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Physical Currency Detector for Visually Impaired Person

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Abstract—Banknote identification systems are one of the most widely researched fields today, with widespread applications in Automated Teller Machines (ATMs), vending machines, and currency recognition aids for th

e visually impaired. Using a modular approach, the present work proposes a novel technique for recognizing Indian currency banknotes. The suggested approach extracts special characteristics of notes, such as the center numeral, RBI stamp, color strip, and other marks, and uses algorithms that are designed to recognize each distinct characteristic. The proposed method is testing on a large data set for recognizing Indian banknotes of various denominations and lighting conditions, such as new notes, wrinkled notes, and non-uniform illumination. We propose a convolutional neural network model that considers many images of various denominations. The specimen photographs are captured in a variety of situations and environments. This work will eventually be expanded into a tiny, portable handheld device.

Keywords— neural network, currency, deep learning, visually impaired, CNN

I. INTRODUCTION

Several deep learning algorithms are used in numerous current problems. Convolutional Neural Networks (CNN) and Fully Convolutional Neural Networks (FCN) have the highest efficiency in various processes between data analysis and data prediction models of all deep learning algorithms. CNN can also consider dynamic objects. Deep learning CNN, which consists of several layers of processing including linear and nonlinear operators (linked end-to-end), aids in the resolution of many time-intensive and complex tasks.

Banknote identification systems are one of the most widely researched and rapidly evolving areas of image processing research today. The need for a robust currency recognition system arises from the need to recognize currency origin and denomination accurately and efficiently in applications such as Automated Teller Machines (ATMs), ticket vending machines, food and beverage dispensers, and self-servicing kiosks placed in banks, as well as to assist the blind in correctly discerning between different denominations. A robust currency recognition system is distinguished by its accuracy, with the ability to identify torn and wrinkled notes as well as new notes while remaining unaffected by external factors such as illumination gradient, scaling, and perspective variation.

We propose a physical node recognition system in this paper that extracts the most prominent features of an Indian banknote, namely the central numeral representing the denomination, the national emblem, the identification mark for the visually impaired, and the color band. Specific algorithms that are targeted and optimized to recognize these specific features are then used for detection and recognition. The next section contains a list of related works in this field. upcoming sections describe the features used in the proposed work for currency recognition. Basically, pre-processing processes like blurring, noise removal, etc. are carried out after cash is scanned to obtain a picture. The feature extraction process is the penultimate step before the final output is displayed after the border detection and cropping are finished. These stages enable us to readily recognize currency by processing currency recognition. understanding the superior currency authentication model

II. LITERATURE SURVEY

The suggested approach in this paper[1] makes use of OpenCV to determine whether the given note is authentic or not. It consists of machine learning methods applied with appropriate mechanisms. A technique for identifying fake currency is presented that reliably detects the lines and curves of authorized notes by using edge detection. Here, anchor lines are specified within modules that are further illustrated in subsequent test patterns by a detector that has been trained using stored data that is comparable to the one that will be tested or compared later.

This paper[2] shows multiple methods for spotting counterfeit money put forth by different scholars. The review highlighted the methods used on specific features, characteristics, and success rates of each approach to identify fake money. Additionally, the study analyses a statistical classification method for currency authentication that is generally accepted. To determine the best model for currency authentication, a comparison of linear discriminant analysis (LDA) and logistic regression was conducted.

This study[3] suggests an automated monetary system that makes use of image-processing methods. Techniques for image processing are employed to enhance the money image's quality so that accurate information may be extracted. Basically, pre-processing processes like blurring, noise removal, etc. are carried out after cash is scanned to obtain a picture. The feature extraction process is the penultimate step before the final output is displayed after the border detection and cropping are finished. These stages enable us to easily recognize currency by processing currency recognition. understanding the superior currency authentication model.

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III. SYSTEM ARCHITECTURE AND METHODOLOGY

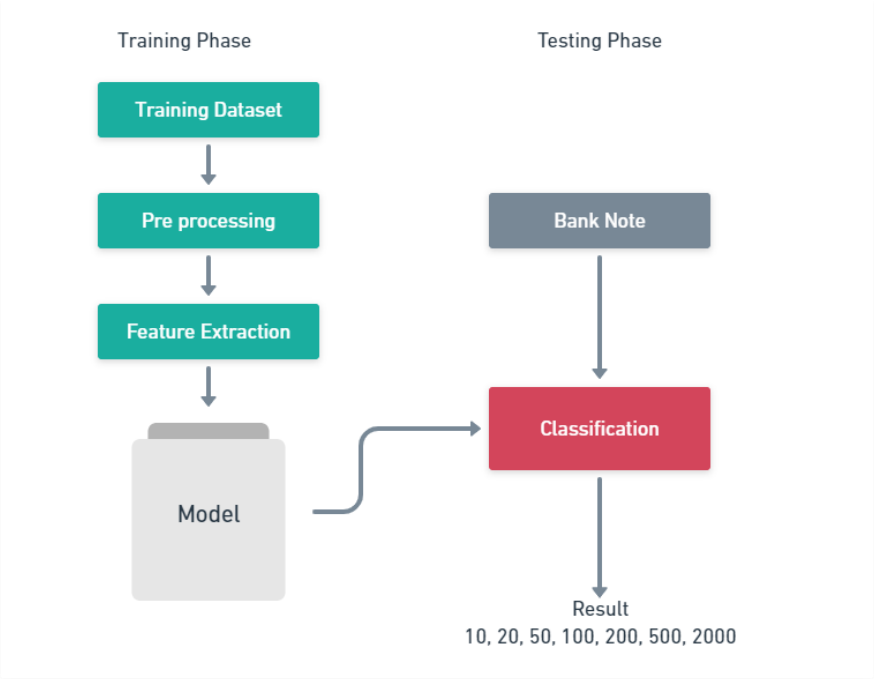

Figure 1 System Architecture

We proposed an Indian currency recognition system in this work that extracts the most prominent features of an Indian banknote, namely the central numeral representing the denomination, the national emblem, the identification mark for the visually impaired, and the color band. Specific algorithms that are targeted and optimized to recognize these specific features are then used for detection and recognition. We are using deep learning techniques to train the Indian banknote dataset.

Dataset used - The dataset used in this work is the "Indian Currency dataset". The dataset contains various Indian currencies of denominations of Rs.10, Rs.20, Rs.50, Rs.100, Rs.200, and Rs.2000. We collected 3600 images of Indian Currencies of different denominations and conditions. To increase the size of the dataset and to obtain a higher trust factor for the model, all images were passed through a function that rotates, shifts, and zooms in or out of each of the images. By the end of this procedure, we had a dataset that consisted of nearly a thousand images.

IV. CONCLUSION

To address the problem of visually impaired people identifying notes, the proposed system takes into account a solution in which currency recognition is possible by utilizing various image processing techniques. The entire methodology is applicable to 10, 20, 50, 100, 200, 500, and 2000 currency notes. The method is simple to implement, and we're using a Raspberry Pi board to make the system portable. This technique is extremely capable of adapting to the real world. The system not only recognizes the currency denomination but also provides the result in the form of audio output. This project will benefit those who are visually impaired.

V. REFERENCES

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