

**CURRENCY RECOGNITION SYSTEM USING IMAGE PROCESSING**Dr. M V RATHNAMMA<sup>1</sup>, Dr. V VENKATA RAMANA<sup>2</sup><sup>1,2</sup>Professor, Dept. of CSE<sup>1</sup>K.L.M College of Engineering for Women, Kadapa,<sup>2</sup>KSRM College of Engineering, Kadapa.**ABSTRACT**

In this research, we introduce a system based on image processing that can recognise currency without human intervention. Banknote denominations and countries of issuance may both be determined using the suggested approach. Only paper currency has been taken into account. This method first determines the country of origin based on a set of known characteristics of that country's currency, and then determines the denomination value based on characteristics of the note itself, such as its size, colour, and text. We analysed 20 of the most liquid currencies, including their most prevalent denominations. Our algorithm is quick and accurate in recognising exam notes.

**1. INTRODUCTION**

There are around 195 nations in the world, as stated in the United Nations Charter. There are now 193 member nations and 2 observer states in the United Nations. The United Nations estimates that there are 180 different currencies in use today. The sizes, hues, and textures of these various currencies are all one of a kind. Recognising individual currency notes is becoming more important as international commerce and tourism surge. When tourists visit other countries, they often use their own currency to pay for purchases and tip locals. This is because locals often lack familiarity with foreign currencies and the conversion rate associated with them. The suggested system uses image processing to provide a reliable and fully automated procedure. currency, it is critical to develop an automated system that can help identify notes quickly and accurately.

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understanding of computer science concepts like Digital Image Processing and Python forms the basis for this system, and it represents a baby step towards implementation in a system vital to the progress of industry.

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The steps taken by the system to generate the intended and achieved results are shown in a block diagram format in Fig. 1. To begin, upload a picture of a currency note that has to be scaled. check out. Next, the system runs the incoming picture through some fundamental image processing techniques to clean it up and make it suitable for comparison to the current image in the dataset. The system extracts data from pictures by analysing things like colour and texture. This information is used by the system to determine the currency and the note's denomination. After that, the given apiurl will be used to get the current exchange rate from the internet. The results are then shown on the screen.

**2. LITERATURE SURVEY****Digital Image Processing, 4th Edition**

In celebration of the book's 40th year in publication, this fourth edition incorporates suggestions from more than 30,000 readers from 150 academic institutions and 30 countries. Their recommendations led to the expansion of our understanding of neural networks and deep learning techniques like convolutional and scale-

free neural networks. Such techniques include the scale-invariant feature transform (SIFT), maximum stable extremal regions (MSERs), graph cuts, k-means clustering and super pixels, active contours (snakes and level sets), and accurate histogram matching. Spatial kernels and spatial filters are now better explained, and the presentation of data about picture alterations is more intuitive. The book's examples and exercises have been extensively rewritten and enlarged. This is the first book of its sort, and it includes MATLAB problems at the end of the book to assist both teachers and students practise what they've learned.

### **An Examination of Paper Currency Identification Techniques**

"paper currency identification" is a method that uses image processing to ascertain the country of origin of foreign money. The value of paper currencies from various countries might be boosted by linking them together. It creates additional work for routine financial bookkeeping. However, the vast majority of currency identification gadgets and tools are intended to detect counterfeit banknotes. As a result, the function played by the money identification system is vital and the system itself must be very trustworthy. To accurately identify paper currency, images must be preprocessed, characteristics extracted, and then categorised. This article reviews published works that discuss several techniques for identifying paper cash. Finally, we found that the identification system's accuracy may be improved by the use of several efficient processes such pre-processing and feature extraction.

### **Real-time paper cash recognition system**

The phrase "money number recognition" encompasses the acceptance of monetary value, currency, and legal tender. The mechanism for verifying monetary values is implemented as a core component.

Cash-related equipment is the most often used kind in self-service systems. In this work, we provide a system for locating monetary data. Accumulating grey value is what enables the speedy placement of a monetary value.

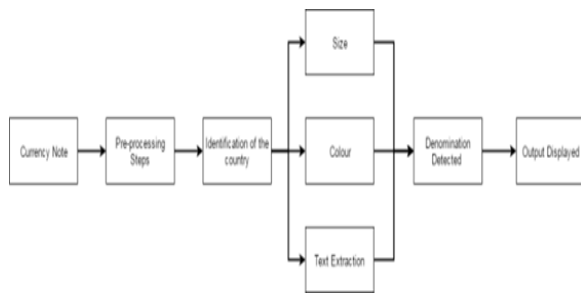
The least squares approach is used to calculate the boundary line of the money number region. The number of slant corrections is generated using the geometrical rotation methodology and the grey adjacent interpolation method. Realisation of character recognition relied on a number of factors, including the formation recognition judgement tree, the character structure characteristic, the imaginary line and character of the point of junction characteristics, and others. The results of the simulation experiment show that the technique achieves respectable recognition accuracy even when faced with rejection.

### **Extraction of serial number on bank notes**

With the goals of reducing financial crime, increasing financial market stability, and bolstering social security, there has been a rise in interest in the research of RMB (renminbi bank note, China's paper currency) serial number identification in recent years. RMB recognition accuracy relies heavily on extraction, which is difficult because to differences in the background and illumination. In this research, we provide a new approach to deciphering RMB characters from digitised RMB photos. First, skew correction and orientation identification are used to zero in on the precise location of the RMB serial number. Next, a mixed thresholding technique is used to binary-ize the observed text region. Then, it is shown how to extract the RMB characters from the binarization using a local contrast average technique. The results show that the proposed binarization technique beats the state-of-the-art alternatives. We give 79.68% overlap recall and 98.10% overlap accuracy when it comes to character extraction.

## **3. SYSTEM ANALYSIS**

### **System architecture**



## EXISTING SYSTEM

The UN charter states that there are about 195 nations in the world. whereby two observer states and 193 member nations of the UN are present. 180 currencies are in use globally, according to the United Nations. These currencies all vary in terms of qualities like size, colour, and texture. It is important to accurately identify each currency note in the age of constantly increasing levels of international commerce and tourism. Nowadays, when people travel abroad, they use their home currency to make purchases or pay bills. However, because the majority of locals are unfamiliar with foreign currencies and do not know how much one foreign currency is worth in their own, it is necessary to create an automated system that makes note recognition quick, simple, and effective.

### Existing Algorithm

The local binary patterns (LBP) visual descriptor is a quick and simple texture operator that may be used for classification in computer vision by thresholding the area around each pixel and treating the resulting binary integer. Because of its practical discriminating strength and computational simplicity, the LBP texture operator has gained widespread acceptance. It provides a unified framework within which the many statistical and structural models used in texture analysis may be applied. Perhaps the biggest practical benefit of the LBP operator is its tolerance for monotonic gray-scale fluctuations brought on by things like changes in illumination. Its computational ease allows for

real-time picture analysis even under challenging settings.

### Disadvantages

1. Critically important to fame.
2. Duration of the procedure

## PROPOSED SYSTEM

The method is resilient and automated thanks to the suggested technology, which is based on image processing. To demonstrate the method, we provided an example using INR and USD. Our familiarity with computer science tools like Python and Digital Image Processing form the basis of this system, which requires just a little amount of effort to incorporate into a larger system vital to the development of commercial enterprises. For this project, we have the INDIAN Rupee and the US Dollar in mind. Project may grow to include additional currencies based on use.

### Algorithms Used

Edges in a digital image are sharp, locally-varying transitions in brightness. An edge is the boundary between two unconnected regions formed by a collection of connected pixels. You may find three distinct varieties of edges:

- Horizontal slits
- Margin on the side
- Angular corners

Edge detection is a method for visually segmenting an image into distinct regions. It is a common technique in the field of digital image processing, including

Pattern recognition and image morphology

- Obtaining Characteristics

Users may use edge detection to check an image's details for a significant grayscale transition. This texture delineates the transition from one part of the image to the next. It reduces

the amount of information in an image while preserving its essential features.

### CNN Algorithm

The first layer of a convolutional neural network (CNN) is used for feature extraction. This layer's features will be taken from the original multidimensional dataset used to train the model, which may be images or something else entirely.

Second, features will be selected by using a layer called pooling or max pooling.

The third component, the activation module, applies RELU to the input features in order to filter out superfluous details while keeping the most important ones.

The fourth layer is called "flatten," and its job is to flatten a multidimensional input feature into a one-dimensional input array.

5) Dense: This layer may connect two layers together to further filter the input characteristics from the previous layer to extract the most important information from the dataset and provide the most accurate forecast.

### Advantages :

1. Recognising currencies is fairly simple when machine learning is used.
2. Recognition of currencies takes very little time.

## 4. MODULES

### 1. Open Image:

When you click on this button, a memory prompt will ask you to choose a picture of money. You will instantly return to the window after choosing a picture, where your choice will be shown in the application window.

### 2. Recognize:

To recognise currencies, use this button. When you click this button, currency identification begins, and you'll see results on the programme window shortly after.

### 3. Conversion

The currency conversion button is located here. When you click this button, a currency conversion will begin, and you will see the results on the application window shortly after.

### 3. Reset:

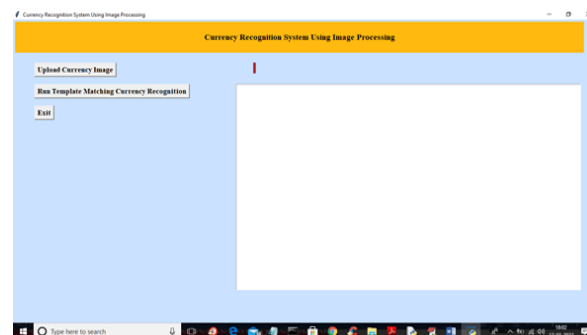
The programme window may be cleared with this button.

### 4. Exit:

This serves as a straightforward exit button that will cause you to leave the programme and end all of its operations.

## 5. RESULTS

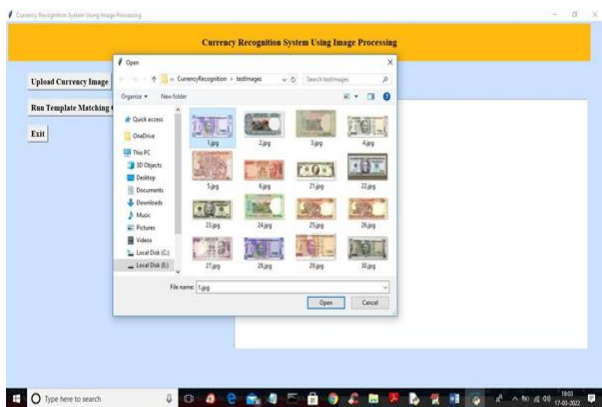
To reach the screen below, double-click the 'run.bat' file to launch the project.



Home Page

To submit money photos similar to the one below, click the 'submit money Image' button in the previous screen.





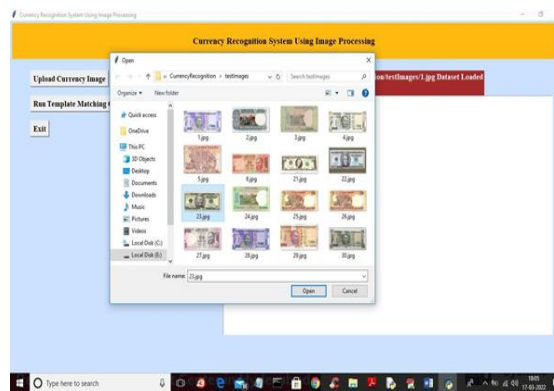
Upload Currency Image

By choosing and adding the "1.jpg" file to the screen above, clicking "Open" to load the picture, and then clicking "Run Template Matching Currency Recognition," you will obtain the result seen below.

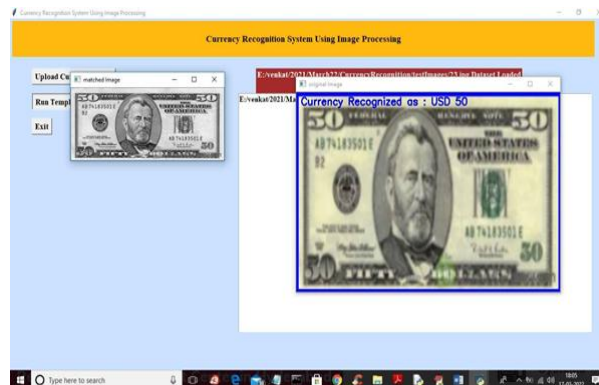


Selecting and Uploading

The training picture template is shown on the top screen, while the real image is shown on the bottom screen. By using a template matching algorithm, we can forecast the right currency not, which is INR 100. Similar to that, you may try by uploading another picture.

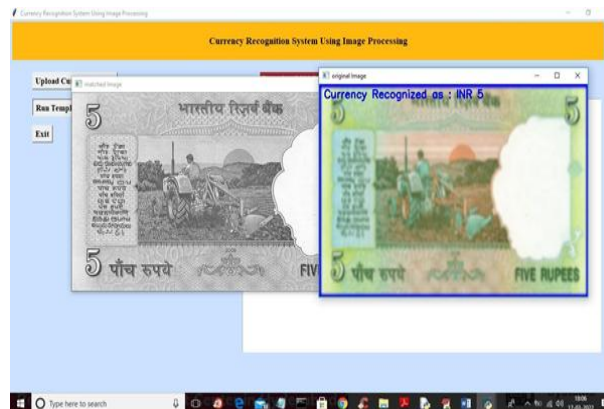


Upload Other Image

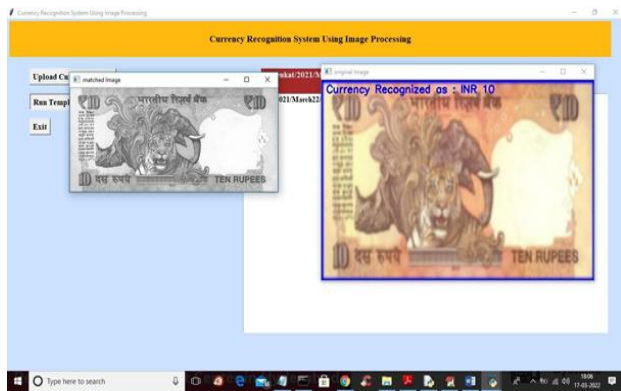


Currency Recognized

On the screen above, the money is labelled as USD 50 in blue letters.



Other Output 1



Other Output 2

## 6. CONCLUSION

In the end, we developed a system that can identify the country of issue, language, and denomination of a given banknote with 100% accuracy. Currently, our system can handle twenty of the most widely used currencies, but as we've already discussed, this may be expanded to include currencies from any country. Compared to the time-consuming and inaccurate pixel-by-pixel comparison method, our technique is a huge improvement. We found that our suggested approach is much faster than the traditional method, with an average recognition time of 5.3 seconds for both currency and denomination. However, our method only accounts for a limited number of different currencies. While the system is capable of supporting more than 180 different currencies, we will only be supporting the 20 most often used ones. The system also has to be effective at spotting altered music. Our system is useless under these settings.

## FUTURE ENHANCEMENT

Extra time and effort will be invested in the coding phase so that we may include a raw data set into the final product and verify the authenticity of the currency.

## REFERENCES

1. Pearson Book on Digital Image Processing 4th Edition By Gonzalez (2018).

2. Programming and Problem Solving with Python 1st Edition by 'Ashok Namdev Kamthane' and 'Amit Ashok Kamthane' 2017

3. Identification of Paper Currency Techniques: A Survey by S. Sahu and T. Verma International Journal of Science Technology & Engineering (2016)

4. Recognition system for real time paper currency. IEEE 2012.

5. Extraction of serial number on bank notes. IEEE.

6. Digital Image Processing And Analysis: Human And Computer Vision Applications With Cviptools, 2nd Edition by Scott E Umbaugh, T and F India.

7. An intelligent system for paper currency recognition - robust features Journal of Intelligent & Fuzzy Systems - A. Sargano, M. Sarfrazb, and N. Haq, 2014.

8. Paper Currency Recognition - Journal of Advanced Computer Science and Technology Research , 'Althafiri E, Sarfraz M', 'Alfarras M. Bahraini'.

9. Study of Printing Identification Based on Multispectrum Imaging Analysis, Proceedings of the International Conference on Computer Science and Software Engineering, By Liu Q, Tang L. p. 229 – 232; 2008.

10. <https://www.google.com>

11. <https://www.geeksforgeeks.org/digital-imageprocessing>

12. <https://www.elprocus.com>

13. <https://www.worldometers.info/geography/>

14. <https://www.worldatlas.com/articles/how-many-currencies-are-in-the-world.html>