CURRENCY RECOGNITION SYSTEM USING IMAGE PROCESSING

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ABSTRACT

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

1.INTRODUCTION

According to the UN charter, there are around 195 countries around the globe. 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. Nowadays people travel to different countries, they use their native country's currency to pay bills or buying stuff and because most of the local people are not familiar with a currency other than their own country's 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. 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 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. the used methods in the system to obtain the actual output same as the expected output. First of all input a currency note image, which needs to be checked. Then system performs basic image processing techniques on input image and refined to convert it into a usable input for matching with present image in dataset. The system extracts the information from image based on features such as colour and texture. With the help of these features the system determines currency name and denomination of the currency note. After this the exchange rate of currency will be extracted from internet with the help of online exchange rate api url. At the end output displayed on the screen.

2.LITERATURE REVIEW

Digital Image Processing, 4th Edition The 4th Edition, which celebrates the book's 40th anniversary, is based on an extensive survey of faculty, students, and independent readers in 150 institutions from 30 countries. Their feedback led to expanded or new coverage of topics such as deep learning and deep neural networks, including convolutional neural nets, the scale-invariant feature transform (SIFT), maximally-stable extremal regions (MSERs), graph cuts, k-means clustering and superpixels, active contours (snakes and level sets), and exact histogram matching. Major improvements were made in reorganizing the material on image transforms into a more cohesive presentation, and in the discussion of spatial kernels and spatial filtering. Major revisions and additions were made to examples and homework exercises throughout the book. For the first time, we added MATLAB projects at the end of every chapter and compiled support packages for students and faculty containing, solutions, image databases, and sample code.

Identification of Paper Currency Techniques: A Survey Paper currency identification is an image processing technique i.e. worn to recognize the currency of different countries. The paper currencies

of different countries are possibly interweaved collectively and consequently rise ever more. It is a challenge for standard currency recognition systems. However, the main focus of most of the standard currency recognition systems and machines is on recognizing forged currencies. Hence there is very vital role of currency identification system and it is essential that the identification system be very accurate. A thriving approach for paper currency identification depends upon preprocessing, feature extraction, and classification of that currency image. In this paper, we have gone through different literature which describes different techniques of paper currency recognition. Finally we have concluded that if we apply some efficient pre-processing and feature extraction technique than we can improve the accuracy of identification system.

Recognition system for real time paper currency Money number recognition refers to the money of the currency, the currency and authenticity recognition. Money number recognition system is the kernel module of self-service system, and the major applied range is cash-related equipments. In this paper we design a kind of money number recognition system. The quick positioning of money number is achieved based on gray value accumulation. The edge line of money number area is detected using the least square method. Using geometrical rotation method and gray adjacent interpolation method to realize the number of tilt correction. Based on the character structure characteristic and the imaginary line and character of the point of intersection features, formation recognition judgment tree, realized the character recognition. The simulation experiment indicates that this algorithm has a high recognition accuracy under the condition of rejection.

Extraction of serial number on bank notes The study of RMB (renminbi bank note, the paper currency used in China) serial number recognition draws more and more attention in recent years, for reducing financial crime, improving financial market stability and social security. The accuracy of RMB recognition relies heavily on the extraction, which is a challenging problem due to background variations and uneven illumination. In this paper, we present a new system that extracts the RMB characters directly from scanned RMB images. First, two different techniques, namely skew correction and orientation identification are used to detect the region which contains RMB serial number. Then the detected text region is binarized by a combined thresholding technique. After that, a local contrast average method is introduced to extract the RMB characters from the binarization result. The experiments demonstrate that the proposed binarization method outperforms other well-known methods. For character extraction, we report an overlap-recall rate of 79.68% and an overlap-precision rate of 98.10% respectively.

Digital Image Processing And Analysis: Human And Computer Vision Applications With Cviptools The author presents the book on digital image and analysis that has four sections and thirteen chapters, which is written at a junior-year or above level and used as a basis for advanced studies involving images.

An intelligent system for paper currency recognition - robust features Intelligent systems on Paper currency recognition and verification are inevitable for modern banking services. These systems are used in Auto-seller machines, vending machines etc. Extracting sufficient and reliable monetary characteristics are essential for accuracy and performance of such systems. This paper proposes a new intelligent system for paper currency recognition. Pakistani paper currency has been considered, as a case study, for intelligent recognition. This paper identifies, introduces, and extracts robust features from Pakistani banknotes. After extracting these features, the paper proposes to use three layers feed-forward Backpropagation Neural Network (BPN) for intelligent classification. The proposed technique and system are simple and comparatively less time consuming which makes it suitable for real-time applications. In order to evaluate the performance of the proposed technique, experiments have been conducted on 175 Pakistani banknotes. The results indicate that system has 100% recognition ability on properly captured images.

Paper Currency Recognition - Journal of Advanced Computer Science and Technology Research Paper currency recognition (PCR) is an important area of pattern recognition. A system for the recognition of paper currency is one kind of intelligent system which is a very important need of the current automation systems in the modern world of today. It has various potential applications including electronic banking, currency monitoring systems, money exchange machines, etc. This paper proposes an automatic paper currency recognition system for paper currency. A method of recognizing paper currencies has been introduced. This is based

on interesting features and correlation between images. It uses Radial Basis Function Network for classification. The method uses the case of Saudi Arabian paper currency as a model. The method is quite reasonable in terms of accuracy. The system deals with 110 images, 10 of which are tilted with an angle less than 15o. The rest of the currency images consist of mixed including noisy and normal images 50 each. It uses fourth series (1984–2007) of currency issued by Saudi Arabian Monetary Agency (SAMA) as a model currency under consideration. The system produces accuracy of recognition as 95.37%, 91.65%, and 87.5%, for the Normal Non-Tilted Images, Noisy Non-Tilted Images, and Tilted Images respectively. The overall Average Recognition Rate for the data of 110 images is computed as 91.51%. The proposed algorithm is fully automatic and requires no human intervention. The proposed technique produces quite satisfactory results in terms of recognition and efficiency.

Study of Printing Identification Based on Multispectrum Imaging Analysis, Proceedings of the International Conference on Computer Science. This paper introduced and adopted multispectrum imaging analysis to conduct the corresponding research and the exploration for the purpose of effectively solving the problems of printing identification such as credentials, bills, legal documents and so on. In addition, it designed and had realized a method to identify printing that had laid a foundation for its more extensive application in printing identification field.

3.SYSTEM ANALYSIS
3.1. 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, colour 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. Local binary patterns (LBP) is a type of visual descriptor used for classification in computer vision and is a simple yet very efficient texture operator which labels the pixels of an image by thresholding the neighborhood of each pixel and considers the result as a binary number. Due to its discriminative power and computational simplicity, LBP texture operator has become a popular approach in various applications. It can be seen as a unifying approach to the traditionally divergent statistical and structural models of texture analysis. Perhaps the most important property of the LBP operator in real-world applications is its robustness to monotonic gray-scale changes caused, for example, by illumination variations. Another important property is its computational simplicity, which makes it possible to analyze images in challenging real-time settings.

Disadvantages
1.very critical to recognition
2.time taken process

3.2. 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.

Advatages:
1. By using Machine Learning currency recognition is very easy
2. very less time for currency recognition.

4. IMPLEMENTATION
4.1. ALGORITHMS

Edges are significant local changes of intensity in a digital image. An edge can be defined as a set of connected pixels that forms a boundary between two disjoint regions. There are three types of edges:

- Horizontal edges
- Vertical edges
- Diagonal edges

Edge Detection is a method of segmenting an image into regions of discontinuity. It is a widely used technique indigitalimageprocessinglike

- pattern recognition

- image morphology
- feature extraction

Edge detection allows users to observe the features of an image for a significant change in the gray level. This texture indicating the end of one region in the image and the beginning of another. It reduces the amount of data in an image and preserves the structural properties of an image.

4.2.CNN ALGORITHM

1. **Feature Extraction:** CNN compose of multiple layers and first layer define for feature extraction and this features will be extracted from given input image dataset or any other multidimensional dataset.
2. **Feature Selection:** Using this layer features will be selected by applying a layer called pooling or max polling.
3. **Activation module:** using this module RELU will be applied on input features to remove out unimportant features and hold only relevant important features
4. **Flatten:** This layer will be define to convert multidimensional input features into single dimensional input array
5. **Dense:** This layer can be used to connect one layer to other layer to receive input features from previous layer to new layer to further filter input features in next layer to get most important features from dataset to have best prediction result.

4.3.ARCHITECTURE
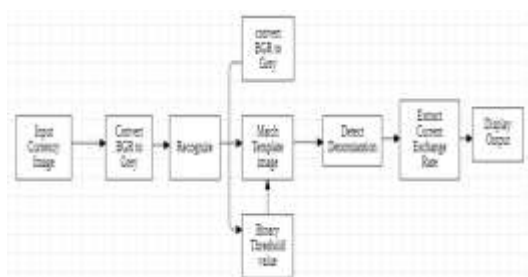
4.4. MODULES

1.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.

2.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.

3.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.

3.Reset:
This button is used to clear the application window.
4.Exit:
This works as simple exit button, you will come out of the application and all processes of application will be terminated.

5.RESULT

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 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..

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