REPORT

Papaya Fruit Disease Detection

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Introduction

Papaya Fruit

Papaya fruit is known for its **vibrant orange flesh**, is a **tropical delicacy**. Rich in **vitamins**, **minerals**, and **enzymes** like papain, it offers a sweet, tropical flavor and numerous **health benefits**.

Papaya Fruit Diseases

Papaya fruit diseases, including **Papaya Ringspot Virus**, **powdery mildew**, and **anthracnose**, threaten fruit quality and yield. Management involves disease-resistant varieties, sanitation, and fungicides for healthy papaya crops.

Machine Learning

Machine learning is a subset of artificial intelligence that allows computers to **learn** and **improve** from **experience** without being explicitly programmed, by using data to identify patterns and make **predictions** or **decisions**.

Motivation

- Crop Yield Optimization
- Economic Impact
- Resource Efficiency
- Food Security
- Scientific Advancement
- Sustainability
- Farmers' Welfare
- Educational Value
- Global Significance
- Future Potential

Limitation/Gaps in Literature

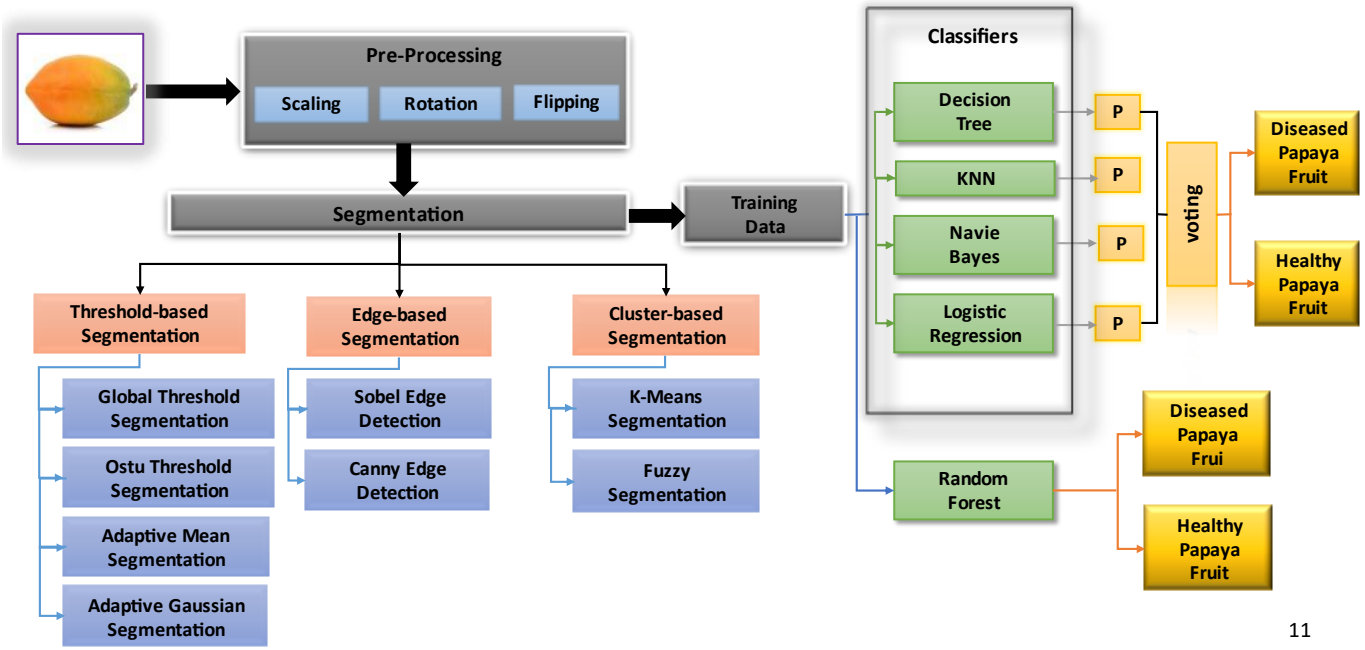
- Limited Focus on Papaya
- Lack of publicly available datasets
- Development of ML-based systems that can detect diseases at an early stage
- Development of ML-based systems that can be used on mobile devices
- Evaluation of ML-based systems on real-world data
- Development of ML-based systems that can be used to detect a wider range of diseases

Objectives

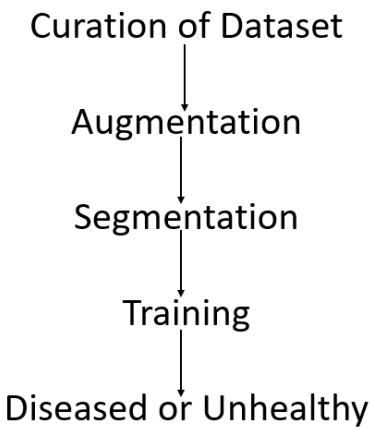
- Increased accuracy and efficiency of disease detection.
- Reduced crop losses due to diseases.
- Improved yields and quality of papaya fruits.
- Reduced use of pesticides and other chemicals.

Overall, the objective of papaya fruit disease detection using machine learning is to develop tools that can help farmers to improve the sustainability and profitability of papaya production.

Proposed Methodology



Implementation



Results & Inferences

Segmentation	Metrics in %	Decision Tree	Naive Bayes	KNN	Logistic regression	Ensemble classifier (Hard Voting)	Ensemble classifier (Soft Voting)	Random Forest
Global Threshold	Accuracy	91.76	96.47	99.98	97.65	98.82	98.82	97.65
Otsu Threshold	Accuracy	95.29	98.82	98.82	98.82	98.82	97.65	99.98
Adaptive Mean	Accuracy	97.65	91.76	96.47	98.82	97.65	98.82	99.98
Adaptive Gaussian	Accuracy	90.59	94.12	62.35	98.82	97.65	95.29	99.98
Canny Edge	Accuracy	94.12	95.29	82.35	95.29	98.82	97.65	97.65
Sobel Edge	Accuracy	95.29	96.47	83.53	99.98	96.47	97.65	99.98
K-means	Accuracy	96.47	98.82	99.98	98.82	99.98	99.98	99.98
Fuzzy	Accuracy	94.12	97.65	94.12	92.94	96.47	98.82	97.65

Conclusion

In conclusion, our project demonstrates a systematic approach to papaya fruit disease detection using a combination of image segmentation and machine learning techniques.

By experimenting with various segmentation methods and classifiers, we were able to identify the most effective combination for accurate disease detection.

This work contributes to the development of an automated system that can help farmers detect diseases in papaya fruits, potentially improving crop yields and reducing losses.

Future work could involve fine-tuning the model, exploring additional segmentation techniques, and optimizing for real-time or large-scale deployment in agricultural settings.

References

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