDCTION

In India, only the Reserve Bank of India has the authority to print currency. Previously, currency designs were exchanged between central banks across the world. To prevent counterfeiting, Indian banknotes are printed with high-quality intaglio printing, which is easily recognizable by laypeople. The edges of the milled or grooved money are also used to verify that no valuable metal has been removed during production. The Reserve Bank of India uses various methods to identify fake notes, but it was previously a time-consuming and laborious manual process. This increases the risk of notes being damaged or torn during transit. With the rise of self-service retail and vending machines, automated ways of recognizing currency are necessary. However, system architects often find it challenging to extract enough monetary attributes from cash pictures to ensure the accuracy and reliability of the automated system. The Reserve Bank of India faces the problem of counterfeit and damaged money every year, which creates additional challenges for handling large quantities of fake bills. Therefore, note-recognition processes have been simplified and streamlined through the use of machines.

Problem Statement

Counterfeit bills are a significant problem in today's world, no matter where cash is exchanged, and it is becoming increasingly problematic for nations like India. With the proliferation of high-quality printing and scanning options, it is now easier than ever to create imitation bills using modern hardware equipment. This poses a significant challenge for those creating new systems, and the Federal Indian Reserve Bank has to deal with the issue of counterfeit and damaged money every year. Dealing with a high amount of counterfeit bills also poses additional challenges. As a result, it has become easier for computers to recognize notes and follow an efficient procedure, either on their own initiative or with the help of human professionals.

Motivation

Our study aims to develop a currency note detection system that utilizes hyper-spectral imaging mode. The system involves several lamps that generate light at different wavelengths. The images obtained are processed using powerful algorithms to compare their characteristics. We apply the same strategy to all photos and gather information by calculating the entropy and mean. After running the program, we will have a graph that shows the variance between genuine and false notes under various modes and wavelengths.We evaluate the effectiveness of a dataframe consisting of low-resolution images of currency notes. By defining the length and width of the ROI region, the various features of the notes can be recognized and retrieved using the ROI extractor methods.

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II. RELATED WORKS

1. "A Survey of Currency Recognition Techniques"
This survey paper provides a comprehensive overview of currency recognition techniques, focusing on computer vision and machine learning approaches. It covers various aspects of currency recognition, including feature extraction, classification, and real-time processing. The paper discusses challenges and trends in this field and highlights the importance of robust currency recognition for various applications.

2. "Deep Learning for Currency Recognition: Challenges and Opportunities"
This research paper explores the application of deep learning techniques, particularly convolutional neural networks (CNNs) and recurrent neural networks (RNNs), for currency recognition. It discusses the challenges specific to currency recognition, such as variations in currency design and wear, and presents state-of-the-art deep learning models and architectures for achieving high accuracy in this domain.

3. "Mobile-Based Currency Recognition for Visually Impaired Individuals"
This paper addresses the important application of currency recognition for assisting visually impaired individuals. It presents a mobile-based currency recognition system that uses smartphone cameras and machine learning algorithms to identify and provide auditory feedback about currency denominations. The study discusses the usability and accessibility aspects of such systems.

4. "Security Features in Banknote Design and Their Role in Currency Recognition"
This research paper delves into the security features incorporated into banknote design to deter counterfeiting and their impact on currency recognition systems. It discusses how currency recognition algorithms can leverage these security features, such as holograms, microprinting, and watermarking, to improve accuracy and counterfeit detection.

5. "Real-Time Currency Recognition for Automated Teller Machines (ATMs)"
Focusing on the critical application of currency recognition in ATMs, this paper presents techniques and models optimized for real-time recognition of banknotes. It discusses the challenges posed by varying lighting conditions and the need for robust algorithms to ensure seamless ATM operation and fraud prevention.

III. SYSTEM ANALYSIS

Counterfeit currency notes have become increasingly sophisticated with the advancement of printing and production equipment. Although there are advanced detection and analysis methods available, most of them require expensive laboratory bench-top equipment and extensive training. These methods are also slow in collecting and analyzing data and cannot be taken into the field.

A technical note presents a simple fluorescence method using hyper spectral-imaging to detect or analyze the level of currency notes and artifacts with the help of a 365 nm Ultraviolet Bulb. All the image and spectral data are collected by capturing a snapshot with a camera.

IV. PROPOSED SYSTEM

The proposed method utilizes machine learning techniques to identify counterfeit Indian and American currency. The system employs advanced computer vision and ML algorithms to analyze Indian and American currency notes for signs of forgery. To train the ML model, a large dataset of photos containing both real and fake bills will be used.

The prototype is capable of determining the authenticity of a given bill by recognizing its unique features. As new types of counterfeit currency are discovered, the model will be updated accordingly. The proposed approach makes use of ML techniques to improve the efficiency and accuracy of currency detection, with the ultimate goal of reducing the amount of counterfeit bills in circulation and enhancing monetary security.

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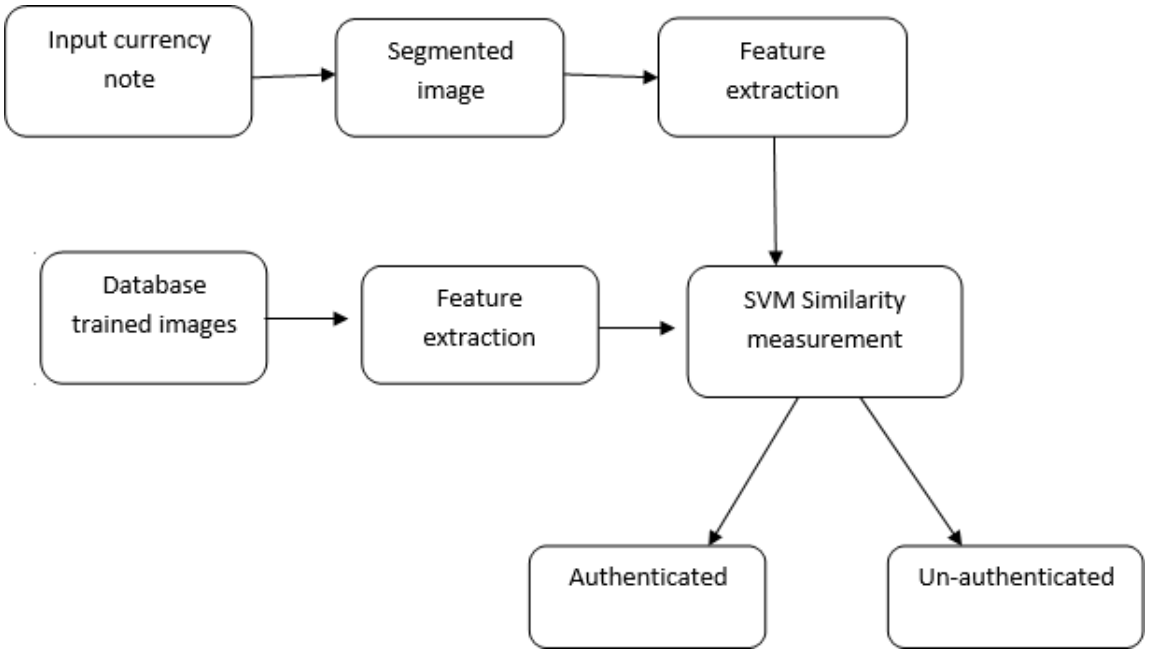

A. Data collection System:

In this module, many kinds of Indian coins vary in value estimate and colour use, apart from printing quality of materials. However for those who can't see, content and colouring will not help, and measure might cause confusion due to currency conversions.

B. Pre-processing Module:

Initial processing involves data analysis and removal. Suppress not wanted, improve, and smooth picture. The currency picture was feature extracted following these two the pre- processing stages.

C. Feature Extraction:

The process of feature extraction chooses and extracts useful and pertinent characteristics from the greatest data collection. it detects fraudulent cash. Image has latent image along with an identifiable mark. They develop a database of real Indian notes and analyse their properties. Extracting features detects fraudulent cash.

D. Detect Fake Currency Module:

Six supervised approaches for machine learning accustomed to detect bank cash authenticity using UCI deep learning repository datasets. We employed Machine learning methods and analysed their results using quantitative analytic factors. Some ML methods improve train test ratio correctness.

V. CONCLUSION

The system for detecting counterfeit currency involves extracting different features from real and fake notes and comparing them to differentiate between the two. This system works for both Indian and USA currency, and it uses a dataset of both genuine and known counterfeit currency to train a machine learning model.

The model identifies specific features in the currency that indicate whether it is real or counterfeit. It can be difficult for a person to distinguish between a real and fake note without understanding the numerous characteristics that establish authenticity. This is because many aspects of a counterfeit note are identical to those of a genuine note, making it challenging to tell the difference.

FUTURE ENEHANCEMENT

In order to develop this system, various distinguishing features of genuine and counterfeit currency notes are extracted and compared to identify the fake ones. The system is designed to work with both Indian and US currency. To train the machine learning model, the system uses a dataset containing images of real as well as counterfeit currency notes.

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