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Rice Grain Classifier Using Open CV

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ABSTRACT: Since there are many different kinds of rice grains on the market today, classifying them is very important. Classifying and analysing the quality of different types of rice grains by hand is neither possible nor useful. When you do classification by hand instead of automatically, it can be a very boring job. This would take a lot of work and a lot of time. There needs to be a smart and clever system that can solve this problem by automating this process. It should be able to automatically recognise each type of rice grain and put it in the right category. The first step should be to gather a set of data. This includes getting information about the major axis, minor axis, eccentricity, length, and width of each rice grain, just to name a few. This information will be used to teach the computer by the system. Each grain of rice or picture would be put in the right class. Classes like surti kolam, idli rice, long grain basmati, and boiled rice are used in this project. Any sample of rice that has been seen by the system will first be categorised, and then it will be put in its own class. This would help keep the whole system in order and separate. It's important to keep track of and manage the different kinds of rice, and in an industrial setting, it's also important to classify them correctly. By automating the system, the industry would have more options for how to use it in the future, depending on what changes the industry needs.

I. INTRODUCTION

Farming is one of the oldest and most important jobs that people have had since the beginning of time. Usually, the quality of food grains is judged by their physical and chemical properties as well as how they taste. There are many ways to sort rice, such as neural networks, digital image processing, and so on.

Various image processing techniques can be used to measure grain sizes and analyse parameters. Most of these methods can take too much time and cost too much money. Image processing techniques could be used as an alternative way to get around these problems. A dial micrometre can be used to measure the length and width of a single rice grain.

Depending on how many rice grains are tested, this analysis can give relative outcomes and results. Quality analysis is important in farming and the agricultural industry as a whole. A professional in the field can tell by looking at the grain seeds how good they are. But this result is not reliable because mistakes can be made by people. When done by a single person, visual analysis can take up a lot of time that could be used in more advanced areas. So, different image processing techniques are proposed to get around the problems caused by all of the traditional methods.

In Asian countries, rice is a popular cereal grain that people eat a lot of. It is easy to find everywhere in the world. People use rice to make a lot of things that have value added to them. The most important thing about milled rice on the market is its quality. With more import and export trade, it's more important to measure quality. Samples of rice have things like paddy, chaff, broken grains, weed seeds, stones, etc. that can be thrown away. The level of these impurities affects how good the rice is.

The main goal of the proposed method is to offer an alternative way to check and analyse quality that takes less time, money, and effort. Image processing is an important and advanced area of technology that has seen a lot of progress. Controlling and analysing the quality of goods made in agriculture and farming is very important. The quality of grain is looked at by experienced people and technicians. But the results of such measurements change over time and are hard to predict.

The technician's mood and attitude can also affect how well something is done.

So, to make up for the problems caused by traditional methods, a new technique called "image processing" is being planned to keep the specifications' integrity. Image processing changes an image so that certain operations can be done on it to make it better and more desirable. And get some useful information from the image input. Image

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processing is a fast-growing technology right now. When using the DIP technique, all types of data have to go through three general steps: pre-processing, enhancement, and display.

II. LITERATURE SURVEY

- "Identification and quality testing of rice grains using image processing and neural network," by V. S. Kolkure and B. N. Shaikh. IJRTER is an acronym for the International Journal of Recent Trends in Engineering and Research (2017). They suggested using neural networks, pattern recognition, and classification. Find the right quality category for a given rice sample and use texture and colour feature extraction to measure the sample's quality. Merit: A good method is proposed for classifying food grains that only needs a few features. This gets around problems like being time-consuming and tedious. Con: It's hard to pick out the exact quality
- "Rice Sample Segmentation and Classification Using Image Processing and Support Vector Machine," by Nadeesha Nagoda and Lochandaka Ranathunga. Pages 179–184 of the 2018 IEEE 13th International Conference on Industrial and Information Systems (ICIIS). Artificial Neural Network and computer vision techniques were used to come up with a way to analyse rice granules (ANN) It took a picture of Basmati rice grains with a CCD camera that had a black background, even lighting, and a constant distance between the camera and the sample of rice. For segmentation, adaptive thresholding is done on them. Sobel and Canny edge detection is used to find edges. The proposed method works better than manual and old ways of doing things. It is expensive and not worth it.
- "Assessment of quality of rice grain using optical and image processing technique," by Zahida Parveen, Muhammad Anzar Alam, and Hina Shakir. Pages 265-270 of the 2017 International Conference on Communication, Computing, and Digital Systems (C-CODE). IEEE, 2017. They chose Image processing is used to come up with the best way to describe and analyse the quality of rice grains. With the help of the extended maxima operator, a white, chalky area on the grains can be found. It only needs a deep understanding of the subject, such as machine learning techniques. Time complexity is high for the proposed algorithm.
- Ali, Syed Farooq, Halima Jamil, Razia Jamil, Iqra Torij, and Saira Naz. "Low-Cost Solution for Rice Quality Analysis Using Morphological Parameters and Comparison with Standard Measurements" In 2017 International Multi-topic Conference (INMIC), pages 1–6. IEEE, 2017. Replacement for SATAKE RSQI10A that doesn't cost much Locally made software reduces the number of functions and features of the SATAKE grain analyzer, making it 95 percent more efficient overall. Rice is automatically sorted and graded based on how many nutrients it has. Negative: Only based on the amount of nutrients.
- Vishnu, Devraj, Gunjan Mukherjee, and Arpitam Chatterjee. "A way to tell the grade of rice bran using computer vision." In 2017, the Third International Conference on Research in Computational Intelligence and Communication Networks (ICRCICN), pages 10–14. IEEE, 2017. Analysis of quality based on computer vision. A method that uses PCA and K-mean cluster analysis Rice bran is the rice milling waste that can be used to make oil. There are different kinds of rice bran based on how much oil they have. For example, boiled rice bran has between 20% and 26% oil, while raw rice bran has between 16% and 18% oil. Neural networks are used. So, it can be more precise under difficult circumstances. Needs high-quality images and machines that can process them quickly.

III. METHODOLOGY

Image processing is used to count the number of rice seeds and sort them based on their length, width, and the ratio of length to width. Length is the average length of a rice grain, and breadth is the average width of a rice grain.: **L/B = [(Average length of rice grain)/ (average breadth of rice)]*10**. In the first step of preprocessing, the image is aligned, and noise is taken out of the image using a filter. The second step is to use a shrinkage algorithm to separate the kernels that are touching.

In the third step, we look for edges to find out where the boundaries are. In the fourth step, the rice seeds are measured for length, width, and the difference between the two. In the fifth step of the algorithm, the rice is put into groups based on how big and round it is. The system is made up of smaller parts called modules.

The modules are as follows:

Capturing rice sample images - The first step is to take pictures of rice samples. The lens of the camera is around 10-15 cm away from the grains of rice. According on the kind of picture, the photographs are subsequently saved in a database.

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Image pre-processing - To reduce picture noise, a filter is employed during the image capture process. The image's sharpness is improved further by the filter. The rice grains are separated from the black backdrop using the Threshold method.

Shrinkage morphological operation -Erosion is used to separate rice grains with touching characteristics while maintaining the integrity of each individual feature. Following the erosion process, dilation occurs. The purpose of dilatation is to restore the original form of eroded parts while preventing the divided portions from being rejoined.

Edge detection - A technique known as edge detection is used to identify the edges of rice grains. To find the corners, we use the canny method.

Object measurement - Measuring yields the number of grains of rice in a certain batch of rice. After determining the number of rice grains, edge detection techniques are applied to the picture, and the endpoint values of each grain are obtained as a result. Each grain's length and width are measured using a calliper, which connects the grain's end points. We can compute the length-breadth ratio after determining the length and breadth values.

Object classification - Classification necessitates the use of all standard, measurable, and computed data. The go-to resource for measuring rice grain size and shape.

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

Long Slender (LS)	Length >= 6mm, L/B Ratio>=3mm
Short Slender (SS)	Length< 6mm, L/B Ratio>=3mm
Medium Slender (MS)	Length >= 6mm, 2.5 <L/B Ratio<3mm
Long Bold (LB)	Length >= 6mm, L/B Ratio<3mm
Short Bold (SB)	Length < 6mm, L/B Ratio<3mm

IV. EXISTING SYSTEM

In general, agriculture is a very big and old business. Since the beginning of time, it has been very hard to figure out how good a grain is. In the current system, grain classification is done by hand. Experienced users can do it perfectly, but new users have a hard time.

V. PROPOSED SYSTEM

Rice seeds are counted and classified using an image processing approach based on their length, width, and the length-to-width ratio. A rice grain's average length is its length, while its average width is its breadth. There are 10 rice grains in an average length of 1 millimetre, hence the length-to-width ratio is 10 millimetres. Noise is removed from the picture using a filter in the first stage of preprocessing. The kernels that are touching must be separated using the shrinkage technique in the next phase. Identifying boundaries is accomplished in part three by scanning for edges. Finally, rice seeds are measured in terms of length and breadth in the fourth phase. According to the fifth stage of the algorithm, the size and roundness of the rice is taken into consideration.

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VI. RESULTS AND ANALYSIS

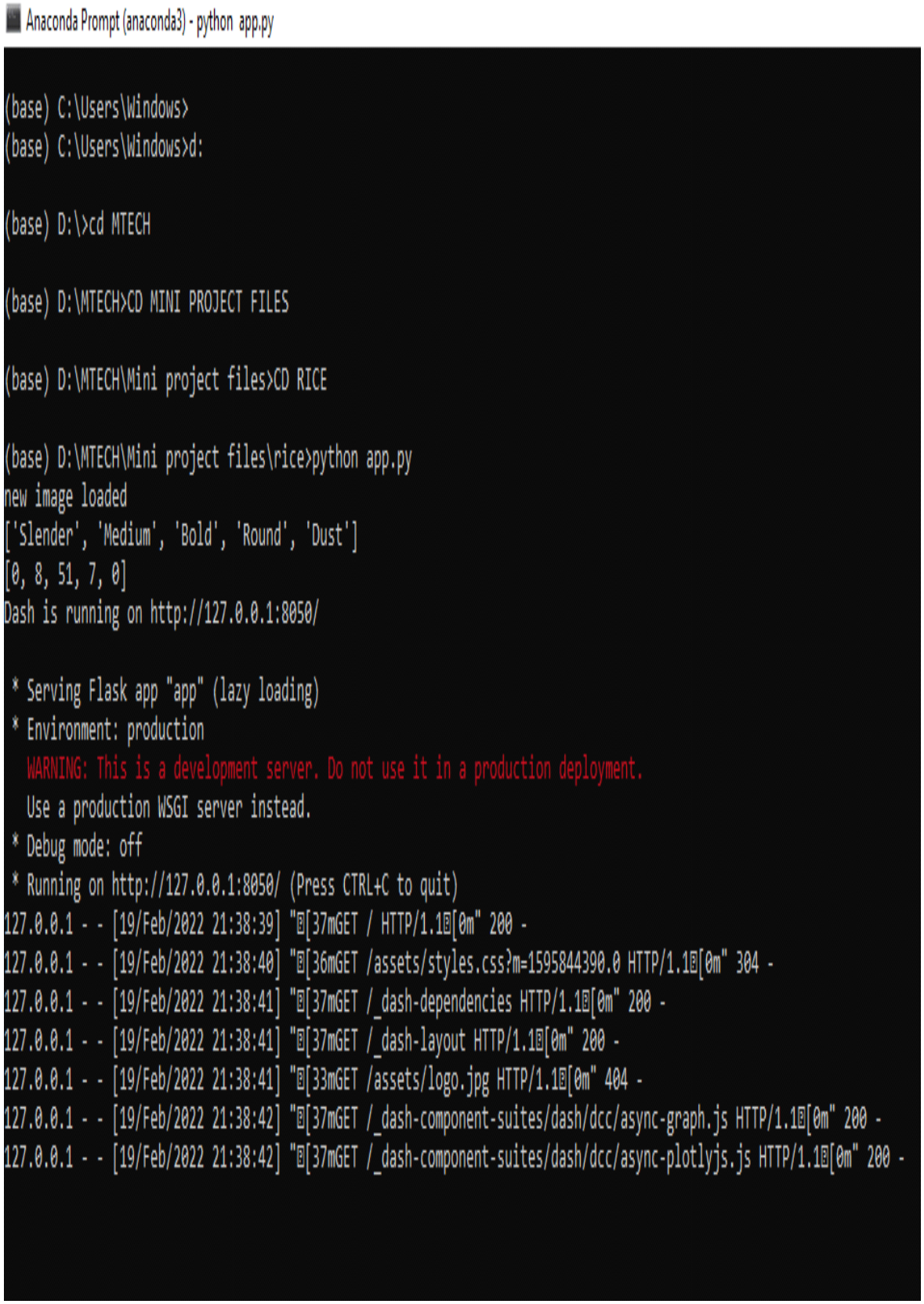

Figure 7: Anaconda command prompt.

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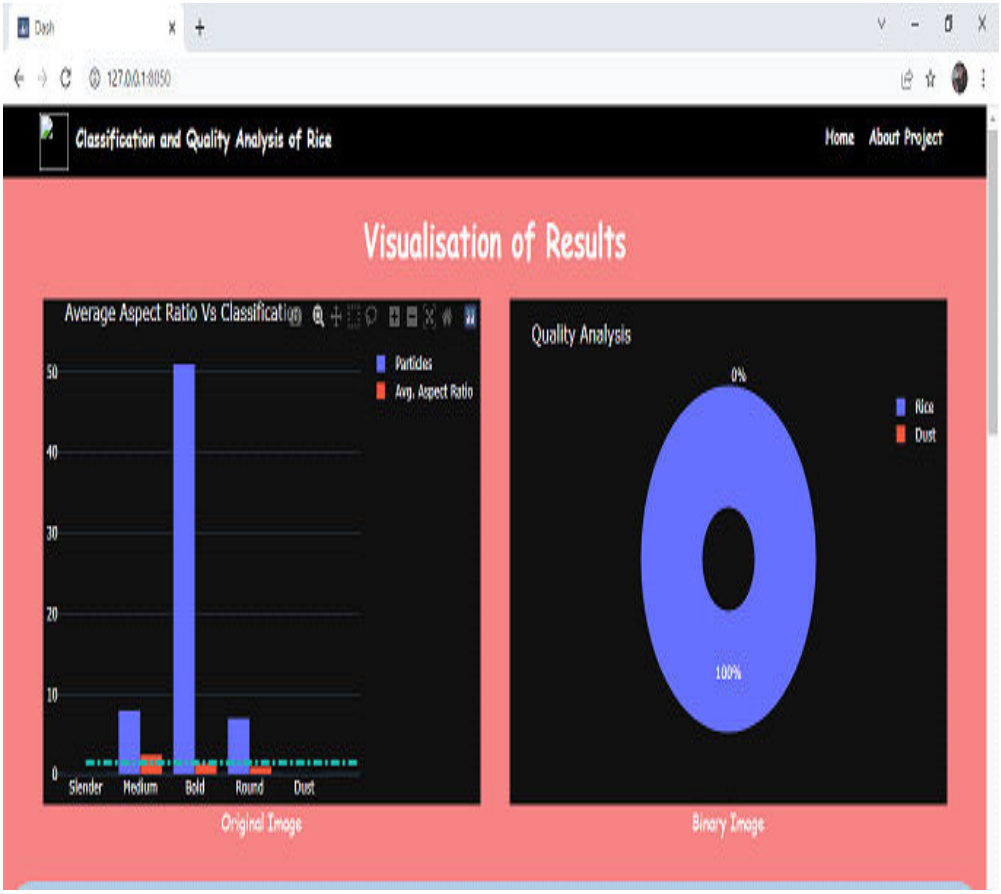
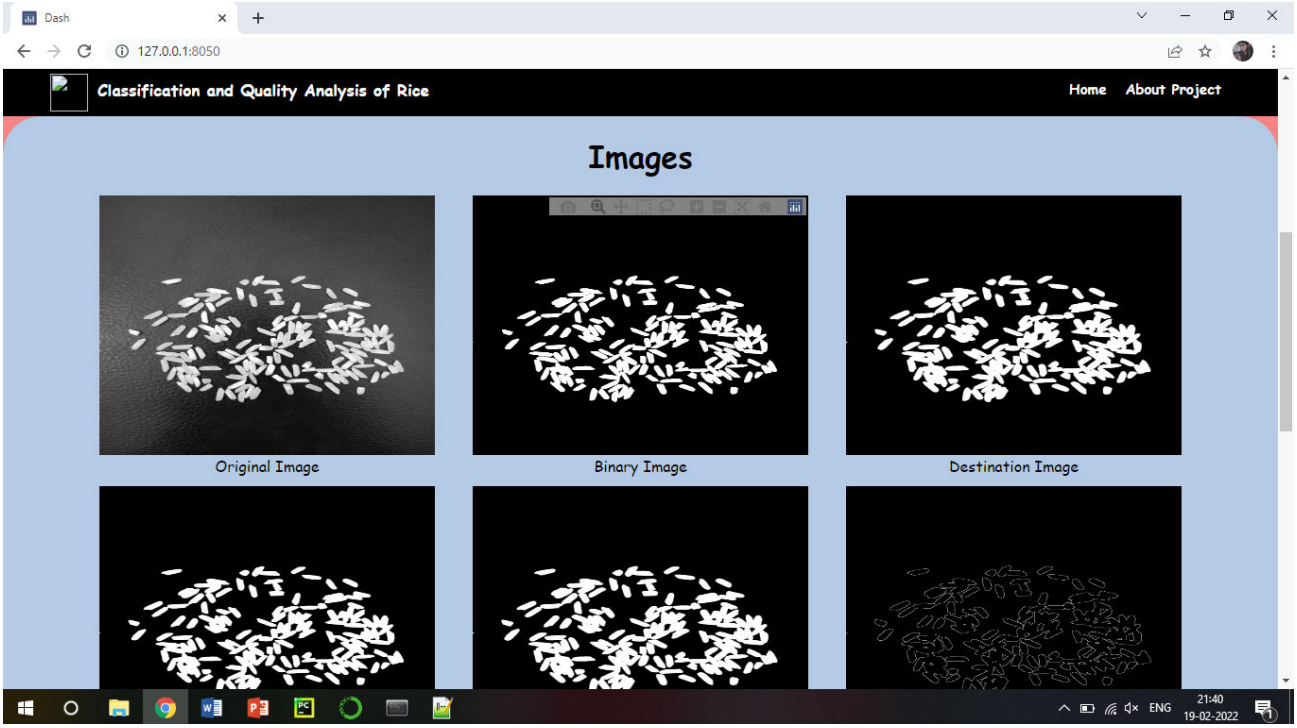


Figure 8: Visualization of result.



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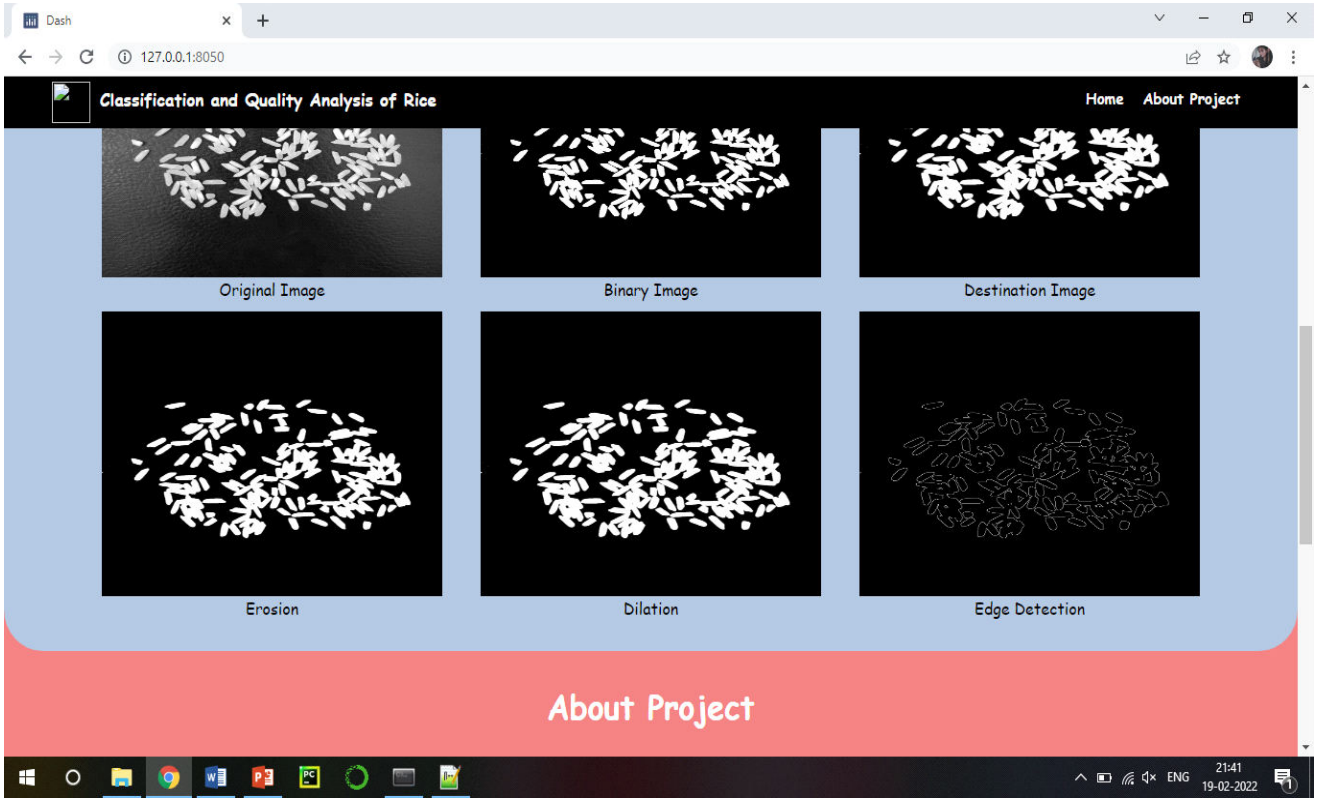

Figure 9: Image processing of rice grain.

Based on the sample images of different types of rice, the system is able to successfully capture different parameters. Features and parameters extracted from a rice data set may be stored in a.csv file for use in subsequent processes. In addition, the system is capable of counting the number of rice grains in each image. On top of that, the system can use the collected data set to run a number of image processing algorithms and machine learning algorithms.

VII. CONCLUSION

On a random picture of rice grains spread out in a single layer, the image analysis techniques are used. The shrinking process is effective in separating the connecting component from the spot where kernels are touching if an error such as this occurs. Edge detection is a technique used to locate the ends and edges of individual grains. After that, a calliper may be used to measure the object's length and breadth. The length-to-width ratio may be calculated after you know the dimensions of the object. Image processing methods are used to identify and separate rice grains in this research. In order to determine the quality of a grain depending on its size, an image processing technique may be used.

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