Disease Detection in Paddy Crop using Machine Learning Techniques

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Abstract:
India ranked second in world, in rice production after China, with an annual production of about 124 million metric tons in the year 2021-2022. The loss of agricultural economy and losses in the community are therefore significantly influenced by diseases in the paddy plant. It is very difficult for the farmers to detect and recognize the various symptoms and diseases in paddy. So, the major challenge is how one can effectively control the diseases by detecting the symptoms earlier. Keeping this challenge in mind this paper proposes a better and effective solution for the detection and identification of diseases in paddy plants using machine learning techniques. In recent times SVM, K-NN, A-NN and CNN are some of the popular approaches used in similar kind of studies. According to researches done all these techniques have certain demerits. SVM are not suitable in large datasets, for K-NN the computation cost is high, in A-NN approach, training examples may contain errors and training data is noisy and CNN faces the challenge of overfitting. The team has proposed a model for paddy plant disease detection using the CNN approach with MobileNetV2 and transfer learning technique that will classify the diseases from the photos captured with an accuracy of 99.98%. The model focuses on Training more data and Data Augmentation to combat the challenge of overfitting. Previously it took many iterations or epochs to train the complete model and to achieve a high accuracy. In this case it will take only five to eight iteration or epochs to achieve a superb accuracy. It saves a lot of computation power and time. Farmers can quickly take action to protect their crops with this approach and will find it to be of great benefit.

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Contents

More than half of the world's population eats rice as their primary food. Its production is affected by several issues brought on by the weather, problems with the environment, soil, viruses, fungus, or different species of animals like mice, locusts, leafhoppers, etc. The diseases put the agriculture industry at risk because they could result in food shortages and a financial crisis. [1]. Therefore, for good crop yield generation, accurate disease detection in Paddy plant is required. Farmers' use of visual analysis results in inaccurate disease detection. It takes time and can damage crops from a small area to the entire field. Because of these, experts and researchers are now considering use of new techniques, with the aid of emerging technology, such as image processing, to address the problems faced and obtain a more accurate yield after the disease has been identified.[2][3]