Physical separation of clustered seeds and analysis of nutrient contents using Image Processing

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ABSTRACT

In order to calculate the cereal grain size precisely and rapidly , a measurement method based on digital image processing technology was given. Of particular importance is rice, being a commodity crop. To check the fraudulent mislabeling of rice grains a technique to define the characteristics for identification was desired. So in order to investigate different types of characteristics a digital imaging approach has been devised. Firstly grain images was scanned and processed using methods of image processing techniques, Raster Scanning for dimensional analysis, HIS (Hue-Saturation-Intensity) model for morphological properties analysis. This method will work on physical separation of clustered seeds and analysis of nutrient content of seeds using different methods like Erosion and Dilation, Watershed Model and Line draw method.

Keywords – **DIP, Nutrients, Image Processing, grain quality, Erosion and Dialation**

I. INTRODUCTION

Digital image processing is a dynamic and expanding area with its usage reaching out into our day today life such as space exploration, medicine, surveillance, authentication, automation industry and many more areas. In these process raw images received from cameras/sensors which are placed on satellites, space probes etc. are taken and enhanced for various applications. Various techniques are used for developing image processing during the last three to four decades. This technique is becoming popular due to easy availability of personal computers, huge capacity memory devices, graphics software's etc.

Determination of grain quality analysis is important for elongated, grain seeds whose utility and/or value may depend on this feature. As figure 1 shows the image acquisition step and figure 2 represents the bulk of seeds. In this work rice grain is taken as an example of such a particle and its aspect ratio distribution in various samples is found using image processing. The samples examined were from three different grades (commonly termed as full, half and broken) sold in local market.
Concept used is Morphology which is used for image processing operations that process images based on shapes.

Morphological operations apply a structuring element to an input image, creating an output image of the same size. In a morphological operation, the value of each pixel in the output image is based on a comparison of the corresponding pixel in the input image with its neighbors. By choosing the size and shape of the neighborhood, you can construct a morphological operation that is sensitive to specific shapes in the input image.

Fig. 1. Image acquisition step

Fig. 2. Image represents the bulk of seeds

The most basic morphological operations are dilation and erosion. Dilation adds pixels to the boundaries of objects in an image, while erosion removes pixels on object boundaries. The number of pixels added or removed from the objects in an image depends on the size and shape of the structuring element used to process the image. In the morphological dilation and erosion operations, the state of any given pixel in the output image is determined by applying a rule to the corresponding pixel and its neighbors in the input image. In figure3 image is scanned for processing The rule used to process the pixels defines the operation as dilation or erosion. the introduction of the paper should explain the nature of the problem, previous work, purpose, and the contribution of the paper. The contents of each section may be provided to understand easily about the paper.

Fig.3. Image scanned for processing

II. EROSION

The basic morphological operations, erosion produce contrasting results when applied to either grayscale or binary images. Erosion shrinks image objects . *Morphology* is a broad set of image processing operations that process images based on shapes. Morphological operations apply a structuring element to an input image, creating an output image of the same size. In a morphological operation, the value of each pixel in the output image is based on a comparison of the corresponding pixel in the input image with its neighbors. Figure 4 shows the erosion process.By choosing the size and shape of the neighborhood, you can construct a morphological operation that is sensitive to specific shapes in the input image. The value of the output pixel is the *minimum* value of all the pixels in the input pixel's neighborhood. In a binary image, if any of the pixels is set to 0, the output pixel is set to 0.

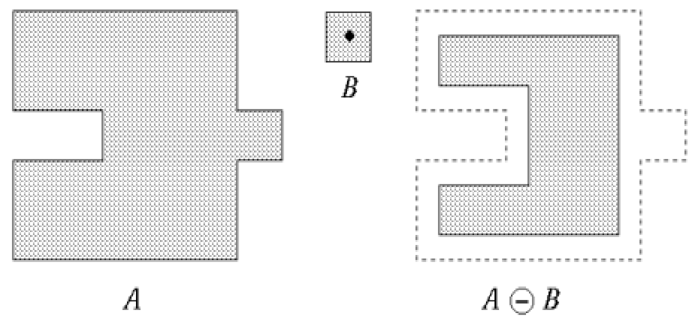

Fig.4. Image represents the erosion process

III. DILATION

The basic morphological operations, dilation, produce contrasting results when applied to either grayscale or binary images. Dilation expands the image size. Dilation adds pixels to the boundaries of objects in an image, while erosion removes pixels on object boundaries. Figure 5 represents the dilation process .The number of pixels added or removed from the objects in an image depends on the size and shape of the *structuring element* used to process the image. In the morphological dilation. The value of the output pixel is the maximum value of all the pixels in the input pixel's neighborhood. In a binary image, if any of the pixels is set to the value 1, the output pixel is set to 1.

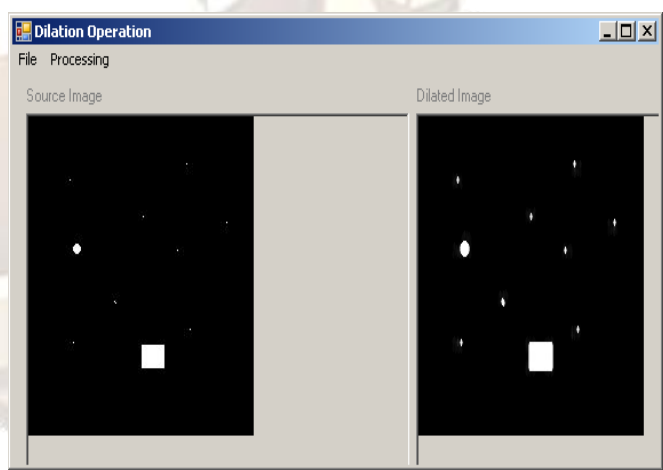

Fig.5. Image represents the dilation process

IV. WATERSHIELD

A watershed model is a three-dimensional representation of land that drains to a single river, stream, lake, or ocean. A watershed model is used as a tool to educate people about their watershed and why they should care about them. Watershed models help people make a connection between land use and water quality by demonstrating how we treat our land impacts the body of water to which the land drains. The watershed model considers the gradient magnitude of an image as a topographic surface. Pixels having the highest gradient magnitude intensities (GMIs) correspond to watershed lines, which represent the region boundaries. Water placed on any pixel enclosed by a common watershed line flows downhill to a common local intensity minimum (LIM). Pixels draining to a common minimum form a catch basin, which represents a segment. As in figure 5 watershed model used in image processing.Watersheds and stream networks are the primary input data of most watershed models, such as hydrologic model, hydraulic model, watershed managing and planning model, drainage system model, pollution control model, landscape model, etc.

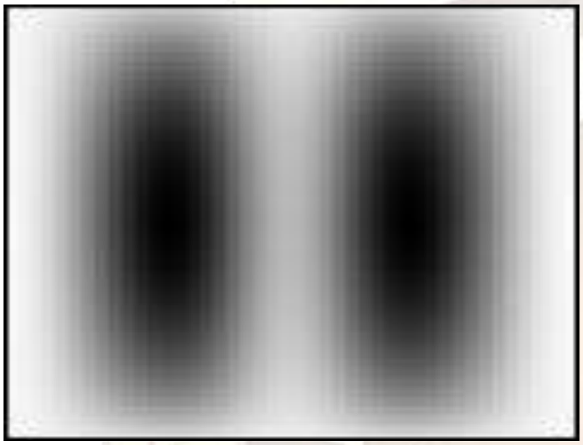

Fig.6. Watershed representative image.

V. LINE DIAGRAM ALGORITHM

That is an another method to separate the seeds manually. In this we simply locate two points and draw the line. After that with the help of this line we can separate the two cluster seeds. The first thing we need to realize is that, when walking from the start pixel to the end pixel, there is always one dimension along which we take integer steps. Along the other dimensions sometimes we'll have to step, ans sometimes we won't. This is, to me, the key finding in the algorithm. This tells us how many pixels will compose the line. If we use more pixels, the line will be thickened at some points, or we'll use some pixels more than once. If we use fewer pixels, the line will not appear continuous. Based on this 1-pixel step size in one dimension, we can easily calculate the sub-pixel step sizes we have to take in the other dimensions. We will then take these steps, computing floating-point coordinates, until we reach the end point. Each of the points we compute we'll round to integer pixel coordinates for output.

VI. CONCLUSION

The conclusion of dimension and morphological features of grains obtained using different techniques of image processing. The Raster scanning technique measure the seed dimension like length, breadth, ratio, weight and area of grain. To determine the textural properties of granular material with image analysis is generally troubled by the fact that touching grain sections merge into single features. Erosion and Dilatation, Watershed model and Line draw algorithm are the image processing techniques classify the accuracy of grain analyzed. All the grain types could be classified with closed to 100% classification accuracy.

VII. REFERENCES

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