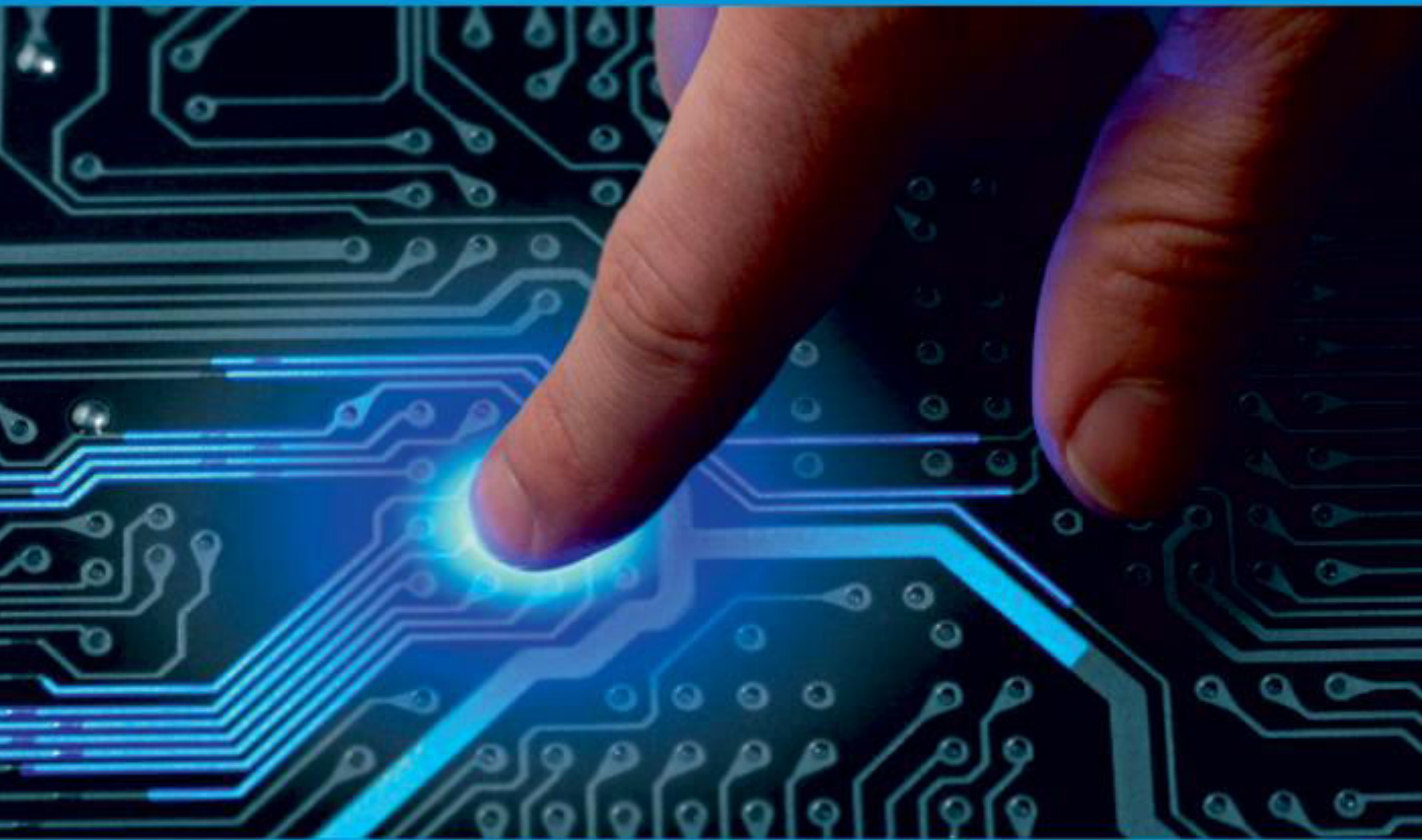
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 10, Issue 4, April 2022

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.165

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 4, April 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1004048|

Citrus Fruit Disease Detection Using Machine Learning

Ankita Jagtap, Ashwini Bankar, Avinash Bhujbal, Omkar Pisal, Prof.Nimbalkar S.S.

UG Student, Dept. of CSE., SVPM's College of Engineering Baramati, Savitribai Phule Pune University, Pune, Maharashtra, India

Assistant Professor, Dept. of CSE., SVPM's College of Engineering Baramati, Savitribai Phule Pune University, Maharashtra, India

ABSTRACT: It is a truly disappointing event in which fruit diseases can cause a decline in productivity and the economy in the agricultural sector around the world. Growing research proves that fruit is important in promoting good health. In fact, fruit should be the basis of a healthy diet. This program provides the best and most modern remedy for the diagnosis of fruit diseases using their physical characteristics. Orange fruit diseases are a major cause of significant decline in citrus fruits. As a result, designing an automated system for diagnosing citrus plant diseases is important. Machine learning techniques have recently found promising results in many artificial intelligences, which leads us to apply it to the challenge of seeing an orange fruit. The proposed ML model is intended to differentiate healthy fruits from common citrus fruits such as black spots, crust, scab, green, and melanose.

KEYWORDS: Citrus fruit , Machine learning , Camera , Raspberry-Pi.

I. INTRODUCTION

The role that Agriculture plays around the world is amazing. There is nothing in the world more than 'food'[1]. Both humans and animals depend on it every day, so a high agricultural premium should be given; it can be the type, variety, yield value or production of any type of crop produced. The biggest threat and problem affecting the agricultural sector is disease[1]. Fruits (citrus) are an important ingredient in agriculture and almost everyone eats them every day. Orange fruit diseases are a serious problem affecting the quality and yield of the entire world. Crop disease is one of the main types of "disasters" with variety and wide range of influence, etc. Disease problems inevitably affect crops throughout their growing cycle.There are different types of diseases that affect citrus fruits[2]. This will analyze some of the diseases that affect citrus fruits. common orange diseases such as blackheads, cancer, scabies, greenery, and melanose. Analysis is performed using image processing techniques to analyze fruit diseases. The separation phase is important prior to the development of the image retrieval tool on the World Wide Web.[3] Image scanning is for different semantic categories, such as images and illustrations. The ancient method of obtaining and identifying fruits is based on the observation of the eyes of experts. A program that helps farmers to see the fruits through this proposed project.Citrus disease classification, as the most significant element of citrus disease processing, is progressively performed by machine learning than manual techniques such as computer image processing, pattern recognition, and other technologies[9]. A suggestion has been made regarding the automatic recognition solution based on the symptoms of citrus fruits.

II. RELATED WORK

The discovery of fruit diseases has been the subject of research for decades. Researchers have studied a variety of methods using machine learning and pattern detection to increase diagnostic status.Early disease identification helps in the prevention of disease transmission to other plants that leads to significant economic losses[9]. This modern technology is used in a variety of crops, including wheat, rice, corn, and corn. A separate experiment on neural network methods used to detect and differentiate diseases from plant leaves and fruit images has been presented by Golhani et al Wetterich et al. use SVM and fluorescence thinking system to detect Citrus canker and Huanglongbing (HLB). The accuracy of the orange and scabies detection method was 97.8 percent while the accuracy of the HLB detection method and zinc deficiency was 95 percent. Padmavathi and Thangadurai have adopted the Recursively Separated Weighted Histogram Equalization (RSHE) method to better differentiate Citrus diseases. In the second stage, the sound is eliminated from the orange images. Suggested solutions improve the quality of orange images that can be used for further analysis. As discussed by Patel et al. The K-Means classification was used to detect diseased regions in previously orange citrus images. Both the color, texture, and shape of the affected region were taken from the training set and separated using the SVM separator.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 4, April 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1004048|

III. PROPOSED ALGORITHM

1. Convert the given dataset into frequency tables.
2. Generate Likelihood table by finding the probabilities of given features.
3. Now, use Bayes theorem to calculate the posterior probability.

A. *Description of the Proposed Algorithm:*

1. Read input image/transform image from RGB to color space.
2. Extract disease containing a segment of Orange using K-means clustering.
3. Extract feature from the segmented image.
4. Classification of the disease using multi-class SVM.
5. Detection of the various diseases.

INPUT: S={I,F,O}

Identify the inputs • F= f1, f2, f3 ....., fn F as set of functions to execute commands.
• I= i1, i2, i3I sets of inputs to the function set
• O= o1, o2, o3.O Set of outputs from the function sets
• S= {I, F, O}
• I = Input Data Set,
• I= Images
• O = Output of Dataset,
• O= matching images with dataset or Unmatched images that stored in dataset
• F = Functions implemented to get the output,

F1= K-means Algorithm • img = cv2.cvtColor(img, cv2.COLOR BGR2RGB) • img.reshape((-1,3)) • pixel vals = np.float32(pixel vals) • criteria = (cv2.TERM CRITERIA EPS + cv2.TERM CRITERIA MAX ITER, 100, 0.85)

• **F2 =SVM Algorithm** Use SVM SVC(C=12, gamma='scale', kernel='rbf', random state=0) Call the fit function for x & Y Calculate accuracy score accuracy score(y test, prediction) * 100 Generate confusion matrix confusion matrix(y test, prediction)

IV. PSEUDO CODE

Step 1: Load the important libraries
```
>> import pandas as pd
>> import numpy as np
>> import sklearn
>> from sklearn import svm
>> from sklearn.model_selection import train_test_split
>> from sklearn import metrics
```
Step 2: Import dataset and extract the X variables and Y separately.
```
>>df = pd.read_csv("mydataset.csv")
>> X = df.loc[:,['Var_X1','Var_X2','Var_X3','Var_X4']]
>> Y = df[['Var_Y']]
```
Step 3: Divide the dataset into train and test
```
>>X_train, X_test, y_train, y_test = train_test_split(X, Y, test_size = 0.3, random_state=123)
```
Step 4: Initializing the SVM classifier model
```
>>svm_clf = svm.SVC(kernel = 'linear')
```
Step 5: Fitting the SVM classifier model
```
>>svm_clf.fit(X_train, y_train)
```
Step 6: Coming up with predictions
```
>>  y_pred_test = svm_clf.predict(X_test)
```
Step 7: Evaluating model's performance
```
>>metrics.accuracy(y_test, y_pred_test)
```

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 4, April 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1004048|

>>metrics.precision(y_test, y_pred_test)
>>metrics.recall(y_test, y_pred_test)

V. SIMULATION RESULTS

Here in the proposed work a dataset of 196 images of fruits are taken in which 100 apple fruits, 100 mango fruits, 100 orange fruits, 100 banana fruits. Out of 100 each 50 are diseased fruit images and 50 are normal fruit images. Here in the proposed work from each type of fruit 30 normal fruits are used for training and 4 diseased fruits are used for training and from normal fruits 156 fruits used for training purpose and 40 for testing purpose.

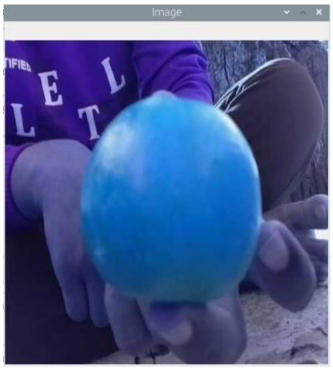


Fig. Captured Image

Fig. Predicted Disease

VI. CONCLUSION AND FUTURE WORK

Recognizing citrus infections is a fundamental reason for the proposed strategy. The proposed methods have been tested for citrus fruit infections. The proposed dividers use color and texture elements to differentiate. Despite the changing effects of various citrus images, the collection of distinctive features has proved to be compelling. The main advantage of the proposed strategy is considered to be the small number of features submitted to achieve the best phase accuracy and to reduce the calculation time. Test results show that the proposed strategy is the best, which can restore accurate orange infection diagnosis with minimal calculation effort. It seems that SVM is achieving significant improvements within the accuracy of the sections with ANN. SVM has proven to be a powerful tool for automatically distinguishing plant diseases considered in this current activity. There is a great deal of improvement within the separation accuracy

There is a wide range that after being diagnosed with the disease, we can offer treatment advice. We can provide a list of medicines that should be used to treat a particular disease.

We can extend this program and work on other fruits and vegetables, flowers etc.

REFERENCES

[1] Benjamin Doh, Duo Zhang, Yue Shen*, Fida Hussain, Ronky Francis Doh, Kwaku Ayepah School of Electrical and Information Engineering, Jiangsu University Zhenjiang.

[2] Zongshuai Liu1, Xuyu Xiang1,2,*, Jiaohua Qin1, Yun Tan1, Qin Zhang1 and Neal N. Xiong3

[3] Md. Rasel Howlader, Umme Habiba, Rahat Hossain Faisal and Md.Mostafijur Rahman Dept. of Computer Science and Engineering University of Barisal

[4] Ashok Bekkanti Assistant Professor, Department of Computer Science And Engineering,KoneruLakshmaiah Education Foundation,Vaddeswaram,AP,India,522502.

[5] S. Alagu1 , K.BhoopathyBagan2 Dept. of Electronic Engineering, Madras Institute of Technology Campus, Anna University. Chennai, Tamil Nadu.

[6] Assistant Professor in Computer Science, Head, Department of Computer Applications and Information Technology, Arignar Anna Government Arts College, Villupuram - 605602, Tamilnadu, India.

[7] Hafiz Tayyab Rauf a, Basharat Ali Saleem b, M. Ikram Ullah Lali a, Muhammad Attique Khan c,Muhammad Sharif d, Syed Ahmad Chan Bukhari e

[8] H. N. Patel, R. Jain, and M. V. Joshi, ”Fruit detection using improved multiple features based algorithm,”International Journal of computer applications, vol.3, pp. 1-5, 2011.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.165 |

|| Volume 10, Issue 4, April 2022 ||

| DOI: 10.15680/IJIRCCE.2022.1004048|

[9] Ahmed Elaraby ,1 Walid Hamdy ,2 and Saad Alanazi 3 40 CITRUS FRUIT DISEASE DETECTION USING MACHINE LEARNING

[10] Poonam Dhiman 1, Vinay Kukreja 1, Poongodi Manoharan 2,* ,Amandeep Kaur 1, M. M. Kamruzzaman 3,*,Imed Ben Dhaou 4,5,6,* and Celestine Iwendi 7

[11] Wan NurazwinSyazwani R. a, Muhammad Asraf H. b,*, MegatSyahirul Amin M.A. c,Nur Dalila K.A.

[12] Shiv Ram Dubey, GLA University Mathura, India Anand Singh Jalal, GLA University Mathura, India