Quality Testing of Rice Grains using SVM

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Abstract **- Classification of rice grains is important for us humans because it straight away affects our health. Approximately 90% of the Asian countries prefer rice as their major food, whose demand and economical aspects are increasing day by day which is to be considered. The only purpose of putting forward this method is, to offer a substitute for quality inspection which reduces the required labor, cost, and time. The exact recognition of rice seeds is essential for classifying rice diversity. The detection of the degree of purity of rice grains makes the piece of work hard and complex. Marketing price, its characteristics, and quality of grains depends on the type of rice. The grade and value of rice are decided by these aspects. Machine Learning Techniques were used to obtain constant standard quality and accuracy. Physical and chemical characteristics together helps in analyzing the quality of rice. Size, shape, and color of grain are some physical characteristics. Using Support Vector Machine all physical features and classification of the rice grains are obtained. By implementing these two and comparing both Support Vector Machine outputs and identifying which technique will perform the classification efficiently.**

Index Terms **- Support Vector Machine, Machine Learning, Classification, Image Processing, Segmentation.**

I.INTRODUCTION

An enormous growth has been seen in Image processing technology lately. The data which is collected has to pass through 3 phases those are pre-processing, intensifying, and display, important data extraction. The main purpose of image processing is to test the quality of grains which is based on various parameters, for example, color of the grain, shape of the grain, and size of the grain. The broken pieces of the rice grain are highly efficient in detecting the quality of the rice. Machine learning algorithms are implemented to figure out the quality of the grain. Digital images are crucial for machine learning algorithms. Here grains are classified according to their color and size. It introduces how to classify four types of rice in a grain mixture. To achieve good results black background was used for the basic operation of the method. The accuracy in identifying rice seeds is required for distinguishing them into their varieties. The variety of rice is determined by the value, genetic characteristics, and quality of rice. The standard of rice and the value of rice are marked by these features. It is a complicated task to the identification of the level of sterility of rice varieties. Through manual inspection, quality examinations can be done only on a few known varieties.

II. LITERATURE SURVEY

Teresa Mary Philip et al., 2017 [1] defined that an automatic class of rice grains will assist in the detection of mistakes which is discovered in guide checking. Many studies are carried out considering the morphological capabilities of grains like region, shape, and many others. But nonetheless, the sizes and styles are too numerous in diverse sorts. As a result, composing a standard component for protecting all varieties becomes a tedious system. In these paintings, the category of some rice styles of commercially famous grains from the Southern area of India is achieved via using Fourier transform. The features are extracted from the pix of rice grains at the side of the Fourier capabilities to investigate the grain. The sorting is performed in stages with the help of the NB Tree classifier and SMO classifier. The study changed into capable of conveying wonderful accuracy as it used the inner capabilities of the grains at the side of the spatial capabilities. Many kinds of studies are completed to discover and classify rice grains primarily based on their first class. Kuchekar et al., 2018 [2], made a try to differentiate the rice grains based totally on picture processing techniques. The exceptional of rice is decided based on the bodily and

chemical traits like location, duration, and width, and so on, here the rice grains are ranked and labeled based totally on these features extracted from the samples the usage of the canny facet detection approach. The outcomes obtained are discovered to be motivating.

Zahida Parveen et al., 2017 [3], developed a set of rules to differentiate the rice grains primarily based on a few developments like length, thickness, and coloration. The measurement and color of the rice also are calculated in this algorithm with the use of 22 pattern snapshots of rice. Adulteration in meal grains must be eliminated as it immediately affects the fitness of someone. So many novel strategies have evolved to investigate the quality of the grains. Samrendra. K. Singh et al., 2019 [4] evolved a brand-new technique that merges image processing and gadget learning (ML) ensemble to exactly measure the dimensions and mass of many rice kernels concurrently. Right here, with the assist of the recursive method a picture processing algorithm turned into developed to become aware of each rice kernel from an image and calculate the scale of the kernels based on the pixels occupied by using the equal. The scale and mass of the rice kernel were expected based totally on the number of pixels it represents. The 3 sorts of rice grains used for the analysis were Calhikari-202 (small grain), Jupiter (medium grain), and CL153 (long grain). This set of rules showed first-rate consequences in detecting the size and mass of rice kernels whilst quantified. Yuchen Kong et al., 2019 [5] has proposed a method to identify the thickness of rice grain by the use of the photogrammetry idea. The rice edges are decided by using considering the elements like length, width, and thickness. The binocular stereo vision precept turned into used for extracting the capabilities of rice grain besides for the texture as it's difficult to fit the respective points inside the 3D reconstruction of the photo. First, the form features are taken into consideration to discover the length, and then through using the manner of space intersection the height of rice is acquired. Ultimately, through the speculation that the approximate thickness of diverse rice can be twice the peak of the rice grain, the thickness of rice is extracted. From the outcomes obtained the mistake turned into now not greater than the ideal range of the commercial trendy. For this reason, this set of rules confirms that the thickness of rice may be extracted by the usage of the threshold detection technique. While assessing the great of rice, the size and mass of the kernels play a critical position, especially in head rice yield. Dr. T. Avudaiappan et al., 2019 [6] focused on a study to investigate the options like form, color, the feel of rice grain. Here image process technique was combined with classification techniques like Support Vector Machine, call tree to diagnose and classify rice seeds from various samples in an exceedingly non-contact mode. Employing a camera, the photographs of the grains were captured pre-processed, filtered, and divided, and also the options are extracted victimization the sting detection methodology. These options obtained were fed to the machine learning algorithmic program and also the results were displayed in LED.

III. PROPOSED SYSTEM ARCHITECTURE

Support Vector Machine is used to enhance the efficiency of rice grains. In the previous methods, the classification is performed very poorly it will overcome by the machine learning algorithms as mentioned above. Support Vector Machine is most popular for classification in the machine learning algorithm. Their mathematical background is important in building the foundation for the geometrical differentiation between the two classes. We can see how Support vector machines work by noticing their implementation in MATLAB. Support vector machines are instances of the supervised binary linear classifier which can be altered to carry out nonlinear classification. These alterations are used to perform classification on an arbitrary number of classes with few additional techniques.

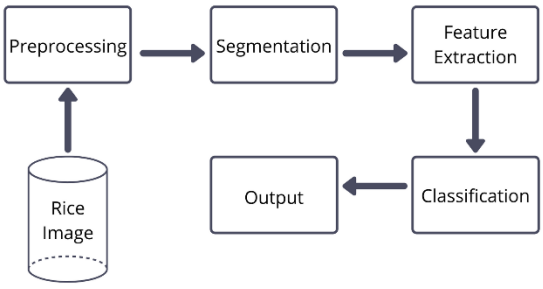


Fig 1. System Architecture

MODULES with DESCRIPTION

- Image Preprocessing
- Segmentation
- Feature Extraction
- Image Classification

a. IMAGE PREPROCESSING

In this stage, we majorly focus on image enhancement. The main aim of image enhancement is to give a better perception of the data contained in the image. So that the results are more suitable for further image processing. In our proposed system, we have enhanced the image in 4 stages.

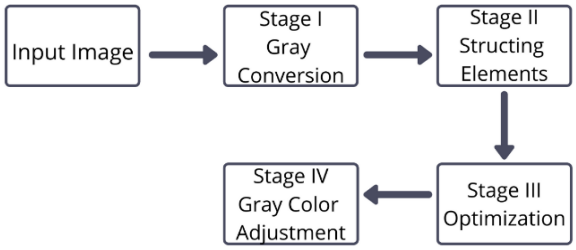


Fig 2. Stages in preprocessing

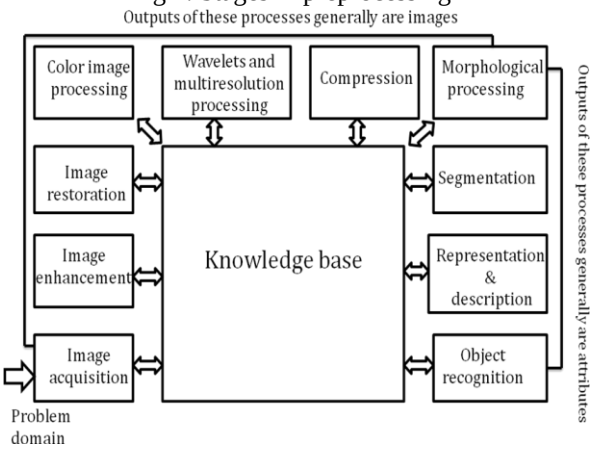


Fig 3. Fundamental Steps in Image Processing

b. SEGMENTATION

Segmentation plays a crucial role in image processing. The word segmentation itself tells that the image is divided into different segments. Here, the division into parts is done based upon the characteristics of the pixels so that we can find the objects i.e., rice grains. Thus, the preprocessed image is converted into a binary image to get the rice grains.

c. FEATURE EXTRACTION

Here in this stage, we have taken 2 features of rice grains which are shape and color. These are useful for the purpose of feature extraction. The succeeding step involves figuring of certain properties of the objects in the image. This is called feature extraction. Feature extraction delineates the pertinent shape information contained in the image so that it becomes easy at the time of classification. It is useful when we want to reduce the redundant information from the image. This function will return the measurements of properties for every object in the binary image.

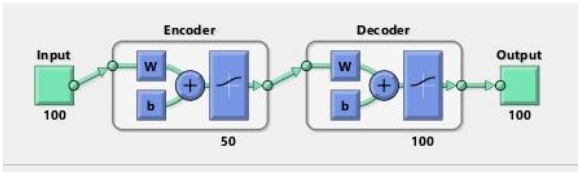


Fig 4. Color-based training

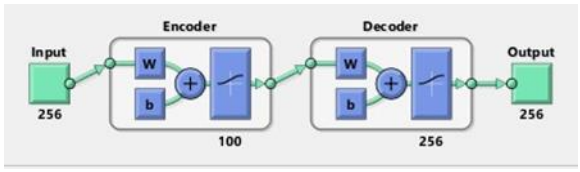


Fig 5. Shape-based training

d. IMAGE CLASSIFICATION

Image classification is a technique of grading the rice grains depending on the prerequisite. It is used to detect the variety of rice grains from the input image. In this project, a Multi-class Support Vector Machine is applied for the classification. This can be done either experimentally or conceptually. The detection is done by using input vectors which are plotted into a high-dimensional space and a hyper-plane is built which separates the data in an efficient manner. The purpose of using Multi-class Support Vector Machine is that it contains a bigger number of classes that are required for classification.

Fig 6. I/p image

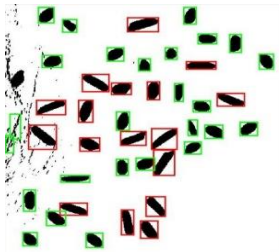


Fig 7. O/p image

IV. RESULTS & DISCUSSION

The classified shape output using the Support Vector Machine is shown below. The short grains are represented using the green color and the long grains are represented using the red color. These bounding boxes are represented based on the threshold value. If at all the obtained value is greater than the threshold value it's indicated by the red color and if the value is less than the threshold value it is represented using the green color.

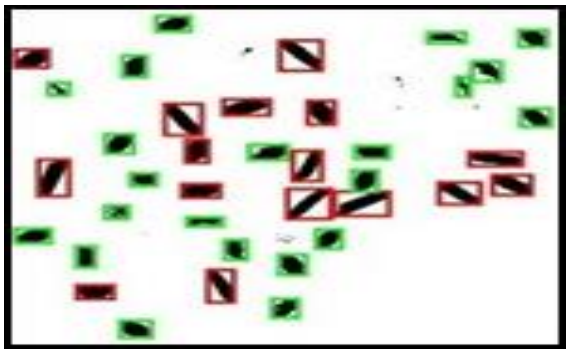
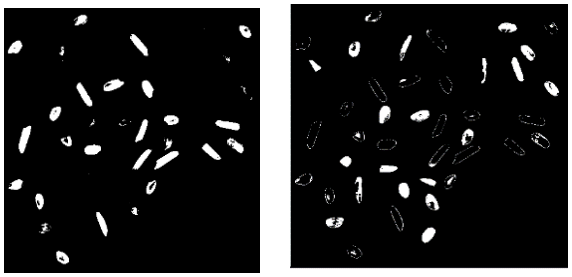


Fig 8. Support vector machine output

The output is represented not only in shape-based segmentation but also based represented on color-based segmentation using the Support Vector Machine in machine learning algorithms. The color segmentation is done basis on ranges of the pixel values and the output is classified.

The classified color output using the Support Vector Machine is shown below. The white and red grains are represented separately in the Support Vector Machine based on the RGB threshold values. This proposed method is executed with an accuracy of 90.5 percent.



a) White Color Grains b) Red Color Grains

Fig 9. Color classified output

V. CONCLUSION

From the obtained consequences we can say that the system is coherent, value-constructive, and decreases hard work. We acquired the classification of grains the use of gadget learning strategies including help Vector gadget (SVM). They are educated to carry out the classification of grains in both color and shape. The work in this field contains image processing strategies that are background subtraction, characteristic extraction, education, and type. Then again, the prevailing rice detection methods pleasant the ends of contemporary necessities, there exist diverse new methods which emerge to aid and reduce the process of rice bifurcation. Those approaches will all provide a much broader intention of optimizing international meals manufacturing.

VI. FUTURE SCOPE

Develop the database of rice and initiate an encyclopedic device for the classification machine. The data enhancement method could be used for building an ethical classifier while the superiority samples are inadequate. Analyze deep neural network architectures and get maintain of complete gain of deep studying algorithms to ameliorate type precision and accentuate the reliability and lustiness of the rice category gadget. In a few different instances, we can also locate stones in the shape of rice grains. They also can be detected at the side of the grains and proven inside the output. To avoid this trouble, we want to categorize the picture more appropriately.

VII. ACKNOWLEDGEMENT

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