Paper Title:
Advancing Agricultural Practices: Federated Learning-based CNN for Mango Leaf Disease Detection

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1 Summary

1.1 Motivation

Revolutionizing mango farming in India, this study introduces a novel solution - federated learning-based CNN. Addressing crucial challenges, it aims to transform mango leaf disease identification, safeguarding crop quality and farmers' livelihoods.

1.2 Contribution

This research pioneers a privacy-preserving federated learning-based CNN model for mango leaf disease detection, demonstrating robust performance across diverse clients and diseases. This breakthrough enhances disease detection techniques, fosters better crop management, and propels advancements in sustainable agriculture.

1.3 Methodology

The methodology involves creating a diverse dataset of mango leaf images, implementing data preprocessing techniques, and developing a CNN model using federated learning. The federated learning approach ensures data privacy and collaboration among clients. The model is evaluated across four distinct clients, detecting and classifying five mango leaf diseases with high precision, recall, F1-score, and accuracy. This study emphasizes the potential of federated learning to address challenges in agriculture-based applications.

1.4 Conclusion

In conclusion, our federated learning-based CNN model effectively identifies and classifies mango leaf diseases, showcasing high-performance metrics. Its collaborative and privacy-preserving nature makes it valuable for advancing agriculture, aiming to contribute to sustainable mango cultivation and enhance farmers' lives.

2 Limitations

2.1 First Limitation: Expand Scope of Disease Identification

The study focuses on a specific set of mango leaf diseases, and the model's performance may vary when applied to a broader range of diseases. Future research could explore the inclusion of additional disease classes for a more comprehensive approach.

2.2 Second Limitation: Enhancement of Model Robustness

Future efforts could focus on refining the model's robustness against variations in environmental conditions, such as different lighting, weather patterns, and soil types. This could contribute to more reliable performance in diverse agricultural settings.

3 Synthesis

This research synthesizes advanced technologies, such as CNNs and federated learning, to address real-world challenges in agriculture. By leveraging collaborative learning while safeguarding data privacy, the study offers a promising avenue for the development of sophisticated disease detection techniques. The findings contribute to the broader field of precision agriculture and lay the foundation for future research in crop disease management.