

# A REVIEW PAPER ON CLASSIFICATION OF BLACK HEART DISEASED AND HEALTHY POMO USING MIXTURE MODEL CLASSIFIER

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**Abstract**-India is an agricultural country. Agriculture is one of the most important occupations of most Indian families. In India, huge amount of agricultural products are exported outside the country but unfortunately farmer is facing problem in classification of fruits that bad fruits also got mixed with export quality fruits as it is done manually many times. This problem affects India's export market. We need to maintain good quality and services while exporting agricultural products. There are so many parameters need to be considered while exporting agricultural products. Here, we are focusing on Classification of black heart diseased and healthy Pomegranate fruits.

**Keywords:** - black heart, mixture model classifier

## Introduction:

Maharashtra is leading growing state of pomegranate in India. The 66% production of pomegranate takes place in Maharashtra. The countries like UAE, Bangladesh, Netherland, Saudi Arabia, UK, Russia etc. are major importing countries of India's pomegranate. As per APEDA database near about 30,000 tones of Indian pomegranates are yearly exporting outside the country. The major disease of pomegranate is black heart disease which affects to India's exportation quality. We need to identify black heart affected Pomegranates at the initial stage and sort out good quality fruits for exportation. Today's sorting system is based on detection of diseased fruits and sorting of export quality fruits by observing its shape, size, color and shine. In case of internal defects in any fruit, it is difficult for farmer to detect its internal injuries of fruit. How to sort it separately from good product? So that we can sort export good quality agricultural fruits effectively. We are focusing on classification of pomegranates. The major disease in pomegranate is black heart disease. It is very difficult to identify affected fruit by observing external symptoms of pomegranate fruit. Diagnosis of black heart disease pomegranate is very difficult. In this review paper we are focusing on classification of black heart diseased pomegranates and healthy pomegranates.

## Significance of the topic

In Maharashtra, in drought affected regions like solapur district, pomegranate cultivation is main source of income. To grow pomegranates disease free is most important. Pomegranate is also called as Chinese apple. This fruit belongs to punica-granatum which is cultivated on thousands of acres of land in solapur and nearby districts of Maharashtra. Now days the demand of pomegranates is increasing in domestic market as well as in abroad also. Pomegranate juice is also healthy for patient. We know that, pomegranate has huge amount of applications in medical field also the medical application of pomegranates in medical field is to reduce risk of heart attack, cancer etc. Doctors recommend their patients to include pomegranates in diet. Most of pomegranate farmers are suffering from black heart disease. It is caused by Alternaria fungi during flowering stage and results in black heart disease. This disease is caused by viral, bacteria and fungi infection. This disease initially occurs to one seed in pomegranate. The fungus survives on sugar and water content of aril. The fungi growth and development take place on sugar and water content of aril. The total internal decay of pomegranate fruit takes place by Aspergillus fungi. It affects farmer's goodwill in market. The Aspergillus fungus spreads in whole fruit and total internal pomegranate decays. The time consumed during transportation of pomegranates helps to spread the black heart disease. The black heart disease produces external symptoms at final stage. We are looking to detect it at initial stage. So, considering the problems of farmer and exporter there is need of innovative system which will have a capacity to sort the pomegranate fruit at initial stage.

What is black heart disease? It is an internal decay of the arils without any external symptom on pomegranate. The disease affects pomegranates is Alternaria fruit rot or Alternaria alternate, Aspergillus fruit rot or Aspergillus niger and gray mold or Botrytis cinerea. Alternaria fruit rot is also known as black heart and Aspergillus fruit rot appear after raining at flowering stage and affect the internal portion of the pomegranate. Alternaria fruit rot is fungi produces black heart disease for aril. The complete fruit becomes black due to Aspergillus fruit rot fungi. Wounds occur after flower initiation. Because of this there is slight change in weight of pomegranate.

The detection of black heart black heart affected pomegranate at the initial stage because transportation of pomegranates takes longer time to reach destination. Till that time pomegranates get totally damaged and it affects to financial loss of farmers and exporters. The classification of black heart affected pomegranates at the primary stage is necessary. Today's manual separation system of pomegranates is time consuming because disease cannot be detected.

### Literature Review:

Lu Zhang et al (2012) [1] have explained new technique for detection of black heart disease of pomegranate using relaxation of aril hydrogen atoms technique. This technique is based on magnetic resonance imaging MRI technology. But it has limitation of misclassification.

Lembe Samukelo Magwaza et al (2014) [2] have explained new technique for detection of quantity and distribution of edible and non-edible portions of pomegranate using values of volumes for air spaces of arils and albedo of pomegranates. This technique is based on X-ray computed tomography (CT) technology. But it has limitation of time needed for data acquisition and image analysis makes the current system impractical for in-line pack house sorting and grading.

Payel G et al (2014) [3] have explained new technique for detection of internal quality of pomegranate using area calculation algorithm which shows the value of the defected area in each pomegranate. This technique is based on continuous soft X-ray system with a semi-conductor detector. But it has limitation of X-ray CT and associated image analysis is accurate in predict in arils and albedo but less accurate with air spaces.

Jagadeesh D. Pujari et al (2013) [4] have explained new technique for detection and classification of fungal disease of pomegranate using GLCM, GLRM and the nearest neighbor classifier technique. This technique is based on camera acquisition technology. But it has limitation of internal pomegranate quality did not check.

Manisha Bhangre et al (2015) [5] have explained new technique for identification of pomegranate disease using Support Vector Machine algorithm (SVM). This technique is based on digital camera technology. But it has limitation of low performance and less accuracy.

Khoshroo A. et al (2009)[6] have explained new technique for assessment of changes in pomegranate maturity stages and detection of internal defects of pomegranate using Gray Level Co-occurrence Matrix (GLCM) and Pixel Run-Length Matrix (PRLM) technique. This technique is based on Magnetic Resonance Imaging (MRI) technology. But it has limitation of sorting mechanism not implemented.

Karen Munhuweyi et al (2015) [7] have explained new technique for postharvest diseases, symptoms, their causative microorganism, importance, types of disease control and management strategies of pomegranate. We are using this paper for reference to identify symptoms and causative fungus due to which black heart disease takes place in pomegranates.

### Limitations of Literature:

The literature survey has revealed that there are limitations of the existing systems of pomegranate black heart disease detection in the area of agriculture. They are as follows

#### Misclassification

Time needed for data acquisition and image analysis makes the current system impractical for in-line pack house classification.

Classification mechanism of pomegranates is not up to mark to maintain high grade export quality separation.

Performance and accuracy of system are not truthful.

Large homogeneous data classification is not used.

Some exporters are still manually Classifying pomegranates which do not have accuracy.

Practical model have not yet developed.

For classification of black heart affected pomegranates new classifiers are not developed. Existing classifiers have been used and they are not efficient to detect and classify based on probability estimator range.

Classifier is required for classification of black heart disease affected pomegranates and good quality pomegranates. There are two types of classifiers mainly hard classifier and soft classifier. In Hard classifier each pixel belongs to one specific class only. Hard classifier is having boundary estimator so either captured image lies in one region or another region which are separated by boundary estimation. Hard classifier is having strongly acceptance ratio denoted by logic 1 as well as strongly rejection ratio denoted by logic 0.

In Soft classifier each pixel belongs to more than one class. Soft classifier is having probability estimator whose values lies between 0 and 1 only. Here programmer gets opportunity to assign probability estimator range. As we know that, training module set has collection or set of all captured images and in train module set has recent captured image. Train module set image will compare with the training module set image. Here, in present contest we are going to compare features of captured image with training module set. Feature extraction transforms data from high dimensional space to less dimensional space. Feature extraction of known data sets or labeled data sets are called as supervised classifier.

### System Model:

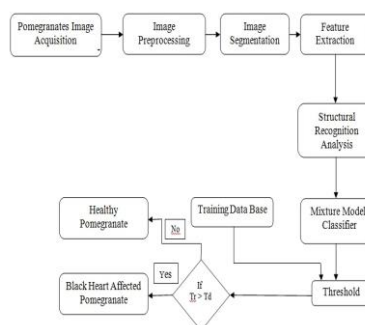


Fig.1 System Model

As shown in fig.1 is block diagram of System model which consists of blocks like Image acquisition, Image preprocessing, Image segmentation, Image feature Extraction, structural recognition analysis, mixture model classifier etc. The role of image acquisition block is to capture the image of pomegranate with the help of MRI or soft X ray imaging or Ultrasonic Imaging. There are three methods of image acquisition which are X ray imaging, Magnetic resonance imaging and Ultrasonic imaging. We can use soft x ray imaging for internal structural identification and recognition of black heart disease. We can use MRI for internal Functional identification and recognition of black heart disease. Image preprocessing is required after imaging acquisition. This step removes noise in input signal, improves contrast and isolate interested object in the image. Here, interested object is nothing but black heart disease part of pomegranate. Image segmentation divides diseased part into constituent part or objects. Feature extraction block is required for extraction features of black heart affected pomegranate. There are two types of analysis, first statistical recognition analysis and second structural recognition analysis. We can use structural recognition analysis to identify black heart disease based on its extracted features and structures.

The next block is mixture model classifier; there are two types of classifiers soft classifier and hard classifier. The soft classifier has probability estimator value. The programmer can assign probability estimator value between 0 to 1. There are two data sets trained and training data sets. The trained data set consists of recently pomegranate captured images and training data set consists of already captured images of black heart disease pomegranates. The role of mixture model classifier is to compare the features of captured image of pomegranate with already stored images in data base and detect black heart disease pomegranate. The probability estimator range detects black heart affected pomegranate and separate it using mixture model classifier. Here, the relationship between Threshold value and Training data base value decides healthy and black heart affected pomegranates.

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