Chapter 9
Plant Disease Detection Using Machine Learning Approaches: A Survey

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ABSTRACT

Agricultural production is one of the main factors affecting a country's domestic market situation. Many problems are the reasons for estimating crop yields, which vary in different parts of the world. Overuse of chemical fertilizers, uneven distribution of rainfall, and uneven soil fertility lead to plant diseases. This forces us to focus on effective methods for detecting plant diseases. It is important to find an effective plant disease detection technique. Plants need to be monitored from the beginning of their life cycle to avoid such diseases. Observation is a kind of visual observation, which is time-consuming, costly, and requires a lot of experience. For speeding up this process, it is necessary to automate the disease detection system. A lot of researchers have developed plant leaf detection systems based on various technologies. In this chapter, the authors discuss the potential of methods for detecting plant leaf diseases. It includes various steps such as image acquisition, image segmentation, feature extraction, and classification.

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INTRODUCTION

India is a farming country. About 70% of the population depends on agriculture. Farmers can choose a variety of suitable crops and find suitable crop protection products. Plant disease refers to the study of visual observation patterns in plants. Plant health and disease control play an important role in successfully growing crops on the farm. In the past, the control and analysis of plant diseases were performed manually by experts in the field. This requires a lot of work and a long processing time. If plant diseases are detected, imaging tests can be used. In most cases, disease symptoms appear on leaves, stems and fruits. The leaves of plants are used to identify diseases by showing symptoms of diseases. This article describes imaging techniques used to detect plant diseases (Ghosh & Singh, 2020).

But agricultural production has also made a significant contribution to today's agricultural production. Significant changes have also taken place in agricultural production. With the increase of knowledge, technology has led to some modernizations in the field of agricultural production. Modern agronomy uses the best technical equipment and techniques. The use of modern tools has increased, making it easy to determine suitable conditions for increasing crop yields. Different types of fertilizers and pesticides are used for this. Even genetically modified seeds are being tested on a larger scale to increase the overall yield in each region.

Planting crops includes all activities aimed at increasing productivity at any time of the year. It includes a comprehensive analysis of the soil and the types of seeds used basically need nutrition. Especially the harvest and many others. The output of crops and other sources is not only used to meet the daily needs of farmers, but also to meet the daily needs of others, but because there are some problems in all fields, agriculture or crop production also faces serious problems in the agricultural field. As a plant disease, with the huge demand for food all over the world, it has become imperative to focus on plant production, the purpose of which is to protect the entire crop from loss before it goes to market. The earthquake and disease also explained the severe crop failure. In terms of quality or quality, the yield is reduced due to various types of plant diseases (Barbedo, 2016). These diseases will seriously affect crop production, and then affect the quality and quantity of the entire crop. Managing large crops requires multiple timely measures, such as disease surveillance, to reduce them to adverse events. This also includes seeking immediate solutions to various problems.

This disease affects the overall function of the plant. This can result in slower growth, decreased fruit yield, more leaves and many other diseases. Sometimes a disease can spread from one culture to another (Gavhale et al., 2014), or it can be spread through pathogens or other means. Sometimes they may be caused by fungi or bacteria, and sometimes viruses can even be carried from one place to another with the seeds.

The main cause of plant diseases is infection, such as pests, bacteria, fungi and viruses. These diseases are very common and can spread to any part of the plant, because any of the following can be found in stems, vegetables, fruits, etc.:

1. Define the affected area
2. Reconstruct the characteristics of the affected area
3. Identify and classify diseases

Agriculture is one of the important sources for India's economic development. India is a farming country, and about 70% of the population depends on agriculture. Farmers have a wide range of op-