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REVIEWER'S REPORT

Manuscript No.: IJAR-58175

Title: TOWARDS TRUSTWORTHY EXPLAINABLE AI FOR TOMATO LEAF CLASSIFICATION: A FIDELITY AND STABILITY ANALYSIS OF GRAD-CAM AND LIME.

Recommendation:

Accept as it is .....

Accept after minor revision.....

Accept after major revision .....

Do not accept (*Reasons below*).....

Rating	Excel.	Good	Fair	Poor
Originality		Yes		
Techn. Quality		Yes		
Clarity		Yes		
Significance		Yes		

Reviewer's ID: JPR- Dr. Bharti Bisht

Detailed Reviewer'sReport

The manuscript presents a relevant and timely study on the explainability of deep learning models for tomato leaf disease classification by evaluating two widely used post-hoc Explainable Artificial Intelligence (XAI) techniques, Grad-CAM and LIME. The topic is significant because the lack of transparency in AI-based agricultural decision support systems remains a major obstacle to their practical adoption. The use of an EfficientNetV2B3 model combined with both qualitative and quantitative explainability assessments demonstrates a well-structured research approach. Evaluating explanation quality through fidelity metrics (IAUC and DAUC) and stability analysis under input perturbations adds scientific value and provides a comprehensive comparison of the two XAI methods. The finding that LIME offers higher fidelity while Grad-CAM provides greater stability highlights an important trade-off and contributes meaningful insights to the field of trustworthy AI in agriculture. However, the manuscript would benefit from several improvements before publication. The introduction should provide a more comprehensive review of recent literature on explainable AI in precision agriculture and clearly identify the research gap that distinguishes this work from previous comparative studies of Grad-CAM and LIME. The dataset description requires additional details, including the source, number of images, disease categories, class distribution, preprocessing techniques, data augmentation methods, and train-validation-test split to ensure reproducibility. The methodology section should explain the selection of EfficientNetV2B3 over alternative architectures and justify the choice of DAUC, IAUC, and stability metrics. More information regarding hyperparameter settings, computational resources, and experimental configurations should also be included. The results section would be strengthened by incorporating statistical significance testing, confidence intervals, or repeated experimental runs to demonstrate the robustness of the reported performance differences. High-quality visual comparisons of Grad-CAM and LIME explanations across multiple disease categories, along with expert agronomic interpretation, would further improve the practical relevance of the study. Additionally, the discussion should critically examine the limitations of both explainability techniques, such as computational complexity, sensitivity to perturbations, and potential biases, while suggesting scenarios where each method is most appropriate. The manuscript should also include a dedicated section on practical implications for precision agriculture, highlighting how explainable models can support farmers, agronomists, and agricultural extension

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services in real-world disease diagnosis. Minor revisions are needed to improve language consistency, formatting of keywords (e.g., "Stability, EfficientNet"), and presentation of numerical results. Overall, the manuscript makes a valuable contribution to the growing field of trustworthy and explainable artificial intelligence for agricultural applications. With additional methodological details, stronger experimental validation, enhanced visualization, and a more comprehensive discussion of practical implications and limitations, the paper will offer significant value to researchers and practitioners. Therefore, I recommend **minor revision** before publication.