IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

COLOR IMAGE SEGMENTATION BASED ON MEAN SHIFT AND NORMALIZED CUTS

Rucha Joshi*, Kunal Sarak

Computer Department, Mumbai University Vidyavardhini's College of Engineering and Technology, K. T. Marg, At & Post-Vasai Road(W),Thane,Pin-401 202.

ABSTRACT

An approach for Image segmentation is proposed based on mean shift algorithm and normalized cuts algorithm and its application's implementation is proposed. The normalized cuts algorithm gives good accuracy and better segmentation compared to all most of the existing methods. By using Mean Shift algorithm on the original image to partition it into sub graphs we can create image matrices with lower dimensions. The proposed algorithm first applied Mean Shift algorithm to obtain sub graphs and then applied Normalized cut. Currency denomination and detection is an application of image segmentation. It is very difficult to count different denomination notes in a bunch. This paper propose a image segmentation technique to extract paper currency denomination. The extracted ROI can be used with Pattern Recognition and Neural Networks matching technique. First we acquire the image by simple flat scanner on fix dpi with a particular size, the pixels level is set to obtain image. Some filters and segmentation algorithms are applied to extract denomination value of note. We use different pixel levels in different denomination notes. The Pattern Recognition and Neural Networks matcher technique is used to match or find currency value/denomination of paper currency. After matching the pattern the result is converted to an audio file which helps in recognition of the given Indian currency.

KEYWORDS: Image segmentation, Image processing, Feature extraction, Neural Networks, ROI (Region of Interest).

INTRODUCTION

Image segmentation is a process of dividing an image into different regions such that each region is nearly homogeneous, whereas the union of any two regions is not. It serves as a key in image analysis and pattern recognition and is a fundamental step toward low-level vision, which is significant for object recognition and tracking, image retrieval, face detection, and other computer-vision-related applications [1]. Color images carry much more information than gray-level ones. In many pattern recognition and computer vision applications, the color information can be used to enhance the image analysis process and improve segmentation results compared to gray-scale-based approaches. As a result, great efforts have been made in recent years to investigate segmentation of color images due to demanding needs. Existing image segmentation algorithms can be generally classified into three major categories, i.e., feature-space-based clustering, spatial segmentation, and graph-based approaches. Feature-space-based clustering approaches [2], [3] capture the global characteristics of the image through the selection and calculation of the image features, which are usually based on the color or texture. By using a specific distance measure that ignores the spatial information, the feature samples are handled as vectors, and the objective is to group them into compact, but well-separated clusters.

Now using this technique, we have recognised various currency and its denomination which makes it easier to recognise for blind people and in turn help them.

The Indian currency system is prevalent since a long time. The Government of India introduced its first paper money issuing 10 rupees notes in 1861. The Reserve bank of India began note production in 1938, issuing 2,5,10,100 and 1000 rupees notes. Currently the Indian currency system has the denomination of Rs. 1, 2, 5, 10, 20, 50, 100, 500

and 1000 [5]. Every denomination notes has its value on it. In this paper we scanned the different denomination notes at 150 dpi with 128x128 pixels. We extract denomination value part from each note. A level is set for all images. By converting compliments, applying different filter i.e. sobel edge filter, AVERAGE FILTER, LAPLACIAN FILTER, denomination value is extracted. The pattern recognition and neural network process is applied for matching to identify note value.

METHODOLOGY
There are various technique for currency recognition that involve texture, pattern or color based. We use digital image processing techniques to find region of interest, after that Neural Network and Pattern Recognition Technique is used for matching the pattern.

The Steps are as follows –
1. Different denomination notes are scanned at 150 dpi with 128x128 pixels by simple flat scanner.
2. ROI is extracted.
3. Converting image in gray scale and Setting up a level.
4. Denomination value can be obtained by complimenting, applying sobel edge filter, average filter, laplacian filter.
5. After obtaining value numerals, it is matched by using Neural Networks and Pattern Recognition Tool in Matlab for matching.

GRAPHICAL REPRESENTATION
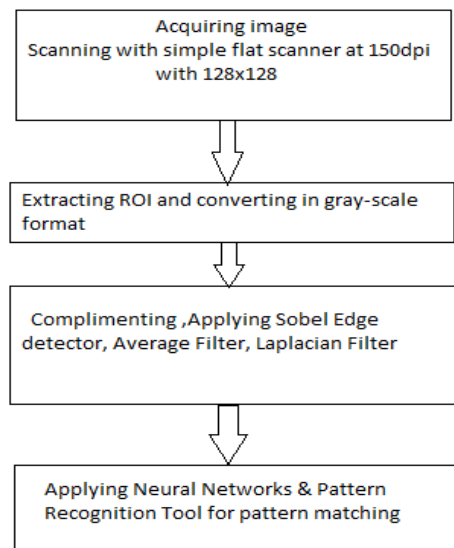
APPROACH
The system begins with scanning the input of a particular currency paper from the user. The paper is scanned or goes as an input to the system through a camera. After which, the algorithm first recognizes the nationality of a particular currency note. Once the recognition is complete, the currency is denominated. The implementation focuses to determine the value of the currency recognized. For this the Region of Interest (ROI) is first recognized and then matched [4].

Fig 1. Copy of Different Indian Paper Currency.

The ROI's are scanned for the different types of paper currencies and saved. Since these ROIs remain constant for all the genuine currencies, they can be efficiently used for detection of the type of currency.

Fig 2. ROI of Different denomination Indian Paper Currency.

Fig   3. Currency Denomination Value With Average Filter.

Fig   4. Currency denomination value with Compliment.

Fig   5. Currency Denomination Value With Laplacian Filter.

The pattern recognition and neural networks technique is used for matching image pixels. The multilayer neural network match each pixel of given sample and provide the exact match.

RESULT
After recognising the currency, the result is convert into an audio format which helps the blind person to recognise which currency it is and its denomination thus helping them in day to day life. The audio which is generated is in .wav format and is supported in almost every system.

CONCLUSION

This recognition method of currency is quite simple,efficient and easy to be realised because denomination numerals are used for identification which can be extracted easily from paper currency. Such numerals are matched and are found exact match for identification. This method of currency recognition will certainly help to identify different denomination of paper currency. This method can be used for counting of different denomination note bunch.

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[5] Hanish Aggarwal1, Padam Kumar2 1,2Department of Electronics and Computer Engineering Indian Institute of Technology Roorkee, Roorkee, India 1hanishtbp@gmail.com, 2padamfec@iitr.ernet.in