CURRENCY RECOGNITION SYSTEM USING CANNY EDGE DETECTION, COLOUR AND TEXTURE ANALYSIS

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ABSTRACT

BACKGROUND

Among the 196 total countries in the world, there a total of 180 different recognised Paper Currency Notes. With the increasing automation of systems like Electronic Banking, Currency Monitoring System and Foreign Exchange, the demand to detect the Name and Country of the Currency has increased rapidly. The techniques used now are either treating the currency notes by x-ray or UV lights or scanning the notes on to the system. All these techniques slowly degrade the quality of the currency note. This paper proposes the use of a mobile scanning application, which does not affect the quality of the note. Once the .jpeg or .png file of the image is ready, it is to be uploaded on the system. The Currency Recognition System provides a simple Graphical User Interface (GUI). For using the GUI, very little level of knowledge of computers is required. Once the image is uploaded, it is pre-processed for further processes like Edge Detection, Colour and Texture Analysis. Once the above-mentioned features are extracted, they are matched to the Currency Notes in the database using Neural Networking.

KEYWORDS

Currency Recognition, Region of Interest, Feature, Canny Edge Detection, Histogram, Mobile Scanner Application.


BACKGROUND

All the Currencies above mentioned look totally different to each other by some or the other feature. It is practically impossible for any person working in any of the offices like foreign exchange to remember all these and recognise the name and the exact value of the rate of conversion of the currency. If the person makes even a little error, it may result into a huge loss to either the firm or the customer, which is not acceptable. Our aim here is to help these people to recognise the currency notes within the smallest possible time and to a greatest accuracy. The amount of the quality deterioration is also reduced. The price of the system is also minimal as the user doesn’t need a special image scanner for this purpose, a free mobile application will be enough. The recognition of the Denomination of the Currency Note is left to the user as that has never been a problem. The conversion of the total value is also very simple once the conversion rate to Dollar is given.

The approach discussed here is based on Image Processing on MATLAB to extract features. Image processing involves changing the nature of the image by preprocessing it by different methodologies for different features. The pre-processed image is then passed on to multiple Image Processing algorithms that involve the extraction of Colour, Texture and Edges of the image. Once the features are extracted, they are compared to the features of the images stored in the database using Neural Networks and Pattern Recognition.

Figure 1. Block Diagram of the Currency Recognition System

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Obtain the Image using a Mobile Scanner Application
The image is obtained using a Mobile Scanner Application and exported as a .jpeg file to the system. The system uses a GUI with just one easy to use Load Button, which uses the open file command to upload the Image. Other interactive text block gives the output and the axes shows the image uploaded on the system.

Apply the Image Preprocessing Algorithms
Different Image preprossing algorithms are required to make the task of extracting the different features from the image. In this case, the different algorithms involve resizing the image, blurring, gray scaling, noise removal using filters and thresholding. These algorithms help us in easy detection of ROI (Region of Interest) and boundaries of the image.

Detection of Boundary and Cropping
For Boundary Detection, the requirement is only a binary image that is the colour ranging from black to white. The method used here for Edge Detection is Canny Algorithm, which is said to be giving best results for Edge Detection by earlier studies.

Extract the Desired Features
The next step is to extract and get a combined resultant values of the features extracted in step 3. The final feature is the combination of the colour, texture and the edge. Colour Matching involves calculating the colour moments like Mean, Colour Variance and Colour Skewness. The Edge detection technique is already discussed. For the Texture Matching, the Gray Level Co-occurrence matrix of the Gray Scale Image is extracted. Then, finally all the features are combined to get a single Structured Matrix.
CONCLUSIONS
The system focused on the successful implementation of a Currency Recognition System wherein a Currency Note is scanned as an image via a Mobile Scanner Application. This Image is then processed at multiple stages to prepare the image of the note for feature extraction methods. The features are then extracted from the note separately and combined to give a combined matrix of values of the features. The features that were focused on this system are Colour, Texture and Edge Detection. The Canny Edge Detection methodology is used to get fast and accurate results. Once the features are extracted, they are compared to the images stored in the Database using the Neural Networks to print the name and its value in Dollars.

Further Enhancements
Further, the plan to add all the denominations of these currencies and also use Optical Character Recognition to read the denominations of the currency and give the exact value of the note is soon to be executed.

Once finished with the above task, the plan is to add as many currencies as possible to our database.

REFERENCES