Chapter 6

Automatic Data Acquisition and Spot Disease Identification System in Plants Pathology Domain: Agricultural Intelligence System in Plant Pathology Domain

Rajesh T. M.
Dayananda Sagar University, India

Kavyashree Dalawai
Dayananda Sagar University, India

Pradeep N.
Bapuji Institute of Engineering and Technology, India

ABSTRACT

Plants play one of the main roles in our ecosystem. Manual identification for the leaves sometimes leads to greater difference due to look alike. People often get confused with lookalike leaves which mostly end in loss of life. Authentication of original leaf with look-alike leaf is very essential nowadays. Disease identification of plants are proved to be beneficial for agro-industries, research, and eco-system balancing. In the era of industrialization, vegetation is shrinking. Early detection of diseases from the dataset of leaf can be rewarding and help in making our environment healthier and green. Implementation involves proper data acquisition where pre-processing of images is done for error correction if present in the raw dataset. It is followed by feature extraction stage to get the best results in further classification stage. K-mean, PCA, and ICA algorithms are used for identification and clustering of diseases in plants. The implementation proves that the proposed method shows promising result on the basis of histogram of gradient (HoG) features.

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INTRODUCTION

Human race depends on plants directly or indirectly for its survival. What not we get from plants? Plants give us food, clothes, medicine, furniture and much more things. Healthy plants mean better quality of life for human being. Diseases in plants can decrease the production, increase the cost and might range to overall economic adversity of a produce if not alleviated suitably at initial phases et. al (Rao & Patel, 2012; Kanungo et al., 2016). The crops need planned nursing to distinguish the early indications in demand to avoid the feast of any plant infection, with low cost and better yield in manufacture. Employing trained agriculturists might not be reasonable particularly in isolated topographical regions. A steady plant monitoring is necessary to control the spread of a disease but its cost may be high and as a result, the producers often skip critical preventive procedures to keep the production cost low. Although, official disease recognition is a responsibility of professional agriculturists, low cost observation and computational assisted diagnosis can effectively help in the recognition of a plant disease in its early stages. A steady plant monitoring is necessary to control the spread of a disease but its cost may be high and as a result, the producers often skip critical preventive procedures to keep the production cost low. Although, official disease recognition is a responsibility of professional agriculturists, low cost observation and computational assisted diagnosis can effectively help in the recognition of a plant disease in its early stages. Gradually with technical and scientific advancement, more reliable methods through lowest turnaround time are developed and proposed for early detection of plant disease. Such techniques are widely used and proved beneficial to farmers as detection of plant disease is possible with minimal time span and corrective actions are carried out at appropriate time. In this chapter, we studied and evaluated existing techniques for detection of plant diseases to get clear outlook about the techniques and methodologies followed. Gradually with technical and scientific advancement, more reliable methods through lowest turnaround time are developed and proposed for early detection of plant disease. Such techniques are widely used and proved beneficial to farmers as detection of plant disease is possible with minimal time span and corrective actions are carried out at appropriate time. Since recent decades, digital image processing, image analysis and machine vision have been sharply developed, and they have become a very important part of artificial intelligence and the interface between human and machine grounded theory and applied technology. These technologies have been applied widely in industry and medicine, but rarely in realm related to agriculture or natural habitats. Many images used to develop new methods are collected under very strict conditions of lighting, angle of capture, distance between object and capture device, among others. This is a common practice and is perfectly acceptable in the Plant Disease Detection using Computer Vision early stages of research. Manual identification for the leaves sometimes leads to greater difference due to look alike. People often get confused with lookalike leaves which mostly end in loss of life. Authentication of original leaf with look-alike leaf is very essential nowadays. However, in most real world applications, those conditions are almost impossible to be enforced, especially if the analysis is expected to be carried out in a non-destructive way. Computer vision can propose a substitute answer in plant nursing and such an approach might help in predicting the diseases at early stages. Knowledge learning on images has been proved to be pioneer in early identification of diseases. Data clustering using k-mean method is a predominant field of investigation in pattern recognition. K-mean remains termed as the most robust and popular method in hard clustering. The enactment of the recommended technique has been paralleled with the existing models by means of synthetic datasets. This chapter presents an approach for plant leaf image segmentation by applying linear k means algorithm. The segmentation process presents a clustering mechanism for high resolution