Review Paper Of Pomegranate Fruit Disease Detection System

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***Abstract*—**
Farmers suffer economic losses due to agricultural dis eases. Routine disease detection and health monitoring in pomegranate crops is labor intensive, requires atte ntion and takes time.
On the other hand, new advances in computer vision a nd imaging have made it possible to detect diseases in pomegranate plants. This study provides an overview of image processing techniques for detecting pomegran ate disease. This study provides an overview of image processing techniques for detecting pomegranate disea se. We also address the challenge of identifying disease s in images and demonstrate the possibility of accurate identification using deep learning.
Keywords: CNN, Softmax layer, SVM (support vector machine), K-means, and pomegranate

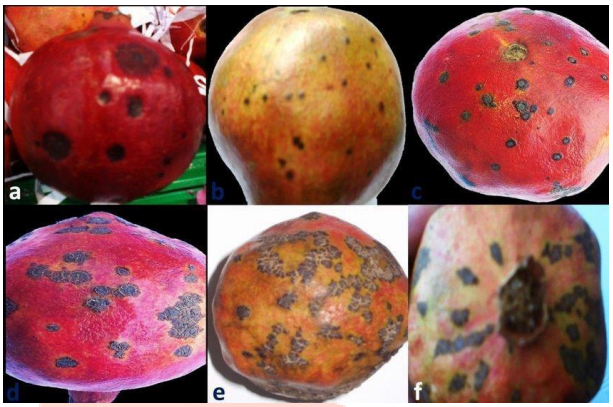


Figure 1 Pomegranate Disease

I. INTRODUCTION

India's main economy is based on agriculture. The problem arises because agriculture relies on many cycles. Urban development and agricultural areas are gradually will decrease, and fruiting will increase due to population growth. production. This requires high fruit yields. Solve this problem by identifying pomegranate disease early. possible. In recent years, late blight, fruit spot, rot, anthracnose and other pomegranate diseases have had little effect on pomegranate yields. During the production process, pomegranate has become one of the following: Products that direct national spending. This gives: Nutritional and economic benefits of large-scale production. This system uses image processing. The first is to scale the image to the desired size, normalize the pixel values, and apply different values. Data set transformation is for example data. Processing that moves the process forward. CNN and Gabor filter are two methods used to remove objects such as: Texture and color. CNN Softmax layers are used for the following purposes: Classification algorithm. CNN on pomegranate disease Detection improves resource efficiency and Promotes early diagnosis and management to reduce crop losses and thereby improve yield and quality. interrupt. The fruit, leaves and stems of the plant are susceptible to late blight. Over time, black spots may develop and cause the fruit to crack or break. Temperature and relative humidity spread over the entire surface favor the development of this disease. See figure (a)

Fruit spot: fungal disease that occurs when it rains more than usual. Asymmetric or balanced lesions may turn brown over time. See figure (b)

Fruit Rot: The exterior of the fruit begins to turn brown. There are small, round fruits attached to the peel. Fruit rot is usually caused by plant debris. A second reason why fruit rot spreads is through conidia being carried by the wind. According to plan.

Anthracnose: Small, irregularly shaped black spots between leaves and fruit. These spots turn dark brown. Diseased leaves lose color and turn yellow. Can See In Fig (d)

II. LITERATURE SURVEY

An overview of various machine learning and image processing methods for pomegranate classification, such as GLCM, ANN, and Kmeans cluster segmentation. Overall, A comprehensive review of existing methods for pomegranate classification using machine learning and image segmentation techniques [1].

The importance of pomegranate as a fruit crop due to both its nutritional value and economic importance. However, pomegranate trees are susceptible to variousdiseases, which can reduce fruit production and quality. Traditional diagnostic procedures require expert observation, which can be time-consuming and detailed. So authors introduce the concept of image processing, which involves the use of digital images and algorithmslike SVM and K-means to analyze and extract useful information. Discuss various techniques that have been used for pomegranate disease detection, including image features like color-based segmentation, texture analysis, and machine learning algorithms. Describe various imaging techniques in detail and cite several studies that have used these techniques to diagnose pomegranate disease. [2].

Discusses various imaging techniques used for detection and classification of leaf diseases. Review provides an overview of current methods for identifying and classifying foliar diseases, including modern methods based on machine learning. Introduce various techniques that can be used for detection and classification of leaf diseases, such as neural network-based, rule-based, decision tree-based, support vector machine-based, and deep learning. Advantages, limitations and potential uses in agriculture [3]. The system has many stages such as image acquisition, image processing, extraction and classification. Taking photos with a digital camera is the first step in capturing an image. Segmentation is used as the next step in image processing to improve image quality by eliminating random noise algorithm[4]. Algorithm has various stages such as pre-processing, segmentation, feature extraction and feature extraction. In the first step of preprocessing, the input image is first converted to grayscale, then filtering techniques are used to improve contrast and remove noise [5]. Separate pomegranates to treat diseases and improve crop management and yield. Collects images of healthy and diseased fruits from different regions and takes the first step towards pre-processing the images to remove background noise and beautify the images. In the next step of feature extraction, researchers use GLCM technology to reduce the size and extract unique and important information from the image, called image features [6].

III. METHODOLOGY

Part of the project includes methods to detect pomegranate diseases. It is recommended to detect pomegranate wilt, rot, fruit rot, anthracnose and other diseases. Diagnostic technology; image prioritization, object extraction using Gabor filter, classification and fruit disease detection using CNN. The concept adopted in this project is shown in the figure: 1 In the previous figure, extraction and distribution are the main stages, which will be discussed in this section [7]. It could be different, it could be different, it could go in different directions. Image preprocessing is the first step in improving image data by removing background, noise, and unnecessary images and converting RGB images into black and color images. Grayscale turns to white. Image preprocessing is the step of converting the raw data of the image into a form that the model can use for training and reasoning. Image processing is similar to data processing.

The steps follow for training materials are the same as those follow for validation and testing; Post-preprocessing and feature extraction is the second process of selecting important features of the image [8]. The last point involves transforming high-dimensional data into low-dimensional space. Unique features are colors and textures that indicate the shape of a particular object. Texture characteristics represent the appearance of the fruit. Texture feature extraction methods include GLCM (gray level appearance matrix) and Gabor filter. GLCM method is an old method used to extract features for texture classification. GLCM is often time consuming and inaccurate in the near field. Gabor filter is a method used for texture classification and removal of Gabor artifacts. The filter is more accurate at the margins. Use CNN algorithm to extract color features. Color histogram is the most commonly used method for color extraction. There are many classification methods such as support vector machine (SVM), nearest neighbor (KNN), artificial neural network (ANN) [9]. The accuracy of various classifications has been demonstrated. In system, a convolutional neural network (CNN) is used for classification after color and texture extraction. CNN softmax layer is used for classification.classification

IV. UDERSTANDING DATASET

Information on pomegranate fruit diseases from a variety of sources, including more than 100 photos of healthy and diseased pomegranates [10]. CNN and SVM are two methods that can be used to train and evaluate machine learning models for disease identification using data from images of pomegranates containing fungal and bacterial diseases.

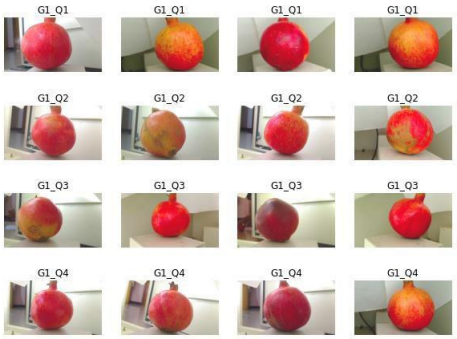


Figure 2 Pomegranate Dataset

V. STEPS TAKEN TO DEVELOP THE PROJECT

1). Data collection and preparation: Collected and integrated data from various sources, including Kaggle and GitHub. Preparation of data: To prepare data for detection of pomegranate disease, the following steps should be taken:

Collect photographs of healthy and diseased fruits: Collect many images of healthy pomegranate fruit and pomegranate fruit affected by various factors. illness. Make sure the images are good and taken from different angles and lighting conditions [11]. If necessary, you can fill in the picture with specific diseases found in the fruit. The

training process will be used to train the model, the validation process will be used to improve the model, and the testing process will be used to evaluate the performance of the model. Images use negative transformations such as rotation, translation, and scaling to enhance data. Include resizing the image, normalizing pixel values, and converting the image to grayscale [12]. Fine-tune the data set. Improve model accuracy with less information. Adjust the model's parameters, such as learning rate and process, to improve its performance.

Test prototype: Test the final prototype of the test setup to evaluate its performance. Measure model's performance using metrics such as accuracy, precision, recall, and F1 score. Documentation dataset: The documentation dataset provides information about the image, its location, and how it was collected. It will help others understand data and reproduce your results [13].

4). Training model: Using CNN softmax layer to train pomegranate fruit disease testing model

5). Provide the model: After training the model to detect pomegranate disease, the next step is to send it to make predictions on new, unseen data. Make User Interface:

The authors suggest various methods that can be used for leaf disease detection and classification, including neural network-based rule-based, decision-making methods, decision tree-based methods, support vector machine-based methods. deep learning [14]. The user interface is designed using Tkinter. Tkinter is a built-in Python module for creating graphical user interfaces (GUIs). It provides a set of tools and widgets that allow developers to create windows, dialogs, buttons, text boxes, and other interactive features for users. Add new widget [15].

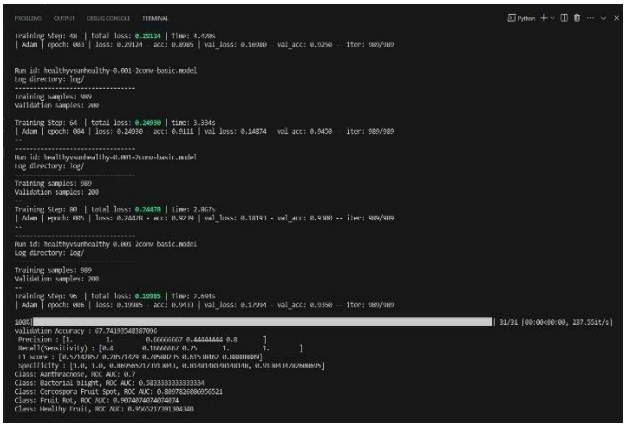
VI. RESULT

1. Importing libraries and loading the data

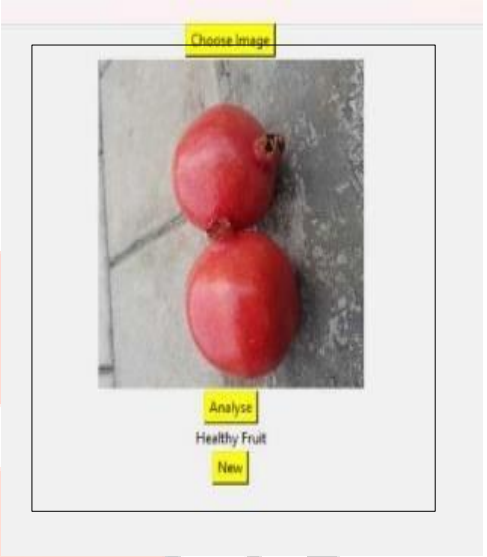
```
import json
import random

import cv2  # working with, mainly resizing, images
import numpy as np  # dealing with arrays
import os  # dealing with directories
from random import shuffle  # mixing up or currently ordered data that might lead our network astray in training.
from tqdm import tqdm  # a nice pretty percentage bar for tasks. Thanks to viewer Daniel BA1/4hler for this suggestion
from sklearn.metrics import accuracy_score, confusion_matrix, precision_score, recall_score, f1_score, roc_auc_score, roc_curve, auc
import matplotlib.pyplot as plt
```

```
import tflearn
from tflearn.layers.conv import conv_2d, max_pool_2d
from tflearn.layers.core import input_data, dropout, fully_connected
from tflearn.layers.estimator import regression
import tensorflow as tf
```

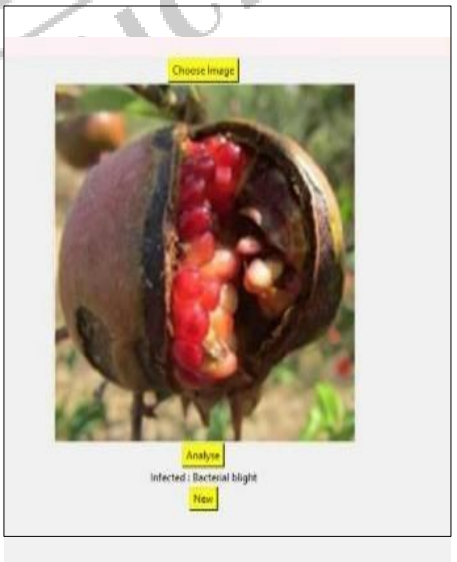
2. Compiling the Model



3. Final Output of Module



Fig(a)



Fig(b)

VII. CAMPARISION OF TECHNIQUES

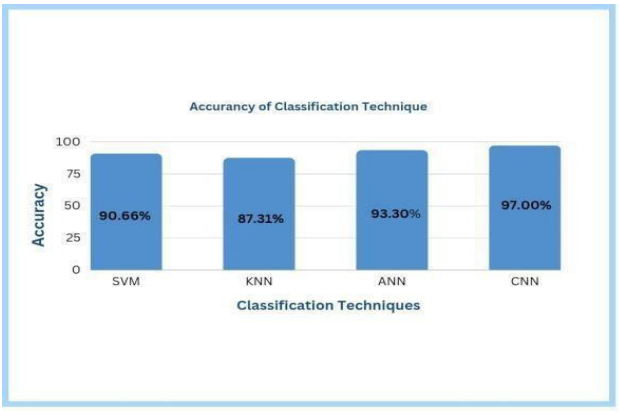


Figure 3 Accuracy of Classification Technique

VIII. FUTURE SCOPE

Considering increasing the dataset size to improve system accuracy. 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.

IX. CONCLUSION

CNN method is used together with image processing Gabor filters for texture and edge detection. Both methods can produce good and beneficial results. Imaging tests can be very helpful in diagnosing the disease. Include more fruit data in our system to help identify fruit diseases in future research. CNN and Softmax algorithm. To achieve accuracy in disease diagnosis, the system uses softmax technology, complex CNN architecture, and large and diverse data. Made with Tkinter module. It allows users to upload images of pomegranate fruit and get quick diagnosis. Quality and quantity of data, accuracy of diagnosis and difficulty of diagnosis are some of the limitations and problems that need to be taken into account both in education and in the entire system. Improve the quality and accuracy of pomegranate fruit disease control, thereby promoting the cultivation and conservation of this important crop. Through further research and development, these tools can be improved and adapted to detect diseases in other types of fruits and crops; Providing a useful tool for farmers and agronomists worldwide.

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