# Survey Paper of Pomegranate Fruit Disease Detection System

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***Abstract-***
Agricultural fruit diseases cause economic losses to far mers. Monitoring the health of the traditional pomegra nate crop and diagnosing disease is highintensity, diffic ult and timeconsuming. However, recent advances in i mage processing and computer vision offer opportuniti es for disease detection in pomegranate plants. In this a rticle, we provide an overview of the imaging technique s used to detect pomegranate disease. In this article, we provide an overview of the methods used to detect pom egranate diseases. We also discuss the challenges of dia gnosing diseases in images and highlight the potential o f deep learning to achieve accurate diagnosis.

**Keywords:** Pomegranate, K-means, SVM (support vector machine), CNN, Softmax layer

## I. INTRODUCTION

India's primary economic sector is agriculture, and its dependence on the agricultural output cycle presents a dilemma. The area used for agriculture will gradually shrink due to rapid growth, and as more people live there, the need for fruit will rise. High fruit quality production is therefore crucial. By identifying pomegranate fruit illness early on, to find a solution to this issue. Pomegranates have been affected by leaf blight, fruit spot, rot, anthracnose, etc. in recent years. Because diseases have little effect on production, pomegranates have become one of the most expensive goods in the nation. Pomegranates are highly productive per acre of land and have good nutritional and economic value. Here, Employ the image processing procedure that begins with the data and proceeds to expand the data using a variety of transformations, normalize the pixel values, and resize the image to fit the given dimensions. CNN and Gabor Filter are two methods for eliminating elements like color and texture. CNN Softmax Layer is one of the techniques used for categorization.

Fig(a) Fig(b)

Fig(c) Fig(d)

Through early disease detection and identification, CNNs for pomegranate disease detection can help boost productivity and enhance quality, which can result in better resource utilization and fewer crop losses.

**Bacterial Blight**: Bacterial blight is a disease that affects pomegranate plants. Wilt disease attacks the plant's fruits, leaves and stems. The fruits crack or break due to the for mation of black spots on the fruit, which later grow and cover the entire surface of the fruit. Temperature and relative humidity facilitate the onset of the disease. As see in picture (a)

**Fruit spot**: Fruit spot is a disease caused by fungi and more rain than usual helps start it. Bones appear broken, rounded, or irregular and turn brown age. As seen in picture (b)

**Fruit rot**: The surface of the fruit begins to turn brown. The small fruits of the peel are small and round. The main reason for the spread of fruit rot is plant debris. The second cause of fruit rot is windborne conidia. As seen in picture (c)

**Anthracnose**: There are irregular to irregular small black spots on the leaves and fruits. These spots turn dark

brown. Diseased leaves turn yellow and fall off. As shown in figure (d)

**Contribution in Project**

Modern systems face all the problems mentioned. To solve this problem, we propose a novel CNN-based solution. We use CNN and Softmax layers for color recognition. Improves the Nar system to recognize colors. right. Images are color coded. Pomegranate system for precise color determination It reduces the amount of manual labor required and provides images with different colors that are easier to recognize. Lighting conditions. This helps reduce negativity as the network can help identify patterns in the image. Identify the specific color that causes the disease.

## II. LITERATURE SURVEY

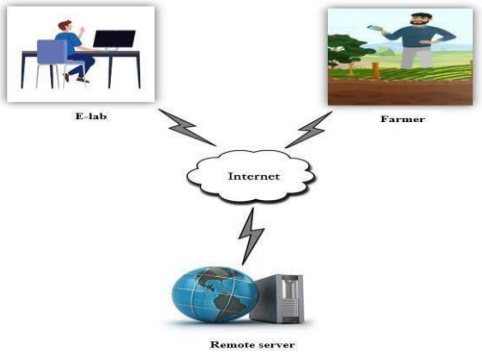
Mainly propose an automatic disease detection system for pomegranate varieties using image processing technology and machine learning algorithms. The proposed system includes several steps: image acquisition, image preprocessing, feature extraction, and classification. The first step in image acquisition is accomplished by capturing the image on a digital camera. The next step in image preprocessing is used to remove unwanted noise, improve image quality, and segmentation to improve image quality. In the feature extraction stage, features of pomegranate fruit such as color, texture, and shape are extracted from the preprocessed image. The final stage of classification uses machine learning algorithms such as decision trees, support vector machines, and k-nearest neighbors to classify pomegranates into healthy and diseased categories and evaluate the severity of the disease[1]. Proposes a fruit detection algorithm that utilizes several image characteristics such as color, texture, and shape. The algorithm consists of several steps: preprocessing, segmentation, feature extraction, and features. In the first preprocessing step, the input image is first converted to black and white and then filtering techniques are applied to increase contrast and remove noise. In the segmentation stage, different region cultivation algorithms are used to identify fruit regions. The region extraction results show a success rate of over 95% in extracting fruit regions from the background, including color features and texture features, based on the co-occurrence matrix. In the final classification step, a support vector machine (SVM) is trained to classify fruit regions based on the selected features [2]. The goal of this study is to develop a pomegranate disease detection system to find an accurate and effective way to detect and classify pomegranate fruit diseases, thereby improving crop management and increasing crop yield. Collected images of healthy and diseased pomegranate fruits from different regions and performed a first step of image preprocessing to remove background noise and improve image quality. In the next step of feature extraction, researchers used GLCM techniques to reduce dimensionality and extract unique and meaningful information called image features from the images. Conducted a study to identify pomegranate diseases using machine learning algorithms, especially probabilistic neural networks (PNN). In the presented work, a PNN classifier was created that can distinguish disease types based on selected shading and composition highlights. Overall, study presents a promising method for pomegranate fruit disease detection and classification using ML algorithms [3]. Provides an overview of different machine learning and image processing methods, such as GLCM, ANN, and K-means cluster partitioning, used to classify pomegranate diseases. Discuss the different types of diseases affecting pomegranate plants and the challenges associated with their diagnosis. Overall, this paper provides a comprehensive overview of state-of-the-art methods for classifying pomegranate diseases using machine learning and image segmentation techniques [4]. Shows the importance of pomegranate as a fruit crop due to its nutritional value and economic importance. However, pomegranate trees are susceptible to a variety of diseases that can reduce fruit yield and quality. Traditional disease detection methods involve visual inspection by experts and can be time-consuming and subjective. Accordingly, presents the concept of image processing that analyzes and extracts useful information using digital images and algorithms such as SVM and K-means, then discuss various methods used to detect pomegranate diseases, including image features such as color-based segmentation, texture analysis, and machine learning algorithms. Provide detailed descriptions of various image processing techniques and cite several studies in which these techniques have been successfully used to identify diseases in pomegranates [5].

## III. METHODOLOGY

The program recommends identifying fruit diseases such as blight, fruit rot, fruit rot and anthracnose in pomegranates [6]. The process used in this project consists of three main steps: image preprocessing, feature extraction using Gabor filters and CNN, and classification using CNN. Distort and resize RGB images using grayscale, then automatically mark them up and convert them to black and white. Texture and color are important in classifying and identifying foods. Texture feature extraction methods include GLCM and Gabor filters, and color feature extraction methods use CNN algorithms [7]. The accuracy of various classifications is shown in Figure 2. In this project, used CNN for classification and softmax layer of CNN for classification. Use the evaluation method to check the accuracy of the trained CNN model. Finally, the exact type of infection is analyzed and the infection rate is measured [8]. How to diagnose pomegranate fruit diseases. It is a good idea to identify pomegranate diseases such as late blight, fruit rot, fruit rot and anthracnose. Disease detection methods include image preprocessing, Gabor filter feature extraction, CNN classification, and fruit disease detection [9]. The circuit used in this project is shown in Figure 1. Feature extraction and classification are important steps in image preprocessing.

## IV. SYSTEM ARCHITECTURE

The system architecture is shown below. Users must




register before using this system. From now on, only authenticated users can access the system.

A pomegranate fruit disease detection system using CNN and Softmax layers is a promising approach for pomegranate disease diagnosis when users log in to transmit pomegranate images over a wireless network. This system uses large and diverse data, complex CNN architecture, and softmax layers to achieve high accuracy in disease diagnosis [10]. A convenient way to upload an image of your pomegranate fruit and get an instant diagnosis. However, as with all learning-based systems, there are limitations and issues to consider, including data quality and size, test line accuracy, and diagnostic complexity. Disease detection can improve the efficiency and accuracy of disease diagnosis in pomegranate fruit, allowing better management and protection of this important crop [11]. With further research and development, the system can be expanded and applied to detect diseases in other types of fruits and crops. This provides useful tools to farmers and ranchers around the world.

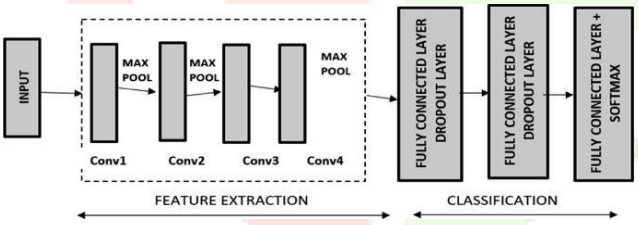



**Figure 1 System Architecture**

## V. UDERSTANDING DATASET

Information about pomegranate fruit diseases has been collected from various sources and over 100 images about pomegranate fruit diseases and health[12]. This data contains images of pomegranate fruits affected by blight and fungal diseases and can be used to train and test learning models for disease detection using methods such as CNNs and SVMs [13].

Figure 1 Dataset Understanding

## VI. FUTURE SCOPE

Increase the size of Dataset to improve the accuracy of the system. Develop a system that can detect and diagnose diseases in pomegranate fruits from adistance with the help of drones or other imaging technologies. Deploy mobile applications and web applications for any other users to use. Improve the accuracy of the system by incorporating other factors such as soil fertility and environmental conditions. Incorporate weather information, like temperature and humidity, into the system topredict possible disease outbreaks.

## VII. CONCLUSION

Information about pomegranate fruit diseases has been collected from various sources and have over 100 images about pomegranate fruit diseases and health. This data contains images of pomegranate fruits with late blight and fungal diseases and can be used to train and test learning models for disease detection using methods such as CNNs and SVMs [10]. This system uses CNN method and also uses Gabor filter for image processing. For edge and texture recognition. Both methods provided accurate and effective results. Imaging plays an important role in disease diagnosis. Future work will add more information about different fruits to this system to help diagnose diseases in many fruits. It is a good way to detect and diagnose pomegranate fruit diseases. System uses large and diverse data, complex CNN architecture, and softmax layers to achieve high accuracy in disease diagnosis . A convenient way to upload an image of your pomegranate fruit and get an instant diagnosis. However, as with all learning-based systems, there are limitations and issues to consider, including data quality and size, test line accuracy, and diagnostic complexity. Disease detection can improve the efficiency and accuracy of disease diagnosis in pomegranate fruit, allowing better management and protection of this important crop . With further research and development, the system can be expanded and applied to detect diseases in other types of fruits and crops. This provides useful tools to farmers and ranchers around the world.

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## REFERENCES

[1]. hetal n. patel, dr. m. v. joshi "fruit detection using improved multiple features based algorithm" international journal of computer applications (0975 – 8887), volume 13– no.2, january 2011.

[2]. Savita N. Ghaiwat, Parul Arora "Detection and Classification of Plant Leaf Diseases Using Image processing Techniques: A Review" International Journal of Recent Advances in Engineering & Technology (IJRAET) ISSN (Online): 2347 - 2812, Volume-2, Issue - 3, 2014.

[3]. Tejal Deshpande, Sharmila Sengupta, K. S. Raghuvanshi "Grading & Identification of Diseasein Pomegranate Leaf and Fruit" International Journal of Computer Science and Information Technologies, Vol. 5 (3), 2014, 4638-4645.

[4]. Monica Jhuria, Ashwini Kumar, Rushikesh Borse "Image Processing for Smart Farming: Detection of Disease and Fruit Grading" Proceeding of the 2013 IEEE Second International Conference on Image Processing.

[5]. H. Al-Hiary, S. Bani-Ahmad, M. Reyalat, M. Braik and Z. ALRahamneh "Fast and Accurate Detection and Classification of Plant Diseases" International Journal of Computer Applications (0975 – 8887) Volume 17– No.1, March 2011.[6]. Anand H. Kulkarni, Ashwin Patil R. K. "Applying image processing technique to detect plant diseases" International Journal of Modern Engineering Research (IJMER) Vol.2, Issue.5, Sep-Oct.2012 pp- 3661-3664

[7]. Yuan Tian, Chunjiang Zhao,Shenglian Lu,and Xinyu Guo,"SVM- based Multiple Classifier System for Recognition of Wheat Leaf Diseases", Proceedings of 2010 Conference on Dependable Computing (CDC'2010) November 20-22, 2010, Yichang, China.

[8]. Chen, Zhong, & Tan. 2019. Multiple-Oriented and Small Object Detection with ConvolutionalNeural Networks for Aerial Image. Remote Sensing, 11(18), 2176. https://doi.org/10.3390/rs11182176

[9]. Savita N. Ghaiwat, Parul Arora (2014), Detection and Classification of Plant Leaf Diseases Using Image processing Techniques: A Review International Journal of Recent Advances in Engineering and Technology (IJRAET)ISSN (Online): 2347 - 2812, Volume-2, Issue – 3

[10]. Anand.H.Kulkarni, Ashwin Patil R. K.(2012),Applying image processing technique to detect plant diseases International Journal of Modern Engineering Research (IJMER) Vol.2, Issue.5,pp-3661-3664.

[11]. Yadav S.S., Jadhav S.M. Deep convolutional neural network based medical image classification for disease diagnosis. J. Big Data. 2019;6:1–18. doi: 10.1186/s40537-019-0276-2

[12]. Camargo, A. and Smith, J. S., (2009). An imageprocessing based algorithm to automaticallyidentify plant disease visual symptoms, Biosystems Engineering, Volume 102, Issue 1, January 2009, Pages 9-21, ISSN 1537-5110, DOI: 10.1016/j.biosystemseng.2008.09.030.

[13]. Rumpf, T., A.-K. Mahlein, U. Steiner, E.-C. Oerke, H.-W. Dehne, L. Plumer, Early detectionand classification of plant diseases with Support Vector Machines based on hyperspectral reflectance, Computers and Electronics in Agriculture, Volume 74, Issue 1, October 2010, Pages 91-99, ISSN 0168-1699, DOI: 10.1016/j.compag.2010.06.009.