Harnessing Agrosphere Data for Precision Plant Disease Diagnosis

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ABSTRACT

Farmers often deal with social and financial difficulties. Many soil types found in different places make it challenging to choose the best and most profitable crop for a given area. This chapter suggests developing a crop recommendation system using a machine learning (ML) model to overcome this difficulty. To predict the best crop for successful cultivation, this system will look at the variables including the area, soil type, yield, and sale price. In agriculture, plant diseases are common and create difficulties for farmers. It is necessary to detect these diseases, especially in large areas. It is challenging for farmers to move forward amid disease control strategies. Plant production and quality deteriorate if left uncontrolled. Introduction to a machine learning-based crop recommendation system is a possible way to address these issues. To recommend the best crops for farming, this system analyzes various factors including geography, soil type, yield, and market prices.

INTRODUCTION

Farming is necessary for there to be enough food for a civilization. Food shortages and an ever increasing population have left a number of countries in hunger today. One requires efficient procedures to ensure predictable clearing of crops at the required time that would be capable to cater population

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pressure and changing weather patterns, soil erosion, climate changes. It is crucial to ensure that food production in agriculture remained sustainable. This highlights that the world's food production heavily relies on land assessment, crop monitoring and accurate prediction of crop yield to stay resilient. The value of agriculture increases and it is becoming more and more attractive as technology is advancing. This necessary change means the face of what farming looks like is changing too.

The farming sector, especially the fields of crop and soil forecasts, fertilizer suggestions, and plant diseases, would likely undergo the revolution of AI and the learning of machines to feed our expanding global population. These technologies are beneficial in the agriculture sector in terms of enhancing overall production by simplifying decision-making and presentation of sustainable solutions.

In the year 2016-17, farmers in 17 states earned approximately Rs. 1700 per month, and this was an impact on land cover and income. 48 percent of children are even discouraged to practice farming since poor crop selection leads to poor production. The changes of the weather, soil, and market affect income due to crop selection difficulties.

These difficulties are compounded by difficulty in accessing key information and resources leading to suboptimal decision-making. To achieve such goals, the sustainability of agriculture and better lifestyles needs stable markets, the easy availability of knowledge and more skills.

In India, between 1.4 and 1.8% of the population used to commit suicide during a one-decade period, as it is mentioned in Wikipedia. Inconsistency in the weather makes agriculture unpredictable to the farmers on the most suitable crop. The seasonal changes also impact on soil, water and air by using fertilizer. The level of crop yield is declining. To enable policymakers to make wise decisions on export-import and help the country on national food security in the face of such barriers precise projections are necessary. It is possible to reduce the effect on farmers and the economy in general through implementation of reasonable plans that are anchored in accurate predictions.

Crop yield is not easily predictable due to the many factors that influence crop yield such as landscapes, the quality of soil, pests, genotype, availability of water, climatic conditions and planning of crops as well. The process of crop yield is a mix of many variables and there exists a complex interaction between them that are time-specific and nonlinear in nature. The projections have been affirmed by historical projections by the farmers that have been made through work experience or on expert judgment. Nonetheless, more recent such as machine learning and simulation of crop models give more accurate predictions. Such technologies deploy powerful computers to analyze massive data in an efficient manner. In terms of yield forecasting, machine learning techniques have become promising in comparison with traditional statistics. The adoption of such innovations could transform the process of decisions made in agriculture. Through the integration, farmers will be able to access real-time knowledge that will encourage adequate and sustainable agricultural practices. The employment of data-driven solutions enables the use of flexible techniques that enhance resiliency amid the fluctuations of environmental circumstances (Rajak et al., 2017).

The application of such strategies ensures that agricultural issues will be prevented in advance and the use of resources lies within the framework of the highest possible productivity.

Automated leaf checks make the process of farming a lot more efficient and efficient, by letting farmers know the illnesses of their crops before it is too late and keeping crops in good shape. Even in the case of different crops, experts might not have some visual diagnosis of diseases. However, the main method to detect issues in the rural areas remains a visual examination of the plants, and it therefore commonly costs farmers a significant amount of time and money dragging to specialists and requesting their help. But then due to the accuracy and speed computers are proving to be of great use. Scientists