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Currency Recognition System Using Image Processing

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Abstract: ***The innovation of currency recognition means to pursuit and concentrate the noticeable and additionally shrouded blemishes on paper money for effective arrangement. Money Recognition and change framework is actualized to decrease human influence to naturally perceive the sum fiscal estimation of cash and change over it into alternate monetary forms without human supervision. The product interface that we are proposing here could be utilized for different monetary standards .Many a circumstances, cash notes are foggy or harmed; a large portion of them have complex plans to improve security. This makes the undertaking of money acknowledgment exceptionally troublesome. So it turns out to be essential to choose the correct elements and appropriate calculation for this reason. The fundamental necessities for a calculation to be considered as for all intents and purposes implementable are straightforwardness, less multifaceted nature, fast and proficiency. Our primary point is to outline a simple however productive calculation that would be helpful for most extreme number of monetary forms, since all monetary forms have diverse security highlights, making it an intense employment to plan one calculation that could be utilized for acknowledgment of all accessible monetary forms. Composing diverse projects for all is additionally a monotonous occupation. The point of the venture is to perceive the monetary forms and not validation.***

Keywords: Currency, feature extraction, eucledian distance, voice generation

1. Introduction

1.1 Basic Concept

All currencies around the world look totally different from each other. For instance the size of the paper is different, the same as the color and pattern. The staffs who work at places like money exchange offices have to distinguish between different types of currencies and that is not an easy job. They have to remember the symbol of each currency. This may result into wrong recognition, so they need an efficient and foolproof system to aid in their work. The aim of our system is to help people who need to recognize different currencies, and work with convenience and efficiency. With development of modern banking services, automatic methods for paper currency recognition become important in many applications such as vending machines. It is very difficult to count different denomination notes in a bunch. This project proposes an image processing technique for paper currency recognition and conversion. The extracted region of interest (ROI) can be used with Pattern Recognition and Neural Networks matching technique.

1.2 Need

The aim of our system is to help people who need to recognize different currencies, and work with convenience and efficiency

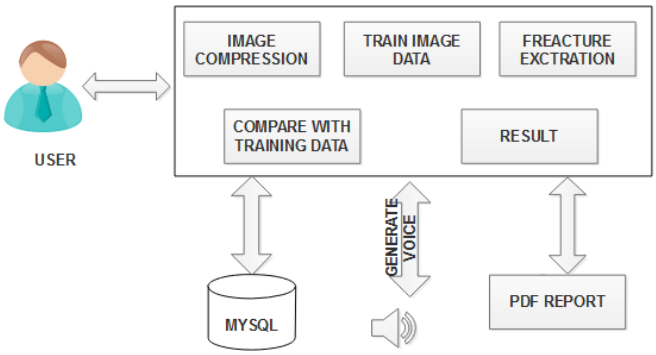
1.3 Application

The Currency recognition application is useful at many place like banking, money exchange offices etc.

2. Problem Definition

This project is basically an idea to design system which is used for currency recognition .Each country has its own different currency so it is very complicated task for people to recognize the currency. In manual currency recognition system , there are many problems. We will be developing this system to overcome those problems which have been faced.

2.1 Architecture of System



3. Literature Survey

The survey has proposed by Jain et al. [1] an image processing method to extract paper currency quantity. The extracted ROI may be wormed with Pattern Recognition and Neural Networks matching method. First they obtain the image by easy flat scanner on glue dpi with an exacting size, the pixels level is place to attain image. A few filters are useful to extract denomination assessment of note. They employ dissimilar pixel levels in different quantity notes.

The paper was presented by Mirza and Nanda [2] a technique for validating paper currency of India. The technique employs four characteristics of paper currency plus identification mark, security thread, latent image and watermark. The scheme may extract the hidden features i.e. latent image and watermark of the paper currency. The anticipated work is an attempt to propose an approach for the characteristic extraction of Indian paper currency.
The review was presented by Chakra borty et al. [3] a widespread review of study on assortment of developments in existing years in classification of currency denomination. A number of techniques applied by a diversity of researchers are proposed briefly in organize to evaluate the condition of art. In this paper the author also focusing primarily on currency detection system including different steps involved in it like image attainment, feature extraction and categorization system uses different algorithm.

The paper was demonstrated by Reel et al. [4] of the heuristic analysis of characters and a number of serial numbers of Indian currency notes to recognition of currency notes. To distinguish a character from a given currency image, there is require to extract feature descriptors of such image. As an extraction technique significantly affects the quality of entire OCR process, it is very significant to extract features, which will be invariant towards the different light conditions, employ font type and deformations of characters caused by a distort of the image. Heuristic analysis of characters is complete for this reason to get the precise features of characters previous feature extraction in currency recognition. The survey was focused by Pawade et al. [5] on existing techniques and systems for currency recognition stands on image processing. They have discussed both invent recognition and paper currency recognition techniques separately. Finally they summarized their work in tabular form which is very cooperative for study at a glance. Even though there is lot of research work done on this topic, still there are a number of issues related to the accuracy and efficiency of the method. Thus achieving maximum efficiency and getting 100% correctness for heterogeneous currency, when physical state of currency is not that much good, will always be a defy for researchers.

4. Algorithm

Obtain the image of the target currency using one of the possible methods (e.g. : Camera, Scanner, etc)

- Use Image Pre processing algorithms to change the nature of the image in order to extract required information.
- Detect the boundaries and extract the ROI (Region of Interest) using cropping.
- Extract the desired features.
- Compare the extracted feature values with ideal feature values that are calculated.
- Display the outputs.
- Voice generation
- Currency PDF report

Description of the Algorithm:

Aim of the proposed algorithm is to develop an algorithm which can be easily applied to number of different currencies and has good efficiency and high speed.

Step 1: Obtaining the Image: An Image can be obtained using number of different equipments, such as cameras or Scanner. The only precaution we need to take is, try to maintain a controlled environment so that the external factors won't affect the feature values.

Step 2: Pre processing Operations: Pre processing operations are required to alter the nature of the image, which makes extraction of features easier. In this particular case, pre processing operations involve, blurring, grayscale conversion, thresholding, noise removal using filters, color blurring RGB to HSV conversion. These operations help us in detecting boundaries, cropping the ROI and Calculating color features.

Step 3: Boundary Detection and cropping: For boundary detection, we require a binary image, which has only 2 colors, black and white. All we do in this process is simply, separate the background and the foreground, and separate the ROI.

Step 4: Feature extraction:
The next step is to extract required information from the cropped ROI image. So from the binary image we find out the dimensions of the currency and find out the aspect ratio, aspect ratio remains same in all light conditions, so it becomes an important feature for recognizing image. Then we compare the aspect ratio of the target image with the ideal aspect ratios of all the denominations of that particular currency. The other features we extract are H, S and V of particular blocks of the currency. We divide the currency in number of blocks. We extract the HSV values of all the pixels and take average of their H, S, V features and again compare them with the values from the database. We use Euclidian distance equation for finding out the average values of the differences between the target and Ideal HSV features

$$dp, q = \sqrt{(h2 - h1)2 + (S2 - S1)2 + (V2 - V1)2}$$

Where, (H1, S1, V1) = Target image feature set
(H2, S2, V2) = Ideal feature set.

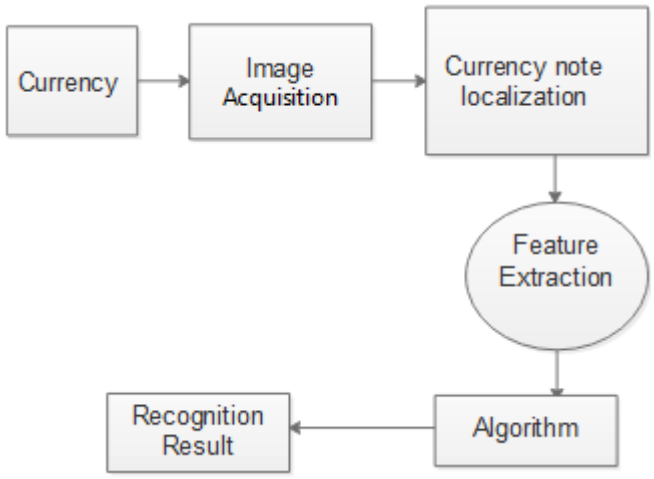
Step 5: Displaying results:
To display the results, we have built a graphical User Interface (GUI); where we are also providing a feature to calculate currency conversions for which we are trying to obtain the conversion rates from the Internet.

Step 6: Voice generation:
In order to detect the currency, we have an additional functionality built within the system, which is Voice generation module. It provides a feature to detect the currency and generate a voice message about it.

Step 7: Currency PDF report:
This is another additional module in the system which displays the currency information in the PDF format along

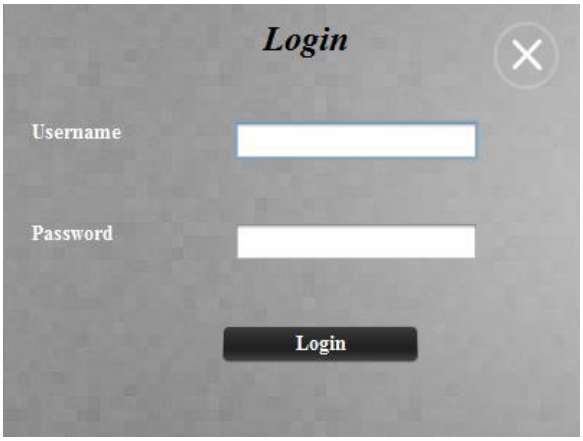
with HSV value. This helps the user to obtain the exact details about the currency.

4.1 Data Flow Diagram

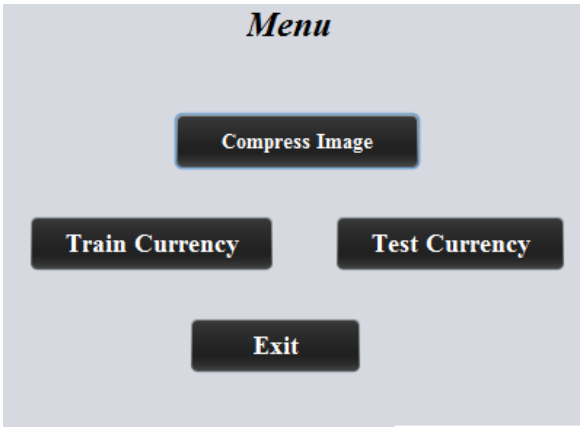


5. Results

a. Login module is the first window of our desktop application by which user can access the system.



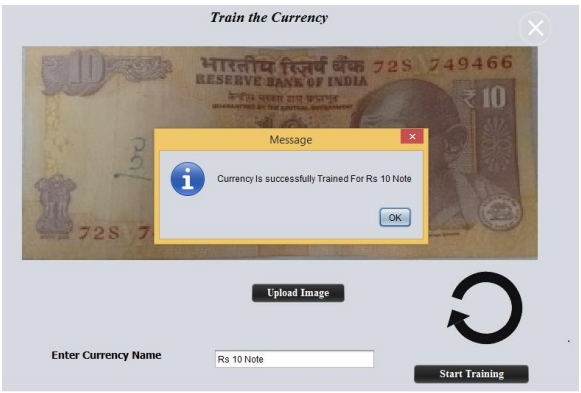
b. This is menu which is having four sections compress, train, test and exit.



c. In the compress image module we are compressing the size of image before uploading for getting faster result**.**

d.This is the train module here we are uplaoding the image for training and also entering the currency name**.**

e.The image is successfully trained and stored into the database by having h1,s1,v1 values**.**



f. This test module where we are uploaded the image & and check currency will start testing.

g.We get h2,s2,v2 and by using eucledian distance we get the result that is currency is detected.

h. We get the result in the pdf format where we can get the currency name and h,s,v values**.**

6. Conclusion

In this project, we actually worked on certain modules of the system which helps for currency recognition. Each country has its own different currency so it is a very difficult task for people to recognize the currency. In manual currency recognition system, there are many problems. We will be developing this system to overcome those problems which have been faced. And it was found that proposed algorithm has solved the major issues related to currency recognition. One of the initial feature of this system is obtaining the image and it basically focuses on an image that can be obtained by using number of different equipment's, such as cameras or Scanner. One approach is basically based on conversion of RGB value into HSV value and we also maintain the distance of each image by calculating Euclidean distance formula and then compare the distance with test image which give accurate result. Also we provide the user with detail information of currency in PDF format and especially for the blind people we provide the facility of voice generator.

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