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Boosting of fruit choices using machine learning-based pomological recommendation system

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Abstract

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Abstract

Pomology, also known as fruticulture, is a significant contributor to the economies of many nations worldwide. While vertical farming methods are not well-suited for fruit cultivation, substrate-based cultivation is commonly practiced. Vertical farming methods use no soil for cultivation of the plants,

and the cultivation is done in vertically stacked layers. Therefore, smaller herbs are best suited for such cultivation, whereas, the majority of the fruit trees are big and woody. Therefore, vertical farming methods are not well suited for fruit trees. However, to maximize fruit production, smarter substrate cultivation methods are needed. Utilizing remote sensing techniques, such as Internet of Things (IoT) devices, agriculture sensors, and cloud computing, allows for precision agriculture and smart farming in autonomous systems. Nevertheless, a lack of understanding of fruit nutrient requirements, growing conditions, and soil health conditions can result in reduced fruit production. To address these challenges, this paper proposes an intelligent model based on machine learning that recommends the best fruit to grow based on prevailing soil and climatic conditions. The system is trained on a dataset that includes details on eleven different fruits, such as Nitrogen (N), Phosphorous (P), Potassium (K), temperature, humidity, pH, and rainfall. The model takes into account the soil type and nutrient contents to recommend the most suitable fruit to grow in the prevailing climate. To enhance the model's efficiency, two novel techniques, Gradient-based Side Sampling (GOSS) and Exclusive Feature Bundling (EFB), have been incorporated. The results show that the proposed system has achieved 99% accuracy in recommending the right fruit based on the given environmental conditions. As a result, this system has the potential to significantly improve the profitability of the pomology industry and boost national economies.

Author keywords

Agricultural productivity; Cloud computing; Internet of Things; Machine learning; Pomology; Precision agriculture

Indexed keywords

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