Using Image's Processing Methods in Bio-Technology

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Abstract

The scanning electron microscope (SEM) remains a main tool for bio-measurements. Otherwise, TEM and AFM are increasingly used for minimum size features, as in plant sample. In addition some natural properties, which give poor information and consequentially the error probability of discussion, will be high. In our paper we will tackling this problem using different image processing technique to get more clarify and sufficient information. After that we make a comparison between our methods and the other hardware laboratory. We have a got a set of images [1]. That analyzed using the above mentioned techniques. This technique started by converting the prepared sample's images (gray scale or colored images) to data file (*.dat) in two dimensional. The 2D data will convert to 3D data file using FORTRAN programming. All images subject to the generate filter algorithm for 3D data file. After filtering the 3D data file we can establish histogram, contours and 3D surface to analyze the image. The quality of filtering depends on the way the data is incorporated into the model. Data should be treated carefully. Using our paper we can analysis any part from any image without reanalysis the whole image, we take sample with different sizes, and this method increases the accuracy of the analysis as will as decrees the cost of hardware used.

Keywords*: image processing, converting data, image formats.*

1   Introduction

Digital image processing analysis and computer visions have exhibited an impressive growth in the past decade in terms of both theoretical development and applications. They constitute a leading technology in a number of verwqw2y important areas, for example in digital telecommunication, broadcasting medical imaging. Multimedia systems, biology, material sciences, Robotics and manufacturing, intelligent sensing systems, remote sensing, graphic arts and printing. Spectral enhancement relies on changing the gray scale representation of pixels to give an image with more contrast for interpretation. It applies the same spectral transformation to all pixels with a given gray scale in the image. However, it does not take full advantage of human recognition capabilities even though, it may allow better interpretation of the image by the user. Interpretation of the image includes the use of brightness information, and the identification of features in the image. Several examples will demonstrate the value of spatial characteristics in image interpretation. Spatial enhancement is the mathematical processing of the image pixel data to emphasize spatial relationships. This process defines homogeneous regions based on linear edges. Spatial enhancement techniques use the concept of spatial frequency within the image. Spatial frequency is the manner in which gray-scale values change relative to their neighbors within the image. If there is a slowly varying change in gray scale in the image from one side of the image to the other, the image is said to have a low spatial frequency. If pixel values vary radically for adjacent pixels, the image is said to have a high spatial frequency [3,4]. In the present research any of the normally dealt with image files with extensions (*.bmp) or tiff are first changed to one with extension (*.dat). Thus, each image is incorporated as a data matrix. Practically, we apply our method on samples in plant.

The rest of the paper is organized as follows. In Section 2, the implementation of the algorithm is illustrated in Section 3 and the required computations are presented. Section 4 contains the description of our comparison between the figures. The Open problem is suggested in Section 5.

2   Converter's methods

The following steps are using to convert image from any extension to *.dat file this file is 2D data (n * m).

 Getting the image from any resources as digital camera, scanners, and normal-electronic- microscopic or any laboratory as in plants, chemistry, after that converting it by using our source code for gray scale or colored images as:

Converts the image x with color map to an intensity image I. ind2gray removes the hue and saturation information while retaining the luminance.

B= ind2gray (xx , map);

Converts the matrix X and corresponding color map to RGB (true color) format.

RGB = ind2rgb (xx , map)

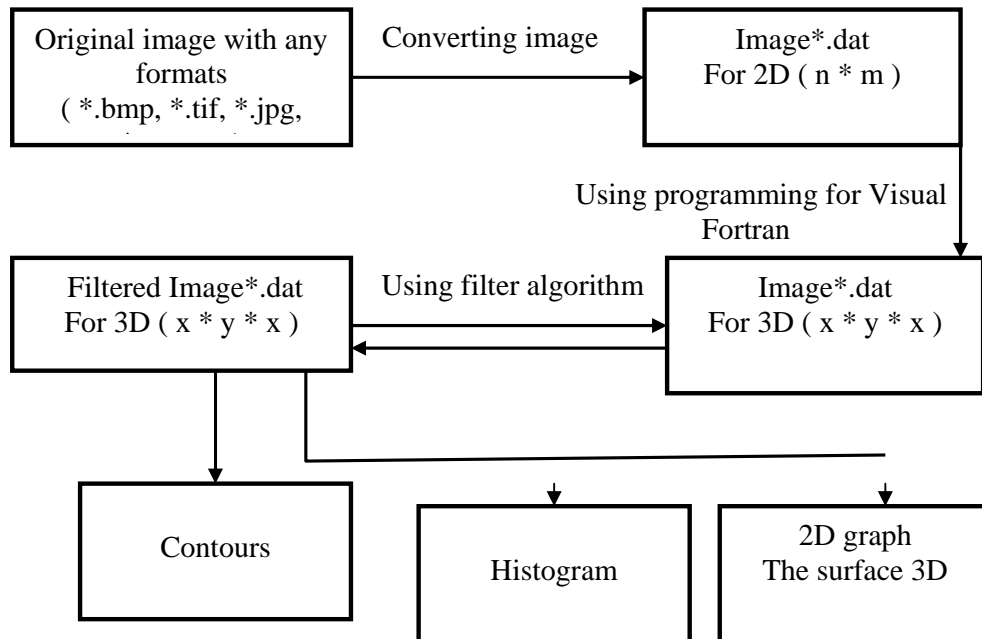**Step 0**: (Input image any formats)

Generate an image rows and columns

Step1: (image file *.dat, 2D data (n * m)) Using FORTRAN programming for converting 2D data (n * m) to 3D data (x, y, z)

Step2: Repeated Step 0 and Step1 for any part of the image. (Or using programming in Visual Fortran for any algorithms)

Step3: Take the 3D data file after filtering and finding the histogram, contours, 3D surface to analysis the image.

after we get the two types of data files 2D data (n * m) , 3D data (x , y , z) we can make compression, transformation …etc.

```
┌─────────────────────┐   Converting image   ┌─────────────────────┐
│ Original image with │ ───────────────────→ │    Image*.dat       │
│   any formats       │                      │  For 2D ( n * m )   │
│ ( *.bmp, *.tif, *.jpg,                      └─────────────────────┘
└─────────────────────┘                                 │
                                    Using programming for Visual
                                              Fortran      │
                                                           ↓
┌─────────────────────┐  Using filter algorithm  ┌─────────────────────┐
│ Filtered Image*.dat │ ───────────────────────→ │    Image*.dat       │
│ For 3D ( x * y * x ) │ ←─────────────────────── │ For 3D ( x * y * x ) │
└─────────────────────┘                          └─────────────────────┘
         │      │
         ↓      └──────────────────────┐
┌────────────────┐   ┌────────────────┐   ┌────────────────┐
│    Contours    │   │   Histogram    │   │    2D graph     │
│                │   │                │   │  The surface 3D │
└────────────────┘   └────────────────┘   └────────────────┘
```

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3 Implementation

We implemented our algorithm for two-dimensional filter using Visual Fortran and the figures have been plotted using Origin. The filtering looks of high quality since it seems to recover the original sine wave with the add noise totally removed. For two-dimensional, any of the normally deal with image files with extensions. (*.bmp) or (*.tiff) are first changed to one with extension. (*.dat). Thus each image is a data matrix. Practically, Figure 1 illustrates a) original image b) contours for image for where it looks from the filtered one above that most of the noisy patches have been removed. Fig 1. Illustrates c) Histogram d) The surface 3D of the original image. Figure 2 illustrates a) the 2D graph between the intensity and the position for our method. b) This curve by our methods using intensity of color using transformation method. c), the 2D graph between by the laboratory of plants in Germany. It should be born in mind that this filtering could be repeated more than one time to obtain the looked for filtering levels.
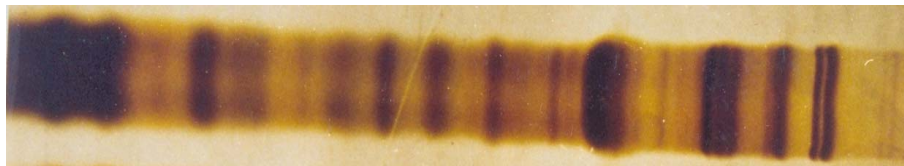
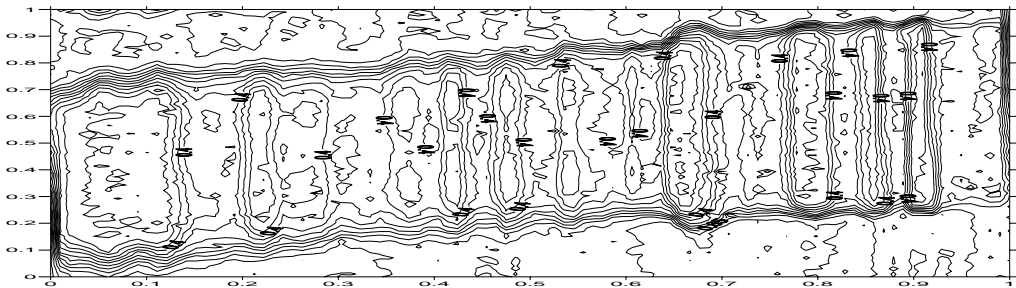# 4   Description and Comparison

Fig1.a. Original image (sample)

Fig1. b. Contours

Count: 230082   Min: 40
Mean: 128.734   Max: 231
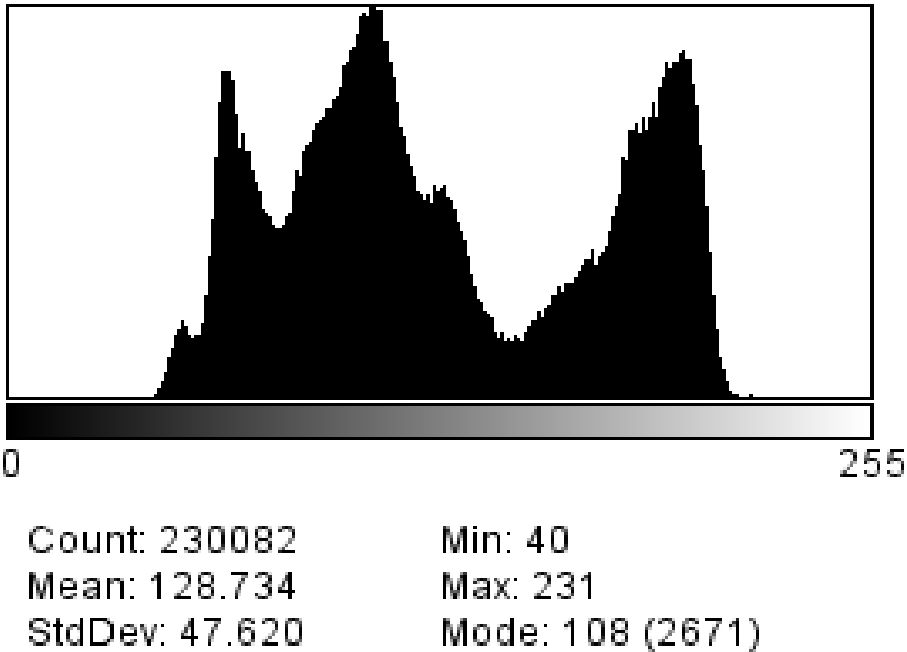StdDev: 47.620   Mode: 108 (2671)
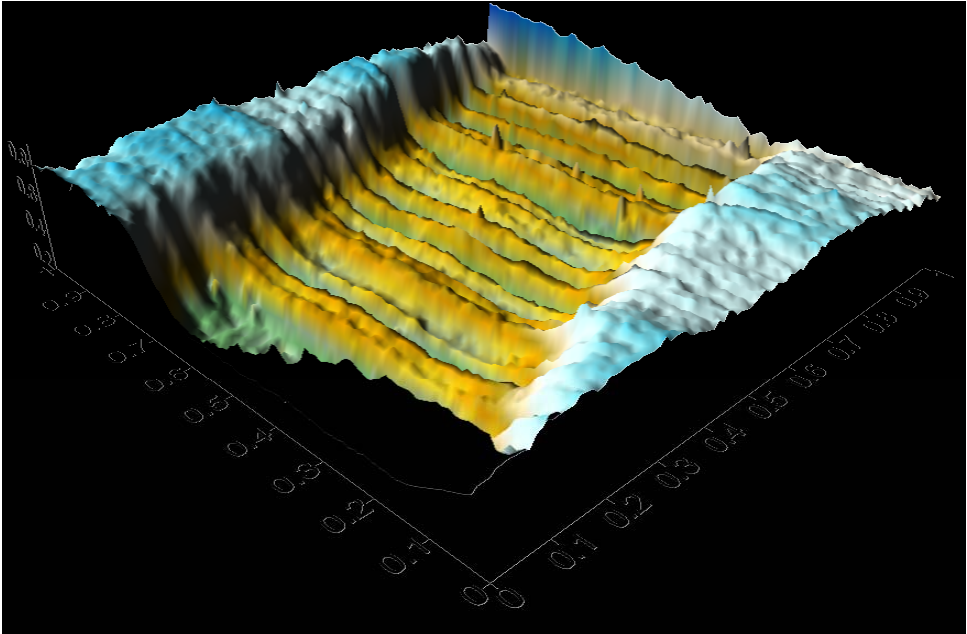
Fig 1. c. Histogram for the original image

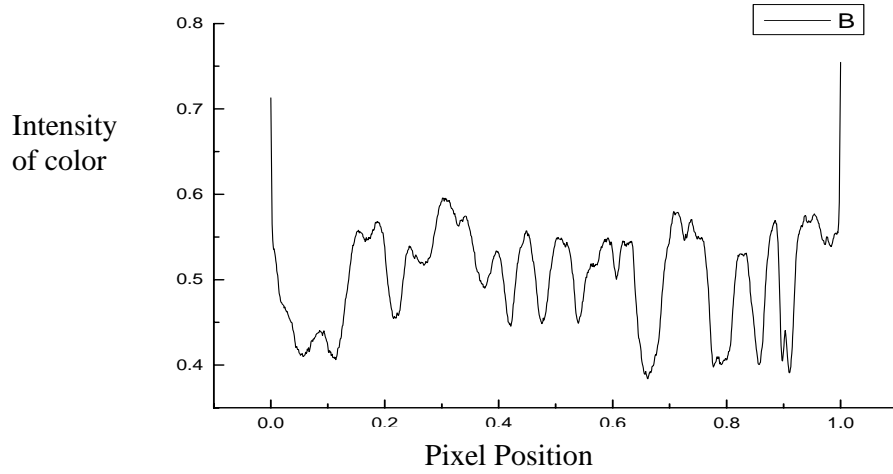Fig1. d. The 3D surface for the original image

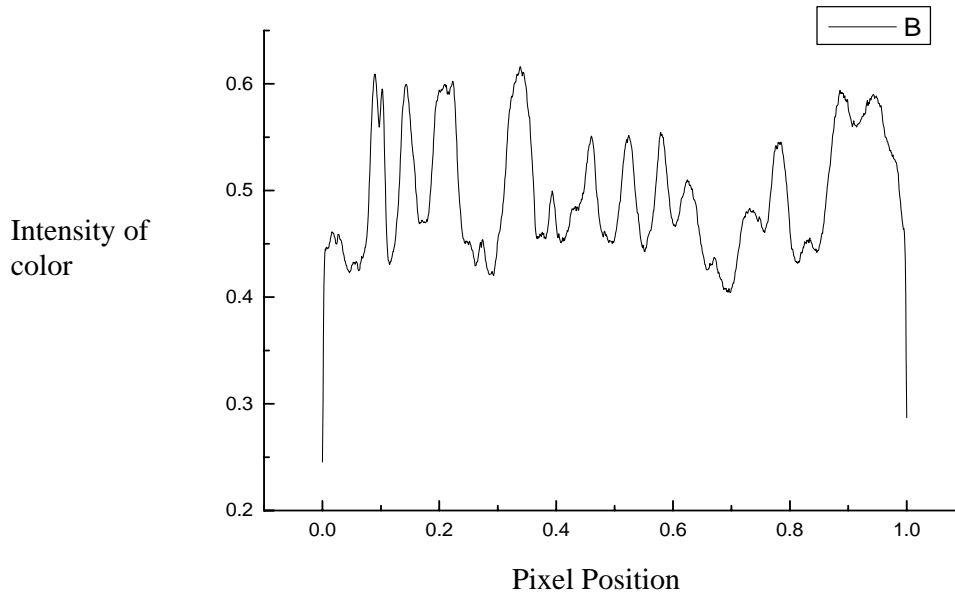Fig2. a. This curve by our methods using intensity of color for image processing source code

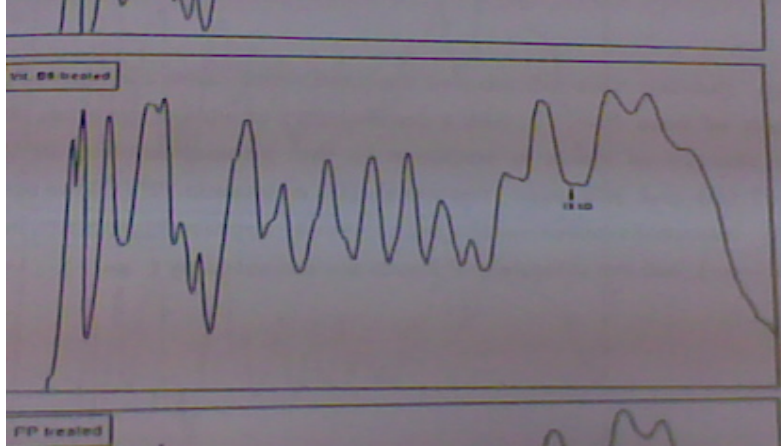Fig2. b. This curve after transformation.

Fig 2. c. This curve using laboratory results

After discuss the above figures we find that our algorithm is more convenience and makes reduction the costs for processing, it depends only on the programming. From the statistical analysis report illustrated below we get all measures of central tendency (mean, median, mode), measures of variation and linear regression equation to the pixels for the matrix of the data files, also we can obtain Sum of Squares (SS) and Mean Square (MS).

Univariate Statistics

Table 1: Statistics

	X	Y	Z
Minimum:	0	0	0.156
25%-tile:	0.25	0.249	0.358
Median:	0.5	0.503	0.456
75%-tile:	0.75	0.751	0.703
Maximum:	1	0.5	0.907
Midrange:	0.5	1	0.531
Range:	1	0.503	0.752
Interquartile Range:	0.5	0.249	0.345
Median Abs. Deviation:	0.25	0.500	0.153
Mean:	0.500	0.500	0.505

Trim Mean (10%):	0.500	0.290	0.504
Standard Deviation:	0.289	0.084	0.187
Variance:	0.083		0.035
Coef.of Variation:			0.370
Coef. of Skewness:			0.245

Planar Regression: Z = AX+BY+C

Table 2: Fitted Parameters

	A	B	C
Parameter Value:	0.020	0.014	0.488
Standard Error:	0.001	0.001	0.001

Table 3: Inter-Parameter Correlations

	A	B	C
A	1.000	-0.000	-0.656
B		1.000	0.653
C			1.000

Table 4: ANOVA Table

Source	df	Sum of Squares	Mean Square	F
Regression:	2	11.715	5.857	168.23
Residual	230074	8010.682	0.035	
Total:	230076	8022.397		

5. Open Problem

An integrated methodology for the detection and removal of cracks on digitized images will discuss using steepest descent algorithm (SDA),which can be applied iteratively, Crack interpolation is performed by appropriately modified and by using steepest descent algorithm (SDA). After detecting and filling the cracks ,we obtain a statistical report includes measures of central tendency (mean , median) , measures of variation (standard deviation, variance) , sum of squares (SS) and mean square (MS), this report can use for comparisons as well as making inferences and hypotheses test.

References

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