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Peer Review

Review of: "Adoption of Machine Learning Methods for Crop Yield Prediction-based Smart Agriculture and Sustainable Growth of Crop Yield Production – Case Study in Jordan"

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Summary:

The study aims to develop a robust and accurate model for crop yield prediction by integrating various machine learning (ML) algorithms. Nine ML regression algorithms were tested, including XGBoost, multiple linear regression, Random Forest, and Lasso regression. These algorithms showed low mean squared errors, indicating high prediction accuracy. The developed model aims to increase crop production efficiency and support decision-making in agricultural planning, ultimately contributing to food security. The authors correctly highlight challenges such as data quality and volume, which are crucial for the effectiveness of ML models in agriculture.

Strengths:

1) The study uses extensive datasets from reliable sources, ensuring a robust foundation for the analysis.

2) By testing nine different ML algorithms, the study provides a thorough comparison and identifies the most effective methods for crop yield prediction.

3) The research has significant real-world implications, aiming to improve agricultural efficiency and support decision-making in farming practices.

4) The study emphasizes sustainable growth, aligning with global goals for food security and environmental conservation.

Weaknesses:

1) The study acknowledges challenges related to data quality and volume, which can impact the accuracy and reliability of the ML models.

2) The case study is focused on Jordan, which may limit the generalizability of the findings to other regions with different climatic and agricultural conditions.

3) While the models show promise, practical implementation in real-world farming scenarios may face obstacles such as technological adoption and resource availability. These may include but are not limited to: data availability and quality,

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cultural and educational barriers, and regulatory and policy issues. These barriers may be overcome by a combination of education, financial support, collaboration, user-friendly design, and supportive policies.

Suggestions:

The authors are encouraged to carefully read the following and try to incorporate them in the revised manuscript. These suggestions aim to enhance the article's comprehensiveness, applicability, and impact.

1) You may try to incorporate additional data sources, such as satellite imagery and soil health data, to enhance the model's accuracy and robustness. For instance, satellite imagery may be used for calculating NDVI and soil moisture levels. Thermal, multispectral, and hyperspectral imaging may be used for disease detection and pest control. Weather and climate-change data may also be integrated, leading to improved prediction accuracy.

2) If available, including case studies from different regions with varying climatic conditions could make the findings more generalizable and applicable to a wider audience. If not possible, then try to provide a generalization statement towards the end to create a broader impact.

3) There are advanced data cleaning and preprocessing techniques available that can help mitigate issues related to data quality and volume. The authors are advised to explore predictive imputation techniques for handling missing data and Z-scores followed by clustering for improving the reliability of the predictions.

4) Conducting longitudinal studies to track the performance of the ML models over multiple growing seasons would provide deeper insights into their long-term effectiveness and stability.

5) Collaborating with experts in agronomy, climate science, and economics could enrich the study by integrating diverse perspectives and expertise.

6) The authors must discuss that the potential policy implications of the findings could highlight how governments and organizations can support the adoption of ML in agriculture for sustainable growth.

Declarations

Potential competing interests: No potential competing interests to declare.