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Application of machine learning techniques in rice leaf disease detection

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ABSTRACT

The automated leaf disease diagnosis system is a precision agriculture system that predicts sickness by analyzing images of infected leaf disease with Computer Vision, Image Processing, and Machine Learning algorithms. Thanks to automated disease detection technology, which speeds up the diagnosis procedure, the farmer can make an informed decision about a plant sickness. Previously, the farmer had to submit the infected leaf to a pathology lab, where the pathologist confirmed the disease, a time-consuming procedure. As a result of the delayed reaction, crop productivity declines. As a result, it is important to automate the disease detection system in order to increase crop yield. This article presents a machine learning based framework for classification and detection of leaf disease. SVM, Naïve Bayes and CNN are used in framework. Preprocessing is done using histogram equalization. For feature extraction, PCA algorithm is used.

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1. Introduction

Recent advancements in computer vision, machine learning, and neural networks have resulted in significant advances in various fields such as medicine, chemistry, mechanics, remote sensing, and agriculture. The automated leaf disease diagnosis method is investigated in this study for speedier diagnostic purposes. In the future, the agriculture industry will confront significant problems. According to a report conducted by the Food and Agriculture Organization of the United States, agricultural production must be increased by 70% in order to feed the Earth's 9.6 billion inhabitants through 2050. This goal must be met despite difficulties such as dwindling arable land availability, increased demand for fresh water, and less predictable factors such as climate change. As a result, it is critical to employ innovative ways to boost agricultural output in the face of adversity [1].

Due to limited natural resources, the main issue in the agricultural area is that the production be proportionate to the increasing population. The main issue here is to enhance productivity despite unfavorable natural circumstances. Precision agriculture is now being implemented, which employs the most sophisticated technologies in the agricultural sector to enhance production. The automated leaf disease diagnostic system is a precision agricultural system that predicts illness by evaluating infected leaf disease pictures with Computer Vision, Image Processing, and Machine Learning algorithms. The farmer may make a quick and correct choice regarding a plant illness thanks to the automated disease detection technology, which speeds up the diagnosis procedure. Previously, the farmer had to send the contaminated leaf to a pathology lab, where the pathologist confirmed the condition, which proved to be a time-consuming task. Crop productivity suffers as a result of a delayed reaction. As a result, it is critical to automate the disease detection system for faster crop diagnosis.

ML encompasses a wide range of methods for learning predictive rules from previous data and constructing a model capable of predicting unknown future data. Machine learning is a branch of computer science that allows a computer to learn from data. Without being expressly programmed, robots are fitted with artificial intelligence and are capable of acting and thinking like humans when machine learning and Bigdata approaches are applied. As a result, we may claim that Bigdata employs data mining and data mining employs Bigdata for unquestionably beneficial inquiry [2].

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