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Enhanced Indian Currency Recognition Denomination Using Roi And Glcm For Ticketing System

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ABSTRACT
Currency Identification by the use of machines is a tedious task. Currency recognition is a simple process of denomination of its value. Various features can be accounted to denominate the value. Here, features under GLCM are used here to denominate. This technique could be more reliable than recent techniques involving neural networks which have serious trouble of processing overhead. The ticketing system which is common in western countries uses coin currency. With this denomination, it is then easier to implement for paper currency for Indian System. The denominated value is the input amount and the destination decides the spare for the distance. The balance amount is then displayed**.**

***Keywords*:** Recognition, denomination, GLCM-Grey Level Co-occurrence Matrix, ROI-Region Of Interest

I. INTRODUCTION

Technological advancement had replaced humans with machines in almost every field. Banking automation has reduced human workload by introducing machines. Tedious task like currency handling that require more care are simplified by banking automation. When machines are handling currency they should recognize it. Currency is the medium for exchanging goods and services. Currencies are issued by the governing bodies to circulate within an area.

II. RECOGNITION SIMPLE TO TEDIOUS TASK

Currency recognition is a simple process of identifying the denominational value of a currency. Currency recognition is a simple job for normal human beings , but for a visually challenging task.

In ATM counters currencies are handled by machines. Moreover humans can identify currency by the pattern recognizing ability inherently available within them. But, currency detection is a complicated task concerning machines.

An optimal currency recognizer shall make use of all available features pertaining to a currency. Currency has intrinsic as well as extrinsic features comprises of physical properties of the currency(size, width etc,.). But these physical features are not reliable. Sometimes currencies may get damaged during circulation. Hence, system fails to identify damaged currencies. Color and texture forms the intrinsic currency features. Reserve Bank of India follows a specific color and texture pattern for currencies of each denomination. Using the recognized amount the ticket is calculated by entering the destination point.

NEED FOR NEW TECHNIQUES

Over the years a lot of researches have been done in this field of Currency note recognition. The authors have done recognition based on Color, texture, security features etc.

The previous research in the field of currency recognition is based on neural networks. The major drawback of using neural network was the processing overhead. Further research was based on image processing methods where the properties and patterns of currencies are used for recognition. The method was slow to identify the currencies and was not suitable for real time applications.

In this paper, currency recognition is used for billing purpose. Here, we process the input image and verify the input amount using image processing techniques.

III. WORKING OF THE EXISTING SYSTEM

The word recognition means to identify objects in an image. The process of recognition starts with image processing techniques.

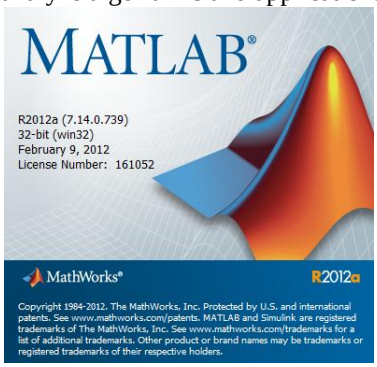
The various steps involved in the existing system for recognition are:

- Image acquisition involves acquiring image from a currency note by using digital camera.
- The next step is pre-processing. Here the size of the image is reduced while the noise is removed. The currency is localized from the background.
- The feature extraction from the currency is followed. The dominant colour and aspect ratio is calculated.

- The Identity mark is segmented and image feature is extracted using Fourier descriptor.
- The shape classification is done using artificial neural network which is followed by the decision algorithm for denomination.

Software's Used

MATLAB provides a high-level language and development tools that let you quickly develop and analyze algorithms and applications.



Together, In MATLAB, Image Acquisition Toolbox, and Image Processing Toolbox™ (and, optionally, Computer Vision System Toolbox™) provide a complete environment for developing customized imaging solutions.

IV. PROPOSED TECHNIQUE-GRAY LEVEL CO-OCCURRENCE MATRIX (GLCM)

Texture representation methods can be classified into two categories: structural and statistical. Structural methods describe the texture by identifying the primitive structure and rules of their placement. Statistical methods characterize texture by the statistical distribution of the image intensity . The Gray Level Co-occurrence Matrix (GLCM) is a statistical method of examining texture that considers the spatial relationship of pixels. GLCM contains information about the position of the pixels that have the same value of gray levels. A GLCM is a 2-dimensional array, P, in which both rows and columns representing a set of possible values of the image. It is a matrix showing how often a pixel with intensity (gray-level) value i occurs in a specific spatial relationship to a pixel with the value j. It is defined by P(i,jld,Θ), which expresses the probability of the couple of pixels at Θ direction and d interval. Once the GLCM is created various features can be computed from it. In order to estimate the similarity between different gray level co-occurrence matrices, Haralick had proposed 14 different statistical features extracted from GLCM. To reduce the computational complexity, only some of these features are selected in this paper, specifically: Energy, Contrast, Homogeneity and Correlation.

The four statistics applied to co-occurrence probabilities are discussed before

1) Energy :

This statistic measures the uniformity of texture that is pixel pair repetitions. It detects disorders in textures. Energy reaches a maximum value that equal to one. High energy values occur when the gray level distribution has a constant or periodic form. Energy has a normal range. The GLCM of less homogeneous image will have large number of small entries.

2) Contrast:

This statistic measures the spatial frequency of an image and is difference moment of GLCM. It is the difference between the highest and the lowest values of a set of adjacent pixels. It measures the amount of local variations present in the image. A low contrast image presents GLCM concentration term around the main diagonal and low spatial frequency features.

3) Homogeneity:

This statistic measures image homogeneity as it assumes larger values for smaller gray tone differences in pair elements. It is more sensitive to the presence of near diagonal elements in the GLCM. It has maximum value when all elements in the image are equal. GLCM contrast and homogeneity are strongly, but inversely, correlated in terms of equivalent distribution in the pixel pairs population. It means homogeneity decreases if contrast increases while energy is kept constant.

4) Correlation:

The feature correlation is a measure of linear dependency of gray tones in the image. The rest of the textural features are secondary and derived from those listed above. The statistic features of this study used are taken in four directions : (00, 450, 900, and 1350). Thus 16 texture feature vectors are calculated for each sub-block.

V. PROPOSED SYSTEM ARCHITECTURE

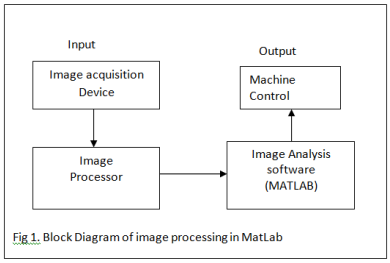


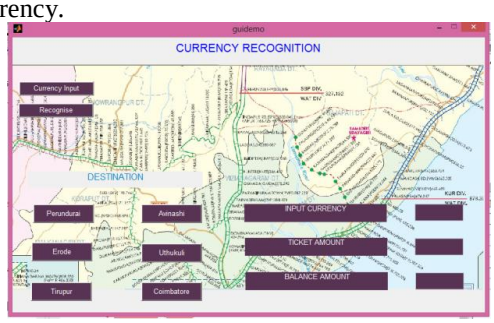
Fig 1. Block Diagram of image processing in MatLab

The Fig.1. represents the overall functioning of the proposed system.

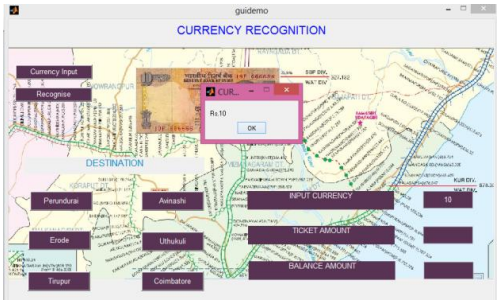
The image acquisition device is probably the digital camera. The image processor is the list of operations performed on the acquired image. The MATLAB tool is then allowed to analyze the image and recognize the value. The machine control given is the ticketing system involved in this proposed model.

Working of Proposed System

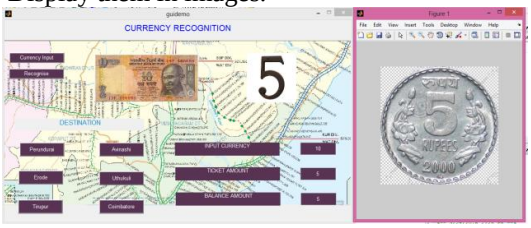
The complete algorithm for our proposed Indian Currency
Recognition is given below:
1. Obtain the image of the currency note as the input currency.



2. Extract the Region of Interest.
3. Pre-process the image.
4. Calculate the GLCM values.



5. Display the recognized amount.
6. Let the passenger choose the destination.
7. Show the ticket amount.
8. Calculate the balance amount.
9. Display them in images.



VI. CONCLUSION

This paper proposes a novel method for detection and recognition of Indian Currencies. By using a well-defined method, the currency is denominated successfully. The texture features are extracted based on GLCM (Gray Level Co-occurrence Matrix) using four statistic features that is contrast, homogenity, energy and corelation. This method is suitable for real time application.

Project Scope

The scope of this project is very vast. The application does not stop with ticketing system. All the vending machines and automatic application like car wash could widely use this recognition technique.

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