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Identifying and authenticating Different Currency Notes and coins

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Abstract

Currency is a medium of exchange that serves as a useful store of value and is used as a token of exchange for purchasing products and services. Currency identification and authentication are some of the most challenging parts in the current time because the currency has its diverse forms like paper, coins, etc. As there are different forms there are different techniques to validate the currencies. Among them, image processing is one of the important techniques for currency identification. In the era of Data Science and Bigdata, a huge amount of data is being processed every day. In this research paper, we explored various currencies and their forms by extracting and analyzing their features in-depth using deep learning. Our system recommends an algorithm to detect forged notes/coins which helps people worldwide to prevent personal monetary damages.

Keywords:-

Image processing, Forged note, Feature extraction, monetary damages, forms of currency, authentication.

1. Introduction

As per the latest UN statistics, there are around 193 different countries and 180 different recognized currencies which are used as legal tender around the globe. A currency comprises various diverse forms like paper and a coin. Currency identification is required for both coin and paper. At present, the existing techniques concentrate more on paper currency rather than coins. Coins are the oldest but still the most used token in the current world at many places, like vending machines, and parking meters. Coins possess great historical value and in recent days many people consider numismatics as an interesting hobby. Currency Exchange also plays a key role in stock markets. When exports are more the trends seem to be positive and vice-versa.

An increase in the fake currency shoots up a counterfeit in the system, which leads to inflation and reduces the value of the currency which in turn leads to an increase in the prices of daily essential commodities.

As the globe transitions to digitization, even the financial system modernization should be done from protecting economic affluence and maintaining social consonance. With the existence of such systems in ATMs and ticket vending machines, the implementation of the same in day-to-day society will eliminate

counterfeit currency in a very good, reliable time with the best performance speed and accuracy. However, the pre-existing techniques fail to provide satisfactory accuracy which led to a continuation of the scope of research in this field of forged currency detection.

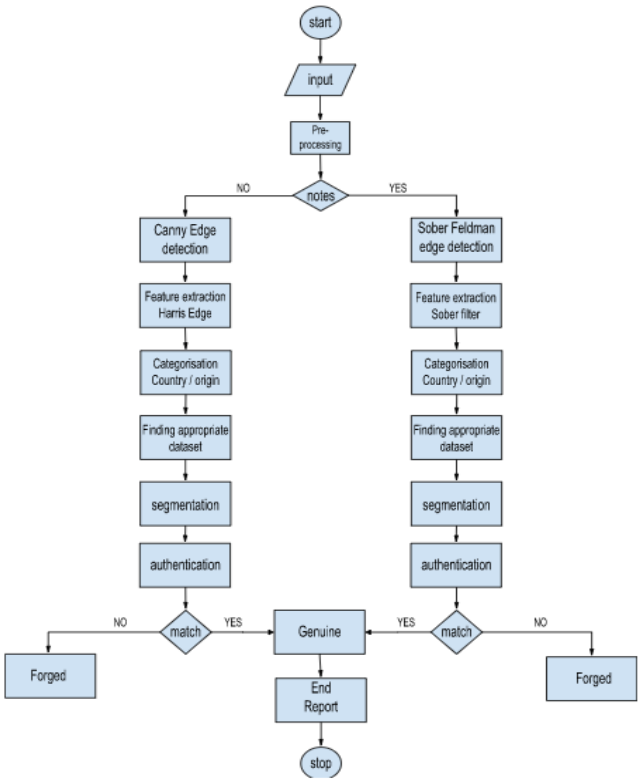
It is strenuous to come up with such a system because all the currencies are unique and each has its own characteristics and ghost features in it[2]. The forged one with almost a similar accuracy looks like a genuine one. It's really hard for a human eye to detect the forged one.

So we use digital image processing to extract the features of a currency for the best-desired results. The main intentions behind this digital image processing are processing speed and accuracy.

2. Objectives and Scope

- To carry out a thorough analysis of various coin/paper currencies and elements based on color, shape, size, and ghost features.[2]
- To identify the paper/coin currency origin.
- To formulate rules and regulations for detecting forged currency.
- To distinguish between genuine and counterfeit currency
- To reduce the computational complexity.

As a result, this research is about reducing counterfeit currency notes/coins using an artificial eye (image processing) in order to avoid massive monetary losses.



3. Image processing

Image processing is a technique that will be performed on an image to extract the required features and to improve the quality of an image[3].

In simple words, It is a type of signal processing in which the input and output is an image, where the required information is derived from the processed image.

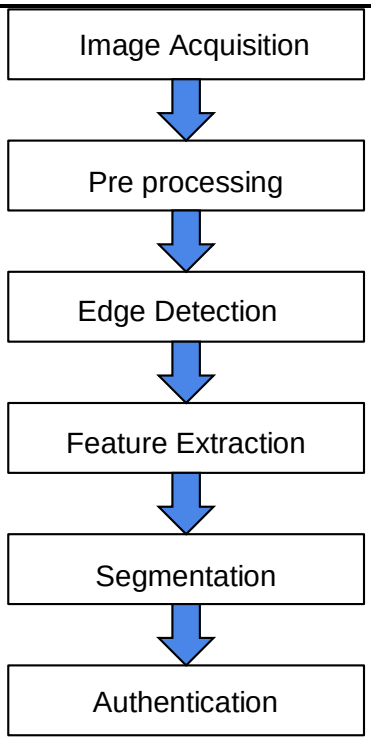
4. Canny Edge Detection

Canny edge detection is a multi-stage edge detection technique for a 3-D image. It reduces
the noise of an image and converts it into greyscale for the extraction of features[9].

5. Methodology

The paper is about the currency note/coin recognition system and it shows how the user can make the best desired and accurate results from the use of this application according to his/her
point of interest. The system provides currency note/coin authentication for different forms of currencies. The user just needs to feed the image of a coin/note to the system and the system will provide the user with the result. This system is less expensive and more efficient than existing systems for currency authentication. The existing systems are way too expensive and hence prove to be difficult to use. This system can be further improved to authenticate bank cheques and signatures for different countries, by providing larger datasets for better accuracy.

The process that takes place in the system is :
->It identifies the coin/note's origin country[4]
->It finds the value of the note/coin with respect to their exchange value
->It authenticates the currency note/coin.



The proposed system includes the development of a software tool using MATLAB[1], a Graphical User Interface (GUI). A method that involves the canny edge detection and LBP, PCA is implemented. Statistical analysis methodology has been used in various other applications such as face recognition and image analysis processing to determine high dimensional and corresponding data. The dataset comprises all the references that are used to acknowledge the different currencies. The instructional dataset contains all of the currency visuals that we have generated for evaluation for identification or verification, as well as all of the currency picture data that we must examine.

a. Image Acquisition

The process of retrieving an image is known as image acquisition. It may be from a digital camera, scanner, or any other source. It is the primary and most crucial stage in the sequence of the system[7].In this process, the currency note/coin images are retrieved and made ready for the next step.

b. Pre-processing

Pre-processing of an image is a technique that "prepares" the sample/image into an algorithm for desired tasks.
It is also used for processes like the PCA(principal component analysis)[10] to reduce the input image size.
It works on de-noising the image by analyzing the currency note's graphics and coin's impressions for re-dimensionalizing for future evaluation.

c. Edge Detection

This is the crucial step that differentiates coins and paper currencies
Initially, if the input image is a paper currency, its edges are detected using the Sobel operator which is also called the Sobel-Feldman operator or Sobel filter where it creates an image emphasizing edges to detect the edges properly[6].
Whereas for coins the edge detection technique is different. Here we use the Canny Edge detection technique[9] to detect the edges of the coins. It first converts the image into greyscale and prepares the image to perform further processing.
The main purpose of using the canny edge detection technique is to get more accurate details while dealing with huge datasets in an open cv.

d. Feature extraction

Feature extraction transforms the input data into a set of features using edge-based segmentation[4]. In this process objects on the input image are separated from their background which is the challenging part of any image processing technique. Feature extraction varies from coin to note. In coin, we extract the features from harris edge detection from the input image. Similarly, the Sober operator with gradient magnitude extracts features from notes, which are then compared to the original currency features stored in the database.
These extracted features will be classified based on:-
->Origin of the country:-Based on the features extracted like objects, templates we can find the origin of the nation.
->Finding the value of a currency:-After finding the country's origin, based on datasets we define the value of a currency.

e. Segmentation

The major aspect of segmentation is to disentangle the image so that it can be analyzed more easily[8]. It is the last step before authentication. Here we partition the image into multiple portions based on its qualities and properties so that is more meaningful and easier to analyze[11].

f. Authentication

It is a technique in the image-processing for final comparison and it is classified into two namely strict and selective authentication.
So, after being through the whole process the extracted image is then evaluated with original currency features from the database.
For the coins, SVM is used to compare the input image with the training dataset. As a result of SVM[5], fake coins and original coins will be classified.
Similarly, for the notes if the pixels of segmented images match with the original images of the database, then the currency note/coin is genuine otherwise it is a counterfeit.

6. Conclusion

Counterfeit currency notes/coins decrease the value of a respective currency. It leads to inflation and the country's economic downfall. In this paper, we came up with a way to reduce the forged currency

transmission in the market. The recommended system evaluates currency notes/coins with the help of image processing and various algorithms to detect counterfeit currency.

7. References

1) Georgie V Rajan, Dincy M panicker, Nisha Elizabeth Chacko, Jayalekshmi Mohan Kavitha V.K, An Extensive Study on Currency Recognition System Using Image Processing, Proc. IEEE Conference on Emerging Devices and Smart Systems (ICEDSS 2018

2) Veda Samhita Abburu, Saumya Gupta, S. R. Rimitha, Manjunath Mulimani, Shashidhar G. Koolagudi, Currency Recognition System Using Image Processing, Proceedings of 2017 Tenth International Conference on Contemporary Computing (IC3), 10-12 August 2017, Noida, India

3) Kalpana Gautham," Indian Currency Detection using Image Recognization Technique", IEEE 2020.

4) Sarthak Bhardwaj, Shivam Vishwakarma, Suneel Kumar ." Identification of Currency via Image Recognition", 2021, International Conference on Advanced Computing and Innovative Technologies in Engineering(ICACITE) Department of Electrical & Electronics Engineering, Galgotias College of Engineering and Technology, Gr.Noida, India

5) Anju Yadav, Tarun Jain, Vivek Kumar Verma, Vipin pal," Evaluation of Machine Learning Algorithms for the Detection of Fake Bank Currency',2021 11th ICCC.data science and engineering(confluence)| 978-1-6654-1451-7/20/$31.00 ©2021 IEEE | DOI: 10.1109/Confluence51648.2021.9377127

6) Li Liu, Ching Y.Suen," An Image-Based Approach to Detection of Fake Coins".IEEE DOI 10.1109/TIFS.2017.2656478.

7) Ms.Megha Jadhav, Dr.YogeshKumarSharma, Dr.G.M.Bhandari, "Currency Identification and Forged Banknote Detection using Deep Learning"

8) Shahbaz Khan, Yogesh Vadekar, Shardul Sant, Mahesh Jadhav." Analysis and Recognition of Currency Notes", International Engineering Research Journal (IERJ) Volume 2 Issue 2 Page 479-483, 2016, ISSN 2395-1621

9) Malatesh M, Prof B.N Veerappa, Anitha G." Indian Coin Matching and Counting Using Edge Detection Technique.,International Journal of Innovative Research in Computer and Communication Engineering. ISSN:2320-9801

10) Vishnu R and Bini Oman, "Principal Features for Indian Currency Recognition", Annual IEEE India Conference, 2014.978-1-4799-5364-6/14/$31.00 c 2014 IEE

11) B Vanajakshi, D Gowthami, and N Mounika, "Image-Based Currency Recognition System", International Journal of Pure and Applied Mathematics, vol. 114, Nov. 11, 2017, pp. 11-18,ISSN 1314-3395 .