Segmentation of Different Rice Varieties Using Different Edge Detection Technique

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Abstract

Segmentation plays an important role to check identification of various rice varieties in the field of agriculture. In the proposed work, segmentation of various rice varieties is performed using different edge detection techniques and hence the results will be compared. Segmentation is done by LOG, Sobel, Prewitt and Canny filter in the proposed work. Experiments have been performed on image captured manually using digital camera.

Keywords: Segmentation, Edge detection, Sobel, Prewitt, Canny.
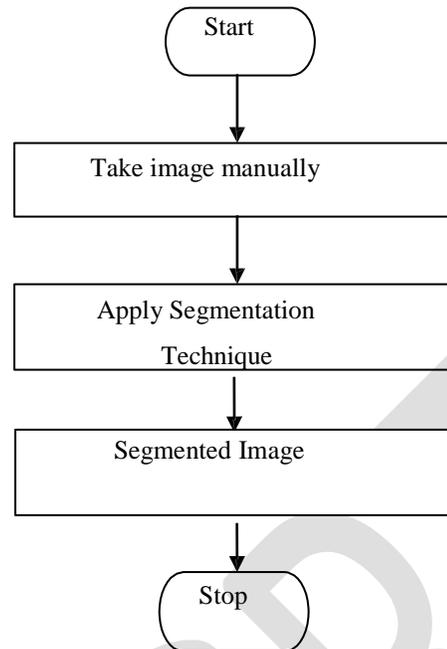
1. INTRODUCTION

Segmentation subdivides an image into constituent regions. The level to which the subdivision is carried depends on the problem being solved. Segmentation process is based on discontinuities in the image and similarity in the image. There are different techniques for segmentation proposed by different researchers.

Benjamaporn Lurstwut et. al. [1] develops a computer system, which can recognize a plant seed image. Anil Kannur et.al.[2] described a neural network model for classification and grading seeds. Hongwei Kong et. al. [3] presented unified method for preprocessing binary image based on mathematical morphology, Attaullan Khawaja et.al. [4] defines the basic use of preprocessing in the recognition. Yungang Zhang and Changshui Zhang. [5] defined enhancement technique for image preprocessing. They used normalization and enhancement technique for preprocessing. M.Sarfraz et.al [6] proposed a new technique for skew estimation of image document. Pei-Yung Hsiao.et.al [7] in the paper "Generic 2-D Gaussian Smoothing Filter for Noisy Image Processing" defines the use of Gaussian filter. Xiaoping Li et. al [8] also proposed the connected domain analysis method, segmentation projection histogram method and shelling projection method for segmentation of digits. To help farmers and buyers of rice, the need of hour is to develop a rice identification system. So in the present work, various segmentation techniques are applied to rice and their results are compared before the identification of rice varieties. These Segmented rice images can be used for rice identification in future works.

2. PROPOSED WORK

The image segmentation process is based on the two attributes, discontinuities in the image and similarity in the images. Discontinuities can be detected by running a mask on image.

In proposed system, segmentation is performed by using sobel, canny, prewitt and log filters.

```
            ┌──────────┐
            │  Start   │
            └────┬─────┘
                 │
                 ▼
    ┌────────────────────────┐
    │  Take image manually   │
    └───────────┬────────────┘
                │
                ▼
    ┌────────────────────────┐
    │  Apply Segmentation    │
    │  Technique             │
    └───────────┬────────────┘
                │
                ▼
    ┌────────────────────────┐
    │  Segmented Image       │
    │                        │
    └───────────┬────────────┘
                │
                ▼
            ┌──────────┐
            │  Stop    │
            └──────────┘
```

Fig.1 Steps for rice Segmentation

The segmentation starts with user taking a rice image by using a digital camera. Then following segmentation techniques are applied to the image for segmentation, these techniques are edge based.

2.1 Sobel operator

The Sobel operator is based on convolving the image with a small, separable, and integer valued filter in horizontal and vertical direction and is therefore relatively inexpensive in terms of computations [11].

2.2 Prewitt Operator

The Prewitt operator is used in image processing, particularly within edge detection algorithms. It is a discrete differentiation operator, computing an approximation of the gradient of the image intensity function. It detects two types of edges Horizontal edges, Vertical Edges. Prewitt operator provides us two masks one for detecting edges in horizontal direction and another for detecting edges in an vertical direction [12].

2.3 Canny

The canny edge detector first smoothes the image to eliminate noise. It then finds the image gradient to highlight regions with high spatial derivatives. The algorithm then tracks along these regions and suppresses any pixel that is not at the maximum. The gradient array is now further reduced by hysteresis. Hysteresis is used to track along the remaining pixels that have not been suppressed. Hysteresis uses two thresholds and if the magnitude is below the first threshold, it is set to zero and made a non-edge. If the magnitude is above the high threshold, it is made an edge [11].
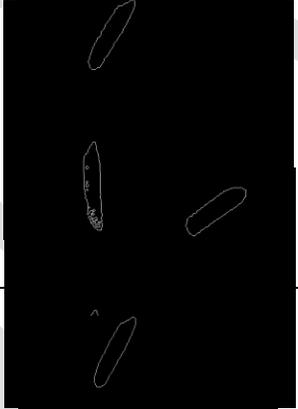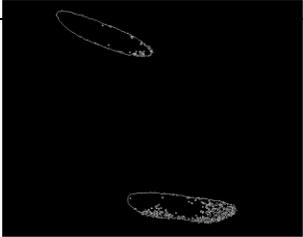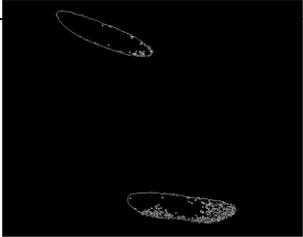
2.4 Laplacian of Gaussian

The Laplacian is often applied to an image that has first been smoothed with Gaussian smoothing filter in order to reduce its sensitivity to noise, and hence the two variants will be described together here. The operator normally takes a single graylevel image as input and produces another graylevel image as output.
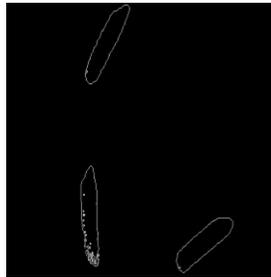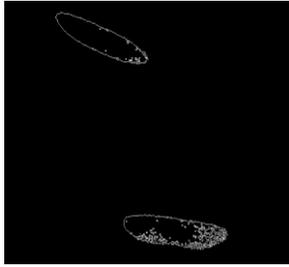
The main objective of segmentation of rice digit image is to separate the clear print area from the non-print area. Then it is easy to find the features of rice for authentication of rice varieties.
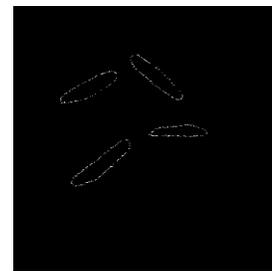
3. RESULT AND DISCUSSION

In the proposed study, images from Basmati rice varieties are used. In proposed system these rice images are segmented using four segmentation techniques with MALAB version 7.0.

Sample images of various rice varieties and result images after applying Segmentation techniques

Rice verities	370	Pb3	1509
Sample Pictures			
Sobel			
Log			
Canny			
Prewitt			
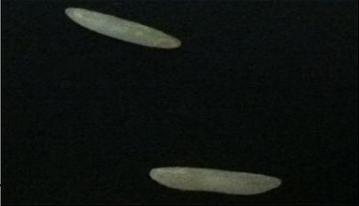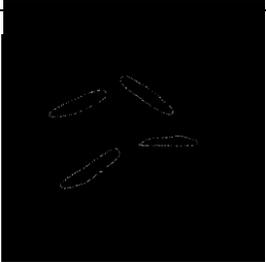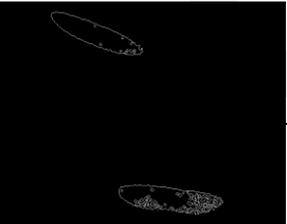
4. CONCLUSION

In the proposed system, basmati rice varieties are selected for testing. The results of Canny filter are best for rice segmentation. The proposed work may be utilized in future for rice varieties identification and grading. It may also be applied to other food grains.

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