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EXPECTATION MAXIMIZATION BASED RICE IMAGE SEGMENTATION

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ABSTRACT

In this paper, an improved version of Expectation Maximization (EM) algorithm is proposed efficiently to segment the rice images. Segmentation of Image is one of the promising and active researches in recent years. As literature prove that region segmentation will produce better results. Human visual perception is more effective than any machine vision systems for extracting semantic information from image. An EM algorithm is developed to estimate parameters of the prior probabilities and likelihood probabilities. So EM algorithm is used for segmenting background and rice extraction is done based on pixel intensity. Finally Peak Signal to Noise Ratio (PSNR) is calculated and it has better results than other.

Key words: Rice Image segmentation, EM, PSNR.

INTRODUCTION

An automatic segmentation algorithm for touching rice grains images is discussed in [1]. Binary image is obtained by transforming original gray image from rice inspection system and extraction is done for the edges of touching grains and de-noising was operated. Using sector area, concave corner points of touching rice grains is detected by this algorithm. Shortest Euclidean distance is used to find corner point pairs. Line segment is employed for segmenting touching rice grains which connected two corner point pair.

Automated separation of touching grains in digital images of thin sections is discussed in [2]. Touching grain sections are separated using computer algorithm in binary images of granular material. Characteristic sharp contact wedges of touching grain sections in outline are detected using this algorithm. If the angle is smaller than user defined threshold value, intersection will create after checking.

Segmentation techniques and aggregate image processing algorithms for aggregate size and shape evaluation is described in [3]. Entity aggregate particle shape and size properties are analyzed and extracted using image processing and acquisition techniques. Digital single lens reflex camera is used to capture the aggregated images and these segmented images are fed into the validated university to calculate the particle shape and size for flat and elongated ratio.

Fuzzy C-means clustering based multispectral image segmentation of rice seedlings in paddy fields is presented in [4]. The image noises are reduced by the difference vegetation index image was appropriate for seedlings recognition by analyzing objects spectral characteristics in near infrared, green and red wavebands. Red image is subtracted for calculating difference vegetation index from a near infrared image and the fuzzy C clustering arithmetic is employed for segmentation threshold. Concave curvature segmentation based on rule for touching rice grains in binary digital images is described in [5]. General shape properties is used by this algorithm for primary decision making, then concave curvature is examined in the shape boundary to choose split points to draw a segmenting split line between contacting grains at the point of contact.

Chalkiness in Rice: Potential for evaluation with image analysis is discussed in [6]. Image information processing is evaluated effectively in this method with inexpensive computer and chalkiness is categorized and measured using digital image scanner. Then method's feasibility is assessed.

Satellite and medical image segmentation based on multiple kernel fuzzy c-Means algorithm with ALS method is explained in [7]. Multiple kernel fuzzy c-means is used to generate initial contour curve during the curve as leaking at the boundary. Initial contour curve is generated using multiple kernel fuzzy c-means during the curve propagation as leaking at the boundary. Finally different information's are combined using multiple kernel fuzzy c-means in segmentation algorithm.

PROPOSED METHODOLOGY

In this proposed system, rice images are segmented using EM algorithm. Before segmentation pre processing is done using median filter to denoising an image to get better results. Here, first the images are segmented using this algorithm. EM parameters are used to determine the latent variable distribution. Block diagram of the proposed image segmentation is given below.

Expectation Maximization

EM algorithm is an iterative method to find maximum likelihood or maximum a posteriori estimates of parameters in statistical models. Expectation step is performing by EM iteration alternatively and it creates a function using current estimate of the log-likelihood for the maximization step and parameters. Finally latent variable distribution is determined by these estimated parameters in the next expectation step.

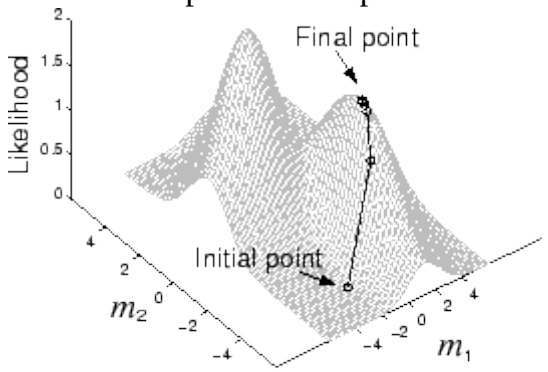
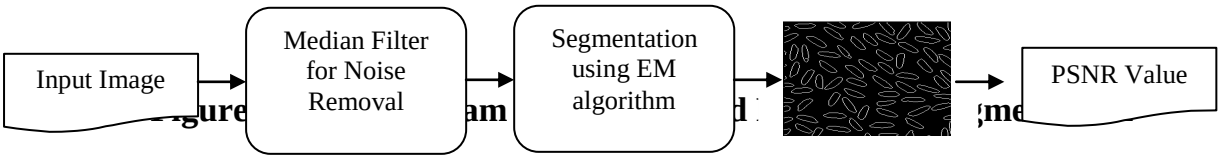


Figure 2 EM Algorithm

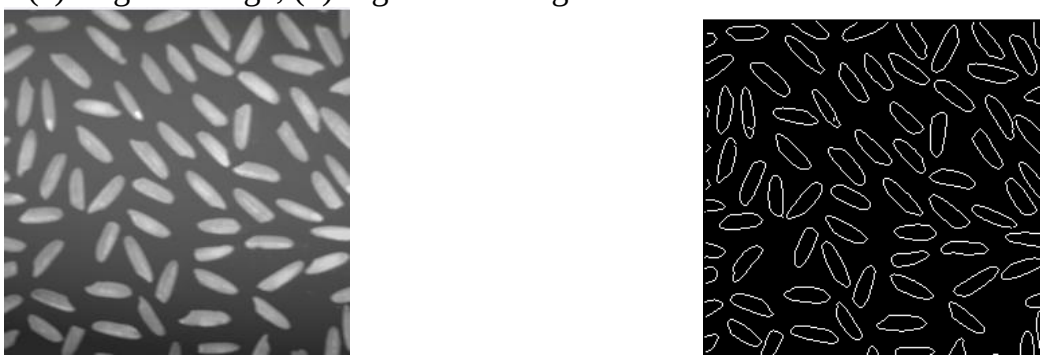
The EM iteration alternates between performing an expectation (E) step, which creates a function for the expectation of the log-likelihood evaluated using the current estimate for the parameters, and maximization (M) step, which computes parameters maximizing the expected

log-likelihood found on the E step. These parameter-estimates are then used to determine the distribution of the latent variables in the next E step.



EXPERIMENTAL RESULTS

This step describes the overall results of the proposed system. Normally images will suffer from the noise. Median filter is proposed in this paper to denoise the image. This section tells about proposed segmenting scheme using EM is oppressed for rice images. Performance of the proposed scheme is computed by PSNR value. Figure 2 shows the proposed (a) original image, (b) segmented image.



(a) (b)

Figure 2. (a) Original image and (b) Segmented Image using EM algorithm

CONCLUSIONS

A novel approach to segment the rice images were developed using EM is proposed. From the investigational results the image segmentation using the proposed method was found to be more visually tempting than other existing algorithms. Figure 2 shows the proposed segmented image using EM algorithm technique. The results show that EM algorithm method is a very efficient optimization and obtained PSNR value is 31.45. Future scope of this paper is to use the advanced segmentation technique to obtain more accurate result.

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