iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** III **Month of publication:** March 2020

DOI:

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue III Mar 2020- Available at www.ijraset.com

Fruit Disease Detection using SVM Algorithm

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Abstract: Diseases in fruit can cause enormous damage to economy and affect the agricultural industry worldwide. The harvests are influenced by uneven climatic conditions. Previously, the detection of infected fruits used to be done manually. Farmers usually observe the visual symptoms of fruits. Authorities could essentially analyze the unhealth or put trust in research lab measure. However, the consultation charges are quite high and it's conjointly unattainable to induce it on time at remote locations. Hence there is a requirement of automatic fruit disease detection system within the early stage of unwellness. There are two main phases; first is for training and the other for testing. In training, data related to the infected and non-infected fruit is stored and in testing, it is broke down the whether the fruit is tainted or not.
Keywords: Image Acquisition, Pre-processing, Segmentation, feature extraction, classification

I. INTRODUCTION

The classical approach for detection of fruit diseases is based on the naked eye observation by the experts. However in most countries, consulting these experts can be quite expensive and arduous as they may not be available. Fruit diseases can affect the quality of harvests. Some diseases may even affect other parts of the tree and cause disease to branches, leaves, twigs etc. Every disease occurring in fruit leaves a particular texture or a colored spot. These features can be used for detection of diseases in the fruit. For example, some common disease of apple fruits are apple scab, apple rot and apple blotch. Apple scabs are gray or brown corky spots. Apple rot infections produces slightly sunken, circular brown or black spots that may be covered by a red halo. Apple blotch is fungal disease and appears on the surface of the fruit as dark, irregular or lobed edges.

II. RELATED STUDY

A Web based Image Processing dependent approach[1] for the Bacterial Blight ("Telva") disease for Pomegranate fruit is proposed. The input image is first pre-processed, then its features are extracted on three parameters namely- color, morphology, and CCV then, training and classification of the same are done. The proposed system provides two methods for the user to check the disease infection for the input pomegranate image as- with intent search and without intent search.

The image processing based proposed approach[2] is composed of the following main steps, in the first step K-Means clustering technique is used for the image segmentation, in the second step some state of the art features are extracted from the segmented image, and finally images are classified into one of the classes by using a Multi-class Support Vector Machine. Our experimental results express that the proposed solution can significantly support accurate detection and automatic classification of apple fruit diseases. The classification accuracy for the proposed solution is achieved up to 93%.

Identificator is a web-based tool[3] used to help non experts in identifying plant diseases, based on the selection of pictures and/or short text descriptions (when no suitable images exist) representing the symptoms on a specific sample of plant organs. The system is based on a multi-access key of identification and specifically on the selection of pictures by the user and can be used remotely from a desktop as well as from a smart phone or personal digital assistant. The system was developed following a simple approach: visual identification where images and/or short descriptions are used to uniquely identify diseases when possible and suggest refining the visual identification process in cases of ambiguous identification. It has been designed in a way that allows easy definition of additional diseases by uploading the correct images and defining the identification rules and diseases. In this way the system may aid growers in identifying various diseases when using the system remotely while the system is developed and maintained centrally. This approach may ease the process of manual visual disease identification until machine vision technology is mature enough to perform this task automatically. We tested the system for visual identification of strawberry diseases using a computer and samples of infected plants. The evaluation showed that it is effective and accurate in enabling its users to identify strawberry diseases. A novel Internet image search approach[4] which only requires one-click user feedback. Intention specific weight schema is proposed to combine visual features and to compute visual similarity adaptive to query images. Without additional human feedback, textual and visual expansions are integrated to capture user intention. Expanded keywords are used to extend

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positive example images and also enlarge the image pool to include more relevant images. This framework makes it possible for industrial scale image search by both text and visual content. The proposed new image reranking framework consists of multiple steps, which can be improved separately or replaced by other techniques equivalently effective. In future work, this framework can be further improved by making use of the query log data, which provides valuable co-occurrence information of keywords, for keyword expansion.

III. PROPOSED SYSTEM

The architecture of the proposed system is shown below:

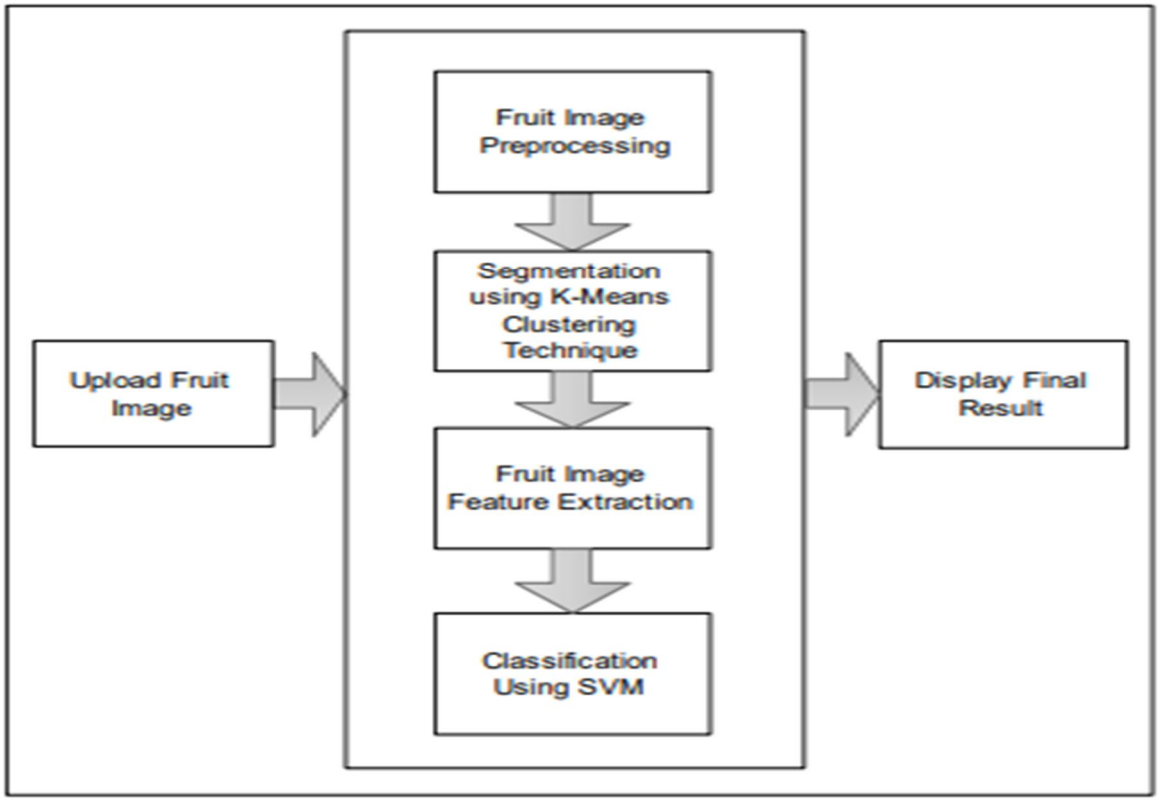

Figure 1: Proposed System

1) *Upload Fruit Image:* This is the most basic step in any Image Processing based approach. In this stage the image needs to be acquired and uploaded. The source can be anything hardware based such as a camera or a webcam. Once the image is uploaded, various processing techniques need to be applied on the image.
2) *Preprocessing:* It must be understood that real-world data is often incomplete, inconsistent and noisy. It often contains lots of errors. Hence, this data cannot be used directly for fruit disease detection. The main aim of preprocessing is to eliminate such unwanted distortion and transform the raw data into a useful form.
3) *Image Segmentation:* The next stage in the proposed approach is Image Segmentation. The aim of this phase is to modify the image into something that is easier to understand and analyze.There are several image segmentation techniques such as: thresholding methods, edge detection-based techniques, region-based techniques, clustering-based techniques etc. The proposed approach makes use of the most popular of clustering-based techniques i.e. K-Means clustering[1] method.

a) K-Means clustering algorithm is an unsupervised algorithm. This algorithm is primarily used to segment the interest area from the background. It is used to partition the data into K clusters. The goal is to find several groups based on the similarity of data.

4) *Feature Extraction:* This stage aims to reduce the number of features in the given data by creating new features from the existing ones. The reduced set of features is known as feature vector. This phase ensures that the extracted features contains only relevant information, so that the classification can be performed using only the limited representation rather than the entire data. The commonly used features are shape, color and size. Based on the features extracted, the system is trained.

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5) Classification: Generally, classification is grouping of people or things in a systematic way. So in this stage, the system classifies whether the fruit contains some sort of disease or not.

The proposed system makes use of SVM[1] algorithm.

6) SVM stands for Support Vector Machine. It is an unsupervised algorithm which can be used for both regression and classification. However, it is mostly used for classification. In this algorithm, each data item is plotted as a point in n-dimensional space (where n is number of features you have) with the value of each feature being the value of a particular coordinate. Then, we perform classification by finding the hyper-plane that differentiate the two classes very well.

The result is then displayed.

IV. CONCLUSION

Disease detection for fruit is projected. The input image is initial pre-processed, then its options are extracted on 3 parameters namely- color, morphology, and CCV then, coaching and classification of a similar are done. The projected system provides 2 strategies for the user to examine the sickness infection for the input pomegranate image as- with intent search and while not intent search. Experimental results show completely different accuracy levels of sickness detection supported the input image quality and also the stages of the sickness. the general system accuracy is measured to be eighty two. Thus, this method takes one step towards promoting the farmers to try to the good farming and permitting them to require choices for a more robust yield by creating them capable them capable to require the mandatory preventive, corrective action on their crop. In future, the system will be improved with the new options incorporated as- coaching the system to notice diseases for different fruits, increase dataset size to boost the general system performance to notice diseases additional accurately.

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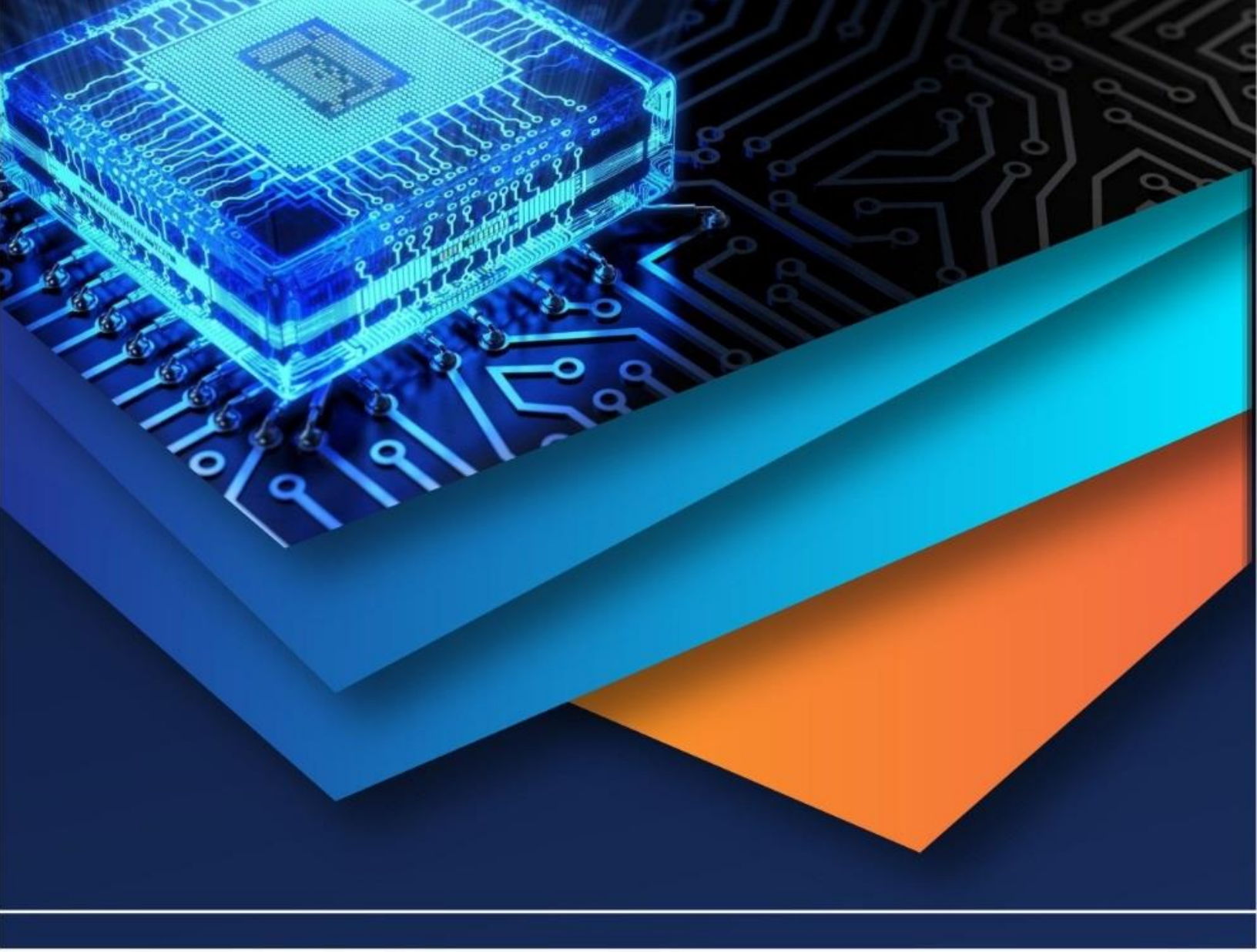

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