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Detection of Counterfeit Currency of Rs.2000 and Rs.500 using MATLAB

Tanaya Deshpande[1], Prachi Puram[2], Sakshi Bondre[3], Sayli Khodankar[4], Kajal Khodankar[5], Virendra Yadav[6]

Research Scholar, Computer Science and Engineering Department, Priyadarshini College of Engineering, Nagpur, India[1, 2, 3, 4, 5]

Professor, Computer Science and Engineering Department, Priyadarshini College of Engineering, Nagpur, India[6]

Abstract: Money transactions are plagued by counterfeit notes, which are among the most common problems. In an evolving country like India, it has become a hazard to the economy as a rise in fake notes shoot up counterfeit money in the system, which lowers the value of real money. It also increases inflation, i.e. price of the articles and commodities due to more supply of money in the country Fraudsters can easily print fake notes using the latest hardware machines due to advances in printing and scanning technologies. Recognizing fake notes manually consumes plenty of time and workforce. Hence there is the necessity of a system that would make the counterfeit currency distinction process manageable and effective. This paper is an attempt on creating a system that will take the image of suspicious notes of Rs.2000 & Rs.500 and detect fake notes to give a promising solution for the counterfeit currency problem.

Keywords: Rs. 2000 & Rs.500, Image Processing, MATLAB, Counterfeit notes, manageable, effective.

I.INTRODUCTION

Countries around the world are suffering financially due to the availability of fake currency. Currency replication is a menace in the business market. In simple words, currency replication is a counterfeit currency that is presently arising due to sophisticated techniques like printing and scanning. In November 2016, Prime Minister of India Mr. Narendra Modi announced that existing rupee notes of 500 and 1000 cease to be valid currency and that step is taken to rein black money. The Prime minister also launched new rupee 500 and 2000 notes and cancelled the existing rupee of 500 and 1000 notes. A report published by the Reserve Bank of India (RBI) reveals that, over the past year, the rate of fake currency note detection decreased 31.4% relative to the previous year due to high security features on new notes that make them hard to counterfeit. Fake currency acknowledgement machine is usually applied in banks, enterprise firms, buying centres, railroad stations, authority's areas, institutions etc. But Common human beings haven't any device to locate suspicious currency and that they cannot understand the fake currency because it consumes lots of time to do it manually. That is the purpose the misbehaviour of counterfeit currency is finished straightforwardly in our economy

II.REVIEW OF LITERATURE

It is important to note that counterfeit money has existed since 1,600 B.C., when the Greeks began coining money. At that time, coins' edges were removed to obtain precious metal, and that metal was used to make counterfeit money. As early as 1861, India had paper money, but as of now the problem persists and the problem has led to the use of different types of printing techniques as well as the inclusion of different fraud-detection features in banknotes in order to combat fraud [2]. Yet, with the advancement of innovation and the development of science better approaches to recognize fake cash is emerging that make this errand somewhat more straightforward with a considerable measure of exactness. Current procedures incorporate 3D images, multi-shaded stripes, a fake pen that contains iodine (which responds with the starch present in paper cash) and the utilization of UV beams to distinguish counterfeit monetary forms [3, 4]. However, every one of the new instruments involved these days in banks are not open to non-specialists; consequently, the issue of identifying counterfeit cash stays in the development. In this paper, we set forward a strategy that can possibly go about as a layman's instrument to distinguish fake cash. The utilization of computerized picture handling for this reason gives us an efficient option in contrast to making a strong fake cash identifying framework that can help society all in all. The phony cash recognition for Bangladeshi notes dependent on picture handling has been finished by Ahmed et. al. [5]. One more methodology was proposed by Ogeilaet. al [6] for counterfeit money identification in electronic cash trade. The phony cash identification was of significant importance to the extent cash store in an ATM is concerned [7]. One more fascinating methodology was introduced by Santhanam. al. [8] by including polarization idea and holographic recognition

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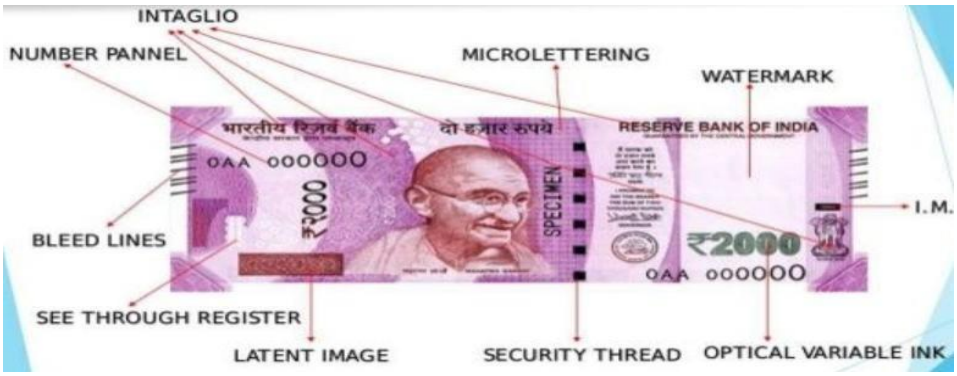
strategies alongside picture handling procedures. Alshayeji et. al. [9] embraced somewhat plane cutting methodology for counterfeit cash location. A survey of the new techniques for counterfeit cash discovery was introduced in [10] and can be alluded to for a definite portrayal. As of late, Limit. al. [11] introduced a methodology named hyper ghastly imaging for cash fake recognition. The higher goal brought about a decent exhibition; however it experienced the downside of the sluggish speed of checking. The answer for slow speed was given by Baberet. al. [12] by applying image processing for detecting edges of the paper notes. The edge detection methods were not so reliable, so, we have proposed new calculations for extricating security highlights. Enlivened by the cutting-edge improvements in the field of picture handling and the accessibility of practical picture procurement gadgets, we present a methodology for counterfeit money recognition dependent on picture handling. The proposed approach separates various elements from Indian money and utilizations them for counterfeit cash identification. The security highlights were removed utilizing different picture handling calculations and afterward format matching was done to distinguish counterfeit money. The nov0elty of the introduced approach is in picture handling applied for the extraction of safety highlights from the given pictures of money

III.FEATURES USED TO DETECT FAKE CURRENCY



SECURITY FEATURES OF INDIAN BANKNOTE:

A. Watermark
B. Latent Image
C. Micro-lettering
D. Security Thread
E. Identification Mark
F. Fluorescence
G. Intaglio Printing
H. Optically Variable Ink
I. See through Register

A. Watermark

All notes are from Mahatma Gandhi Series of banknotes, they contain watermarks with fade and shading effects and multi-directional lines in Mahatma Gandhi's windows...

B. Latent Image

On the surface of the memo, the upward stripes in the correct half of Mahatma Gandhi's illustration contain an inactive photo showing a unique denomination that is truly numerical. The slow-moving photos are simply major, but the notes are kept frivolous at eye level.

C. Micro-lettering

This feature appears between the vertical band and Mahatma Gandhi portrait. It contains the word 'RBI' in Rs.5 and Rs.10. The notes of Rs.20 and above also contain the denominational value of the notes in micro-letters. This feature can be seen well under a magnifying glass.

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D. Security Thread

Released in October 2000, notepad Rs.Rs.1000 contains security string with a compostable window engraved “Bharat" (Hindi), "1000" and "RBI" on the front. However, it is completely recessed on the other side. The Rs.500 and Rs.100 bills are relatively reflective and the seat belts have “Bharat" (Hindi) and "RBI" engraved on them. When you hold it on the light, the security string of Rs.500 is displayed as a single line. Notes of Rs.5, Rs.10, Rs.20 and Rs.50 include a clear and fully inserted security string with windows and accents "Bharat" (Hindi) and "RBI". He was. A security chain appears on one side of the Mahatma image. Rated before, the presentation of the Mahatma Gandhi series features a simple, cryptic and fully installed security sequence.

E. Identification Mark

An exceptional element in intaglio has been presented on the left of the watermark window on all notes with the exception of Rs.10/ - note. This element is in various shapes for different divisions (Rs.500-Circle, Rs.2000 - Horizontal Rectangle) and helps the outwardly hindered to distinguish the category

F. Fluorescence

The number plate is printed with fluorescent ink. The banknotes also have fibre optics. Both can be seen when the bills are shined under an ultraviolet light.

G. Intaglio Printing

Mahatma Gandhi's avatar, Reserve Bank seal, insurance and guarantee conditions, Ashoka pillar emblem on the left, RBI governor's seal printed with intaglio, such as for relief , can be felt by touch.

H. Optically Variable Ink

This is another safety highlight consolidated into Rs.2000 and Rs.500 ratings with a redesigned shading plan. The numbers 2000 and 500 on the front of the Rs.2000 and Rs.500 banknotes are printed exclusively with optical-factor ink, i.e., glossy mobile ink. The shadow of the number 2000/500 will appear green when the note is held at level, but will turn blue when the note is held at a point.

I. See through Register

The small flower is printed on both the front (blank) and inlaid (upward) side of the bill in an ascending stripe near the watermark with an exact consecutive inscription. The shot will appear as a single flower image when viewed against the light.

IV. METHODOLOGY

Initially, after receiving image data various steps have to be done to get results in the form of real or fake currency.

- Image Acquisition
- Pre-Processing
- Feature Extraction
- Comparison with Threshold

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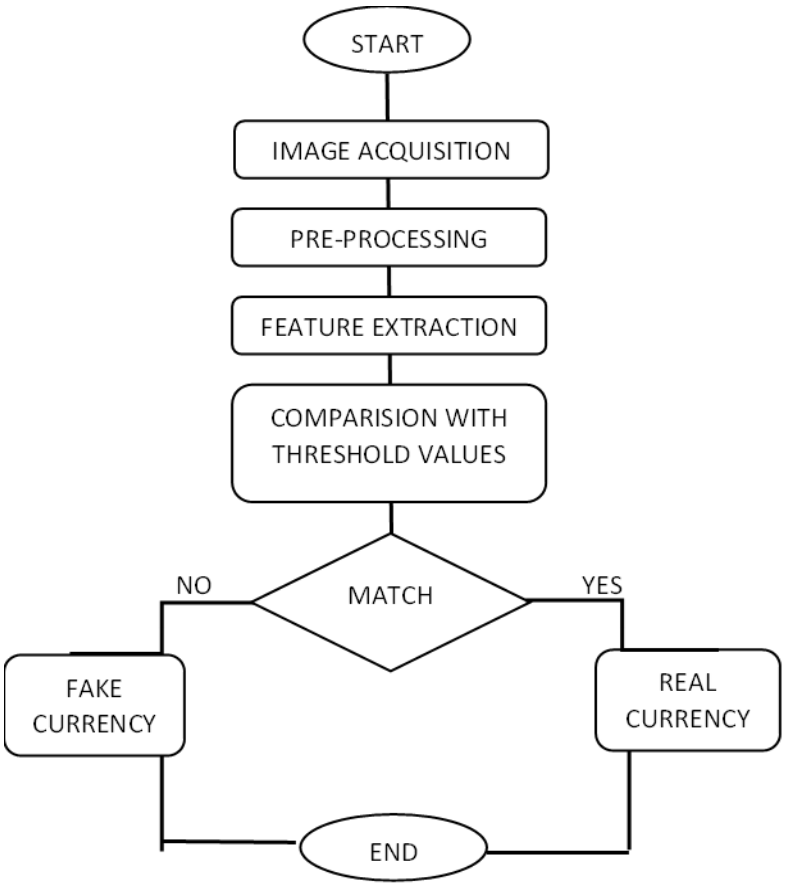

Image Acquisition- In image acquisition an image is given as input to the system, it is captured using camera or scanner and then passed to system for further processing.

Pre-processing- Data pre-processing is the process of converting, or encoding, the data so that the system can parse it easily. It is one of the most crucial phases. It is done to sharpen the image's features that are important for the analysis. By pre-processing images, we try to remove any unwanted distortions from the data or enhance certain features necessary for the next step of analysis and processing. Various phases of pre-processing are as follows

- Grey Scale Image Conversion

The RGB image contains loads of information that may not be necessary to manipulate. When you convert a RGB image into gray scale you discard lots of information which is not needed for processing and it reduces the complexity of code.

- Edge Detection

Edge detection is an image processing technique for detecting item boundaries within images. We can detect the strength and direction edges by filtering out noise.

- Image Segmentation

It is the partitioning an image into several regions or segments. Threshold segmentation is then used to obtain threshold values. The goal is to transform the image's representation into a having relatively simple and more meaningful image.

Feature Extraction- Unpacking features is one of the important and difficult tasks. It is expected that the features we are evaluating will extract the accepted information from the input file. One of the four important security measures discovered in this system, they are as follows

•Security thread
•Gandhiji's image watermark
•Intaglio printing
•Angular bleed lines on the left and right sides of the note

Comparison with threshold- After comparing the values of the training image with the input data image by checking the difference between certain threshold values we will be able to finalize it as a real or fake currency.

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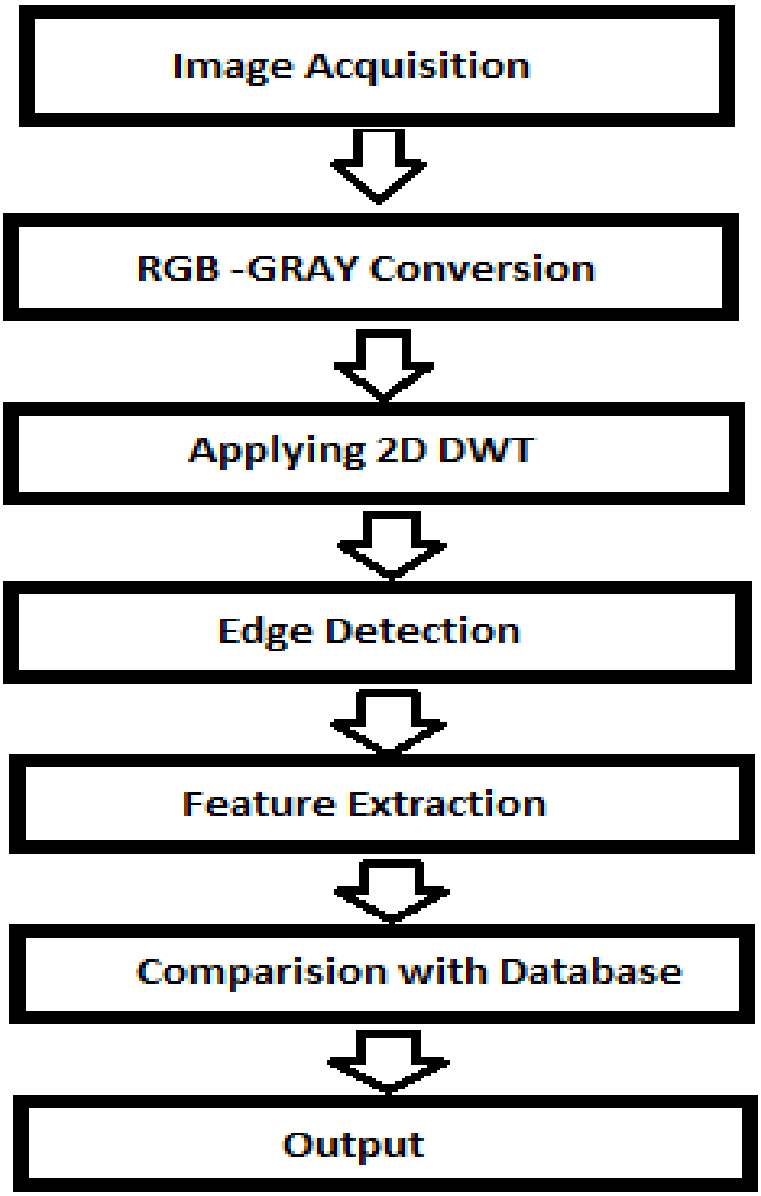
V. PROPOSED ALGORITHM FLOW

Following is the figure showing data flow chart of proposed algorithm.



VI. EXPERIMENTAL RESULT

After executing the code MATLAB will ask user to put name of the scanner or captured image in single quote with a line saying "Enter the image in single quote" after receiving input further processing will occur on image and output will be displayed based on comparison between threshold values of input and threshold value of trained data

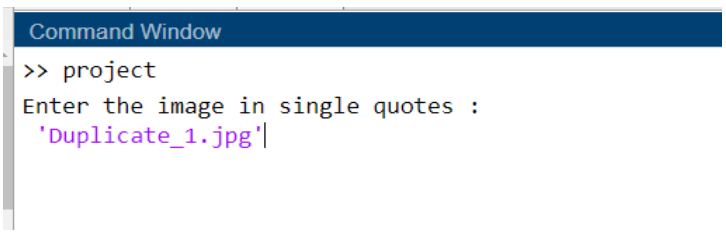


Fig 1. Input to the system

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- Fig 1. After running the program system asking the user for image in single quotes.

Fig 2.1. Testing Sample 1

Fig 2.2. Testing Sample 2

Fig 2.3. Testing sample 3

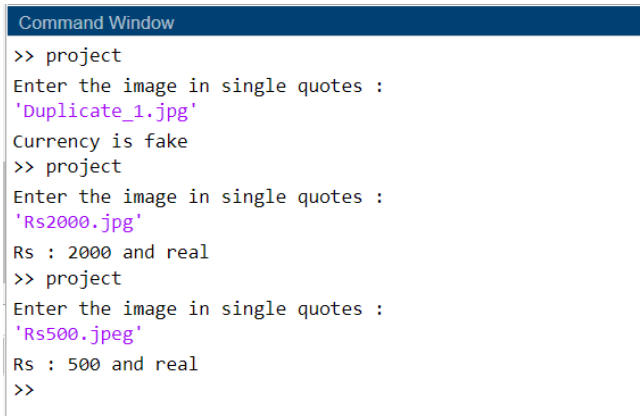

Fig 3. Output of the system

- Fig 3 shows the output of the system on giving different images of currency to check if they are real or fake.

VII. CONCLUSION

The essential goal behind the advancement of this undertaking is to make a framework for speedy and simple discovery of authentic and phony money notes. The proposed strategy offers an effective technique for fake cash location dependent on the actual impression of the notes. This task is a MATLAB based framework to naturally perceive the security elements of Indian money. Four significant security highlights are investigated in this venture which is the security string, Gandhi picture watermark and distinguishing proof blemishes on the left side and right half of the note. Picture Processing has been applied to remove the highlights and analyse them. Successful picture handling methods and calculations will furnish the minimal expense framework with solid and exact outcomes as shown by the testing results. The future point of view

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of this methodology is to utilize the framework to perceive other countries' monetary forms and to consolidate the submitted approach into a portable application so it very well may be a superior utility for commoners.

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