Journal of Nonlinear Analysis and Optimization Vol. 14, Issue. 2 : 2023 ISSN : **1906-9685**



CURRENCY RECOGNITION SYSTEM USING IMAGE PROCESSING

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ABSTRACT

In this paper, we proposed an automatic currency recognition system using digital Image processing methodology. The following project mainly focuses on the recognition of currency by its image or photograph. It will help users to recognize details about currency like Currency Value, Currency Name, the value in INR, EURO, and US Dollar. It works using the main characteristics of currency notes such as size color or printed text on it and also depends on differ in currency notes within the same country. We have considered INDIAN Rupee and US Dollar, the most used currencies in our domain with their denominations. This system works accurately and also able to quickly identify the currency notes.

Introduction

All economic activities relating to production, distribution, consumption etc. can be motivated by money. Savings and investments can be made in the form of capital information. Thus, money is important in the dynamic society for everything. As our economy is moving towards the development there are many other things which are downsizing it. One of those things is production and usage of forged bank notes.

The worst hit of this action is mostly average citizen as fake banknotes have become so deeply embedded in the Indian economy that even bank branches and ATMs are disbursing counterfeit currency. From petrol stations to the local vegetable vendor, everybody is wary of accepting banknotes in denominations of Rs.500 and Rs.1, 000 as a majority of them are almost impossible to tell from genuine banknotes. The usual effect of counterfeit on economy is inflation. The only solution that is presently available for common man to detect counterfeit currency is Fake Note Detector Machine. This machine is mostly available only in banks which is not reachable every time by average citizen. All these scenarios need a kind of solution for common people to judge a forged bank note and to refrain our currency from losing its value.

A Digital Image processing is an area characterized by the need for extensive experimental work to establish the validity of proposed solutions to a given problem. It encompasses processes whose inputs and outputs are images encompasses processes that extract attributes from images up to and including the recognition of individual objects. MATLAB is the computational tool of choice for research, development and analysis. The image formats supported by MATLAB are JPEG, PCX, TIFF, PNG etc. Characteristic extraction of images is challenging work in digital image processing. It involves extraction of visible and some invisible features of

Indian currency notes. A good characteristic extraction scheme should maintain and enhance those characteristics of the input data which make distinct pattern classes separate from each other [6][8].

PROBLEM STATEMENT

As there are more than 180+ currencies all over the sphere. It is hard to identify and remember the currencies. People may remember for shorter time as time passes, they may forget. So, this may cause problems in businesses where people who deals with number of currencies. Hence, we suggested a computerized method which accurately identifies name of the currency, origin and value of the note without any human interventions.

OBJECTIVE

The main objective of this system is to recognize currency using image processing technique.

The system performs image processing on inserted image and match with trained data set.

To save user time it needs device should be connected to internet so that it can extract current exchange rate of that currency into other mainly used currencies.

For using this no need for high specs hardware and easy to use.

EXISTING SYSTEM

According to the UN charter there are around 195 countries around the globe. In which 193 countries are members of the UN and two are observing states. According to The U.N., worldwide there are 180 currencies. All these currencies are different in characteristics such as size, color and texture. In the era of rapidly growing levels of trade between countries and also tourism all over the world, it becomes necessary to recognize each currency note correctly. Now a days people travel to different countries, they use their native country currency in paying bills or buying stuffs and because most of the local people are not familiar with the currency other than their own country currency and also not familiar with the exchange rate of that currency in their own currency, it becomes necessary to develop an automated system that helps in recognition notes easily, faster with efficiency.

PROPOSED SYSTEM

The proposed system is based on image processing and makes the process robust and automatic.

We used INR and USD as an example to illustrate the technique. This system is based on our knowledge about computer science technologies like Digital Image Processing, python and also a small step to implement in a system that is most important for industrial development. We had considered INDIAN Rupee and US Dollar for this project. Project can expand for more currencies inclusion according to use.



Fig. 1 Block diagram of the Proposed System

MODULES

Open Image

When you click on this button then it will direct you to memory and ask you to select image of currency. After selecting an image, you will automatically return to the window and your selected image will be visible in application window.

Recognize

This button is used for currency recognition. After pressing this button currency recognition will start and you will get output in few seconds on the application window.

Conversion

This button is used for currency Conversion. After pressing this button currency Conversion will start and you will get output in few seconds on the application window.

Reset:

This button is used to clear the application window.

Exit

This works as simple exit button; you will come out of the application and all processes of application will be terminated.



RESULTS

Firstly, we run the application, welcome window will open as in Figure. Welcome window have 4 buttons 'Open Image', 'Recognize', 'Result' and 'Exit' button. Open Image: When you click on this button then it will direct you to memory and ask you to select image of currency. After selecting an image you will automatically return to the window and your selected image will be visible in application window as in Fig. 9. Recognize: This button is used for currency recognition. After pressing this button currency recognition will start and you will get output in few seconds on the application window as in Fig. 12. Reset: This button is used to clear the application window. Exit: This works as simple exit button, you will come out of the application and all processes of application will be terminated

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In above screen you can see exchange rate is giving error when trying to access free account. To run project double click on 'run.bat' file to get below screen

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In above screen click on 'Upload Currency Image' button to upload currency images like below screen

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In above screen selecting and uploading '1.jpg' file and then click on 'Open' button to load image and then click on 'Run Template Matching Currency Recognition' button to get below output

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In above screen first image is the training image template and second image is the original image so by applying template matching algorithm we can predict correct currency not and that currency not recognized as INR 100. Similarly you can upload other image and test

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In above screen in blue colour text we can see currency identified as USD 50



Note: this is computer program not human so it may recognize 7 images out of 10 correctly as no computer algorithms are 100% perfect

CONCLUSION

In conclusion, we have designed a system that accurately identifies both the country of origin and the denomination of a given banknote. Our system currently supports twenty of the most common currencies, but can easily be extended to more countries based on the method we have previously described. When compared

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with the crude algorithm of pixel-by-pixel comparison, our algorithm is considerably more accurate, and takes less time. We have thus learned that our proposed algorithm is able to identify currency and denomination in an average of 5.3 seconds, which is a considerable improvement over the crude algorithm. However, our proposed system only considers a limited number of currencies. There are 180+ currencies that can be included in the system, and we have chosen to only do for 20 of the most common ones. Also, the system should be effective in identifying notes that are mutilated. Our system is not effective under this consideration. This can be worked on in the future.

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.googlescholar.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-manycurrencies-are