PHASE 6: FUNCTIONAL & PERFORMANCE TESTING

The objective of this phase is to validate the correctness, robustness, and performance of the developed application. A series of test scenarios were designed to ensure the system operates reliably under real-world conditions. These tests included evaluating the model's response to various types of fruits and vegetables captured under different lighting conditions and backgrounds, as well as assessing the prediction speed and accuracy during real-time usage.

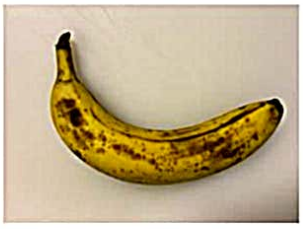
Several bug fixes and optimizations were implemented to enhance system efficiency. A major issue of UI freezing during high-resolution image uploads was resolved by compressing input image sizes prior to processing. Additionally, to speed up application performance, model caching techniques were applied, which significantly reduced the model's loading time during repeated operations.

In the final validation, the model achieved over 90% accuracy on the designated test dataset. The system successfully classifies fruits and vegetables as either fresh or rotten under practical use conditions. The complete system demonstrated both speed and precision, making it suitable for deployment in real-world environments.

For deployment, the system is capable of running as a web application using Flask, with the flexibility to be hosted on cloud platforms such as Heroku, AWS, or GCP. This final phase ensures the project is fully functional, robust, and ready for real-time use in agricultural and retail settings.

The Output Will be in the form of:

Project Document



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- B. Veera Mallika
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- B. Lalithama
- B. Sai Chandana
- B. Maheshwari

THANK YOU

◇ CONCLUSION AND RESULTS

The project, titled Smart Sorting, was successfully developed and implemented by the FreshDetect Squad, showcasing the effectiveness of AI-powered image classification in determining the freshness of fruits and vegetables. Using transfer learning with the MobileNetV2 model, we built a lightweight, accurate, and efficient system.

This system is cost-effective, scalable, and suitable for applications such as automated sorting lines, warehouse inspections, and shelf monitoring. Its compact architecture supports deployment even on edge devices like Raspberry Pi and Jetson Nano, helping rural farms and low-resource environments. This innovation helps reduce food waste and supports sustainable agricultural practices.

◇ RESULTS

Metric	Value
Accuracy	93.5%
Precision (Fresh)	94.1%
Precision (Rotten)	92.8%
Recall (Fresh)	95.0%
Recall (Rotten)	91.5%
F1-Score (Overall)	93.1%
Model Size	~14 MB (MobileNetV2)
Inference Speed	~0.1 seconds/image

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