School of Information Technology And Engineering (SITE)

M.Tech Integrated - (Software Engineering)

SWE1010 – DIGITAL IMAGE PROCESSING

PROJECT REPORT

Rice Grains Classification and Rice Quality Analysis Using Image Processing Techniques

SUBMITTED BY

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Abstract:-

The quality of the rice grains depends on the combination of the physical and chemical properties, physical properties are length, width, chalkiness and the chemical properties are gel consistency (i,e this will tell the quality of rice whether they are suitable for eating). Human vision varies from person to person, so the quality and the quantity may vary. Even if we go with the traditional methods, they take much time to detect and they are of very high cost in present day market. So, with the help **IMAGE PROCESSING** it is very easy to detect the quality and the quantity of the rice grains. This also takes less time and the cost is also low.

Key Words:-

Grain quality, rice characteristics, image acquisition, length, width, image processing and analysis, edge dection etc.

Introduction:-

As we all know that RICE is a very important agriculture crop in tropical countries, the quality of the rice is very important. The rice should be in a quality such that it should be able for cooking and eating. Most of the rice production is in THAILAND. The most important indicators for the quality of rice grains are length, berth, width and height. Based upon this we are going to use the procedure like, First we take the picture sample grains and store it into the hard disc. Then we convert the available image into a BINARY image. Then by using some image processing techniques we will detect the edges. Based on this the length, berth and the width are determined. Then according to the size the quality is determined. Here the important thing is that we have also used some image processing techniques to count the number of RICE GRAINS.

Problem statement:-

As there are many kind of rice grains, it is very difficult to sort out physically. To resolve this problem quality testing of the food grains is important. To overcome this problem, we use different **Image Processing** technique. There are many solutions for this problem but, we cannot define which method is more accurate.

Scope:-

The Project tell us about the grading of rice grains. This software is used to count the no, of rice grains present in a layer. and also it tell about the quality and quantity of the rice grains present in a layer. and our project displays the no, of the rice grains present in a layer.

Objectives:-

The main objectives are as follows,

- ➔ In agriculture industry, the quality of the rice grains are very important.
- ➔ Finding the quality and quantity of the rice grains.
- ➔ If any grain spoils, it will not detect by our software.
- ➔ Quality of the rice grains can be classified into good, medium, and bad and
- ➔ The quality of the rice grains tells about the ratio between the classifications.
- ➔ With the help of software, we can grade the rice grains in a layer with low cost and low money.

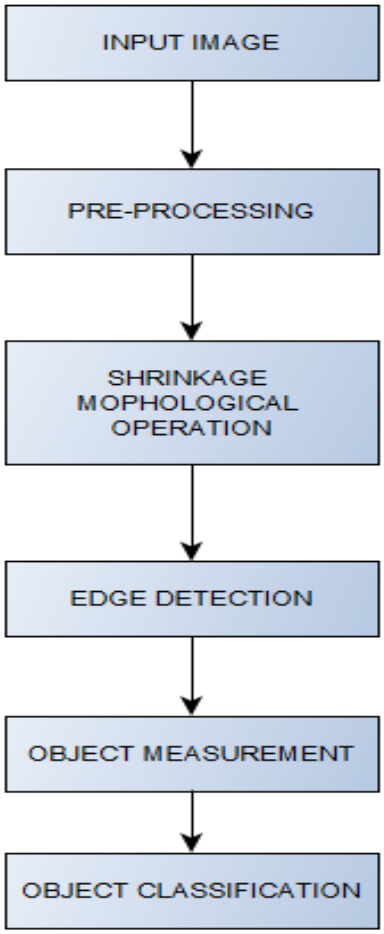
PROPOSED METHOD:-

Localization - The inner and the outer boundaries of the rice grain are calculated.

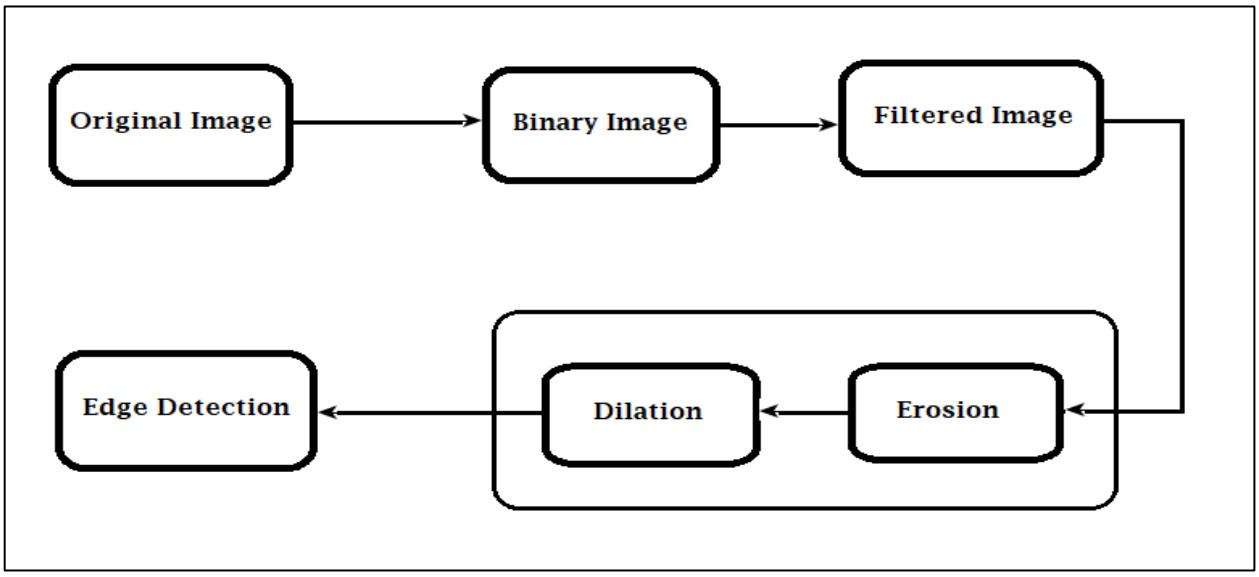
Normalization- Rice grains of different categories may be captured in different size, for the same personal so size may vary because of the variation in illumination and other factors.

Feature extraction – Rice grains provides abundant texture information. A feature vector is formed which consists of the ordered sequence of features extracted from the various representation of the images.

Techniques – we can use different techniques like dilation and erosion.



EXTERNAL ARCHITECTURE:-



A. INPUT IMAGE:-

- Image is selected from the data set.

B. PRE-PROCESSING:-

- Filter is applied to remove noise which occurs during the acquisition of image. Filter also sharpens the image. Threshold algorithm is used to segment the rice grains from the black background.

C. SHRINKAGE MORPHOLOGICAL OPERATION:-

- Erosion is applied to separate the touching features of rice grains without losing the integrity of single feature. Dilation process follows erosion process. The goal of dilation is grow the eroded features to their original shape without re-joining the separated features.

D. EDGE DETECTION: -

- Edge detection helps to find out the region of boundaries of rice grains. We use canny algorithm to detect the edges.

E. OBJECT MEASUREMENT:-

- Measurement indicates the count of rice grains. After getting the count of rice grains, edge detection algorithms applied on the image and outcome of the applied algorithm is we get endpoint values of each grain.
- We use caliper to join the endpoints and measure the value of length and breadth of each grain. After getting the value of length and breadth we can calculate length-breadth ratio.

F. OBJECT CLASSIFICATION:-

- Classification requires all standard, measured and calculated results.
- The classification of rice grains as per the standard database is shown in following tables. Table indicates classification of rice grains on the basis of length and length-breadth ratio.

Table 1 indicates classification of rice grains on the basis of length and length-breadth ratio.

Long Slender (LS)	Length 6 mm and above, L/B ratio 3 and above
Short Slender (SS)	Length less than 6 mm, L/B ratio 3 and above
Medium Slender (MS)	Length less than 6 mm, L/B ratio 2.5 to 3.0
Long Bold (LB)	Length 6 mm and above, L/B ratio less than 3
Short Bold (SB)	Length less than 6 mm, L/B ratio less than 2.5

Table-2 Shows classification of grains on the basis of length, which decides size of the specific grain

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CLASSIFICATION ON THE BASIS OF LENGTH [9]

Grain size	**Length (mm)**
Extra-long	>7.5
Long	6.61 – 7.7
Medium	5.51 – 6.6
Short	5.5 or less

Classification on basis of L/B ratio

Grain Shape	L/B ratio
Slender	Over 3
Medium	2.1 – 3.0
Bold	1.1 – 2.0
Round	Less than or equal to1

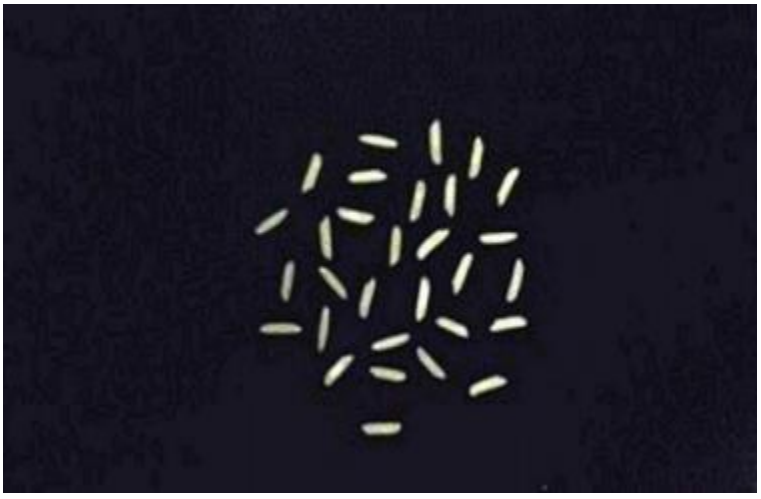
Experimental Results:-

We have taken an image, then we have performed the above methodology. Firstly, we converted it into Binary image from original image, we have done this because for highlighting the object in an image. and it also make the background black. Next, we have filtered the image by using average filter and median filter. This removes the noise in the image.

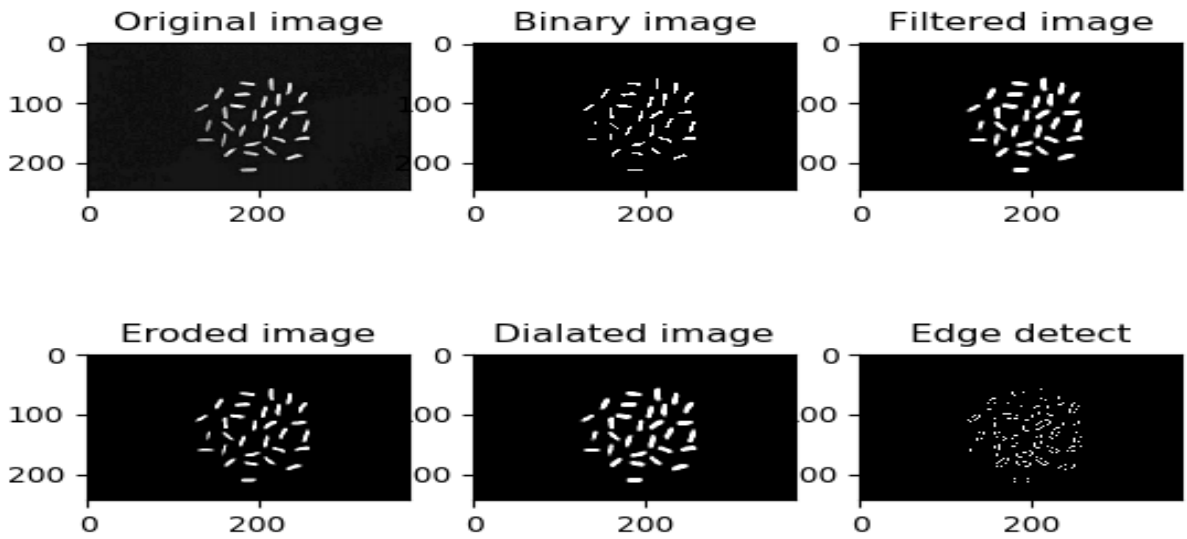
By using erosion and dilation methods in feature extraction we have performed filling the gaps in an image. By using this technique, we can overcome the drawback like if there is a hole in a rice grain it gets filled up and we can get an accurate image. This makes easy counting of rice grains and also for measuring the height and width.

TET CASES:-

1. **Sample Image:-**



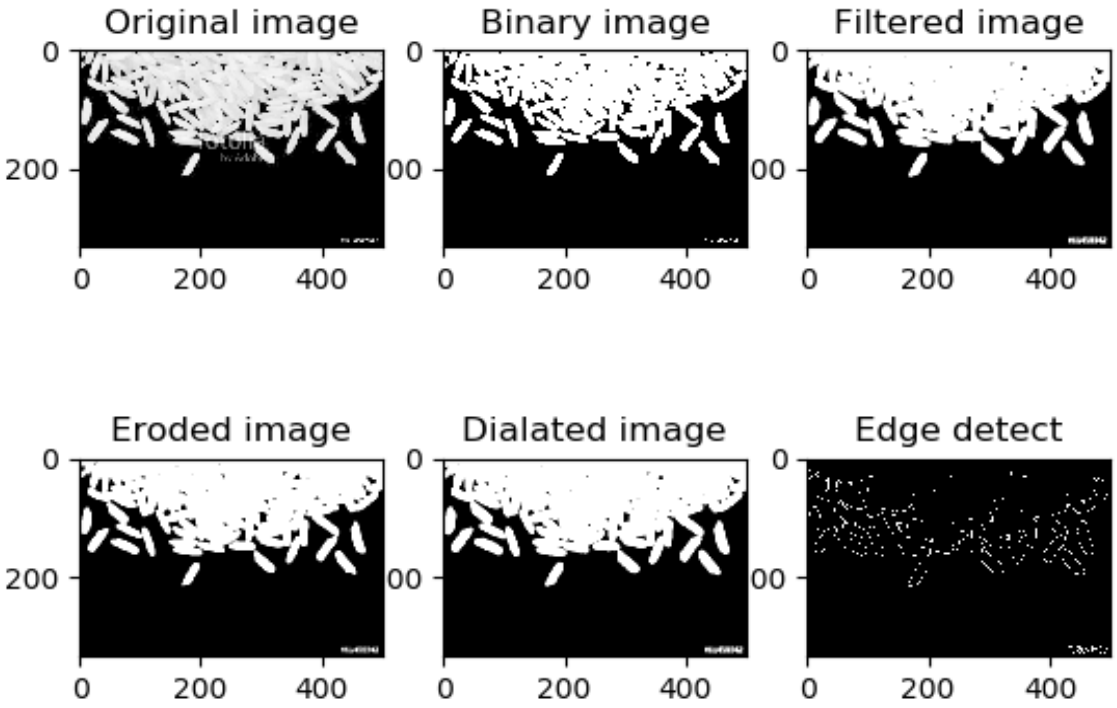
OUTPUT:-




```
*Python 3.7.0 Shell*
File  Edit  Shell  Debug  Options  Window  Help
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2
1)] on win32
Type "copyright", "credits" or "license()
>>>
========== RESTART: C:\Users\Ajith\Desk
Starting
No. of rice grains= 30
3.17 (Slender)
1.73 (Bold)
2.38 (Medium)
1.07 (Bold)
1.14 (Bold)
2.11 (Medium)
4.0 (Slender)
1.55 (Bold)
2.11 (Medium)
3.5 (Slender)
2.22 (Medium)
2.75 (Medium)
1.14 (Bold)
3.0 (Slender)
2.2 (Medium)
1.91 (Bold)
2.86 (Medium)
1.12 (Bold)
2.86 (Medium)
3.0 (Slender)
1.33 (Bold)
2.11 (Medium)
2.33 (Medium)
3.0 (Slender)
2.38 (Medium)
1.67 (Bold)
1.73 (Bold)
2.62 (Medium)
2.86 (Medium)
3.14 (Slender)
Average Aspect Ratio= 2.3 (Medium)
```

2. **Sample Image:-**

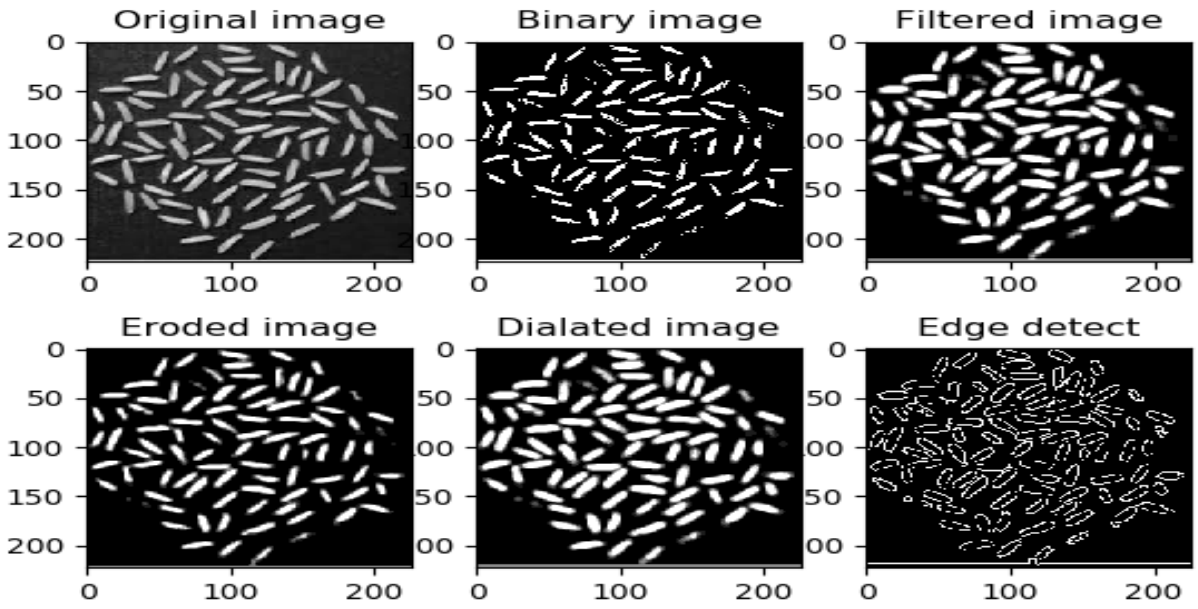
OUTPUT:-



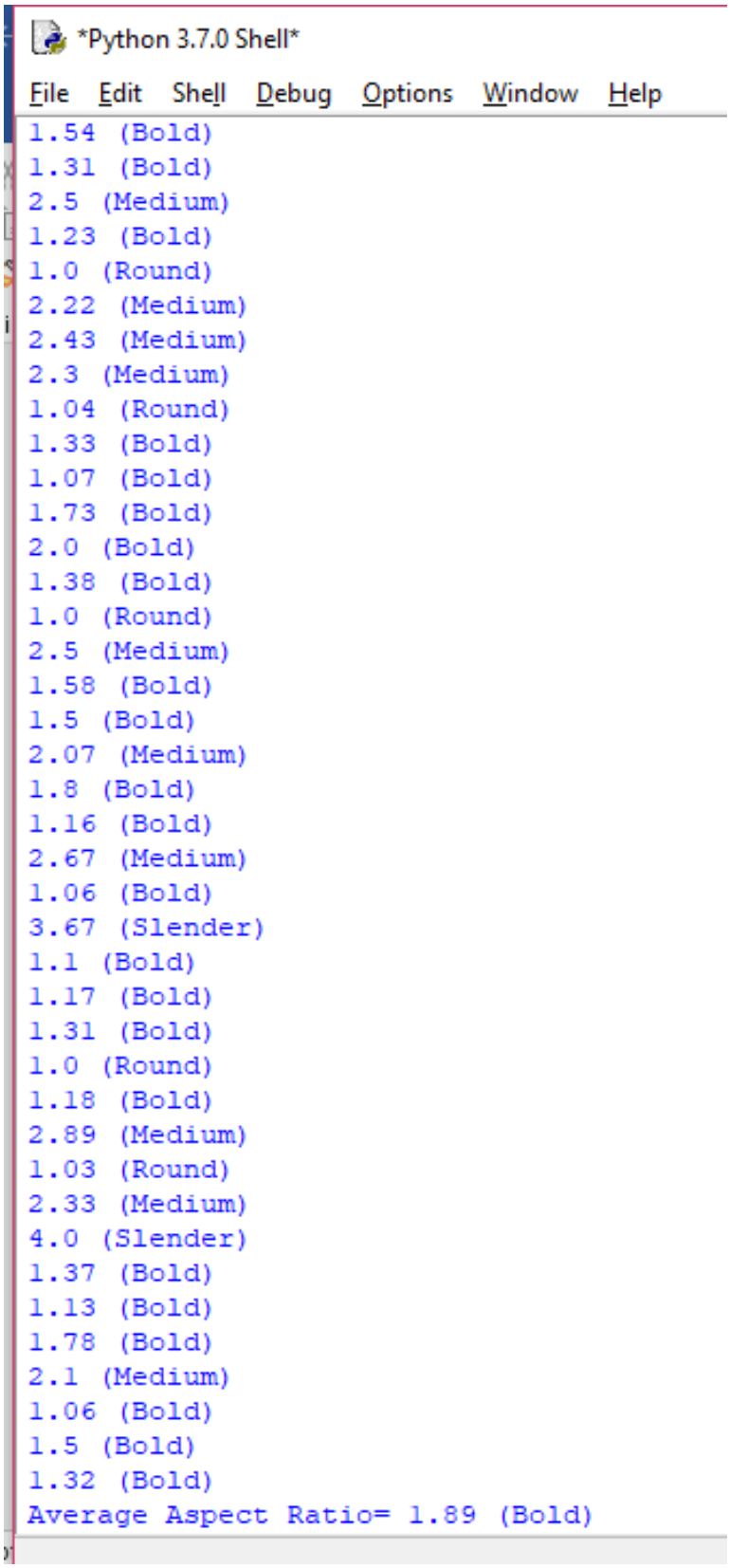
```
*Python 3.7.0 Shell*
File  Edit  Shell  Debug  Options  Window  Help
Python 3.7.0 (v3.7.0:1bf9cc5093, Jun 27 2018, 04:06:
l)] on win32
Type "copyright", "credits" or "license()" for more
>>>
============ RESTART: C:\Users\Ajith\Desktop\dip pro
Starting
No. of rice grains= 8
5.73 (Slender)
1.32 (Bold)
1.16 (Bold)
1.66 (Bold)
1.17 (Bold)
2.12 (Medium)
2.14 (Medium)
2.56 (Medium)
Average Aspect Ratio= 2.23 (Medium)
```

3. **Sample Image**:-

OUTPUT:-




```
*Python 3.7.0 Shell*
File  Edit  Shell  Debug  Options  Window  Help
>>>
============ RESTART: C:\Users\Ajith\Desktop\dip
Starting
No. of rice grains= 65
10.76 (Slender)
2.78 (Medium)
1.12 (Bold)
1.64 (Bold)
1.67 (Bold)
2.3 (Medium)
2.33 (Medium)
2.1 (Medium)
1.25 (Bold)
1.83 (Bold)
1.17 (Bold)
1.0 (Round)
1.67 (Bold)
1.16 (Bold)
1.67 (Bold)
1.15 (Bold)
1.25 (Bold)
1.88 (Bold)
1.62 (Bold)
1.14 (Bold)
2.67 (Medium)
2.22 (Medium)
3.67 (Slender)
2.22 (Medium)
2.56 (Medium)
```


Python 3.7.0 Shell
File Edit Shell Debug Options Window Help
1.54 (Bold)
1.31 (Bold)
2.5 (Medium)
1.23 (Bold)
1.0 (Round)
2.22 (Medium)
2.43 (Medium)
2.3 (Medium)
1.04 (Round)
1.33 (Bold)
1.07 (Bold)
1.73 (Bold)
2.0 (Bold)
1.38 (Bold)
1.0 (Round)
2.5 (Medium)
1.58 (Bold)
1.5 (Bold)
2.07 (Medium)
1.8 (Bold)
1.16 (Bold)
2.67 (Medium)
1.06 (Bold)
3.67 (Slender)
1.1 (Bold)
1.17 (Bold)
1.31 (Bold)
1.0 (Round)
1.18 (Bold)
2.89 (Medium)
1.03 (Round)
2.33 (Medium)
4.0 (Slender)
1.37 (Bold)
1.13 (Bold)
1.78 (Bold)
2.1 (Medium)
1.06 (Bold)
1.5 (Bold)
1.32 (Bold)
Average Aspect Ratio= 1.89 (Bold)

Conclusion:-

This image processing is used to determine the counting the rice grains from a image Actually, counting the rice grains by traditional method is a very risky process and more costly. Introducing one new technique counting the rice grains is done by the image processing and cost is low and is done by the software.

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