Project Report Format

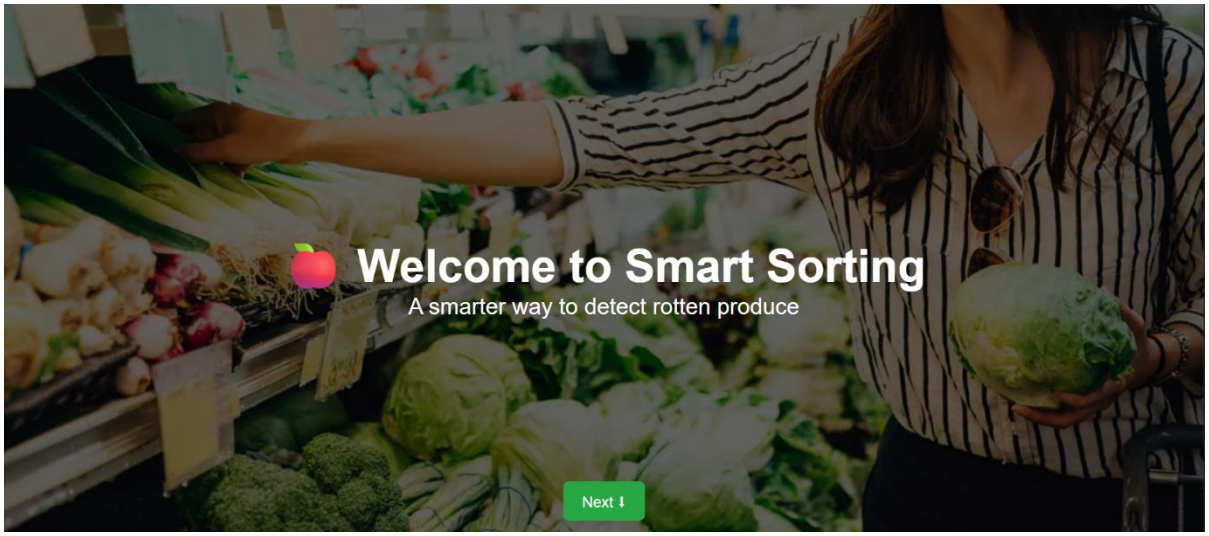
1. **INTRODUCTION**
   - 1.1 Project Overview:

     Smart Sorting is an AI-powered solution that leverages transfer learning to detect whether fruits and vegetables are healthy or rotten. A user-friendly web application allows image uploads and provides predictions with confidence scores and recommendations such as "Good to Eat" or "Don't Eat."

   - 1.2 Purpose:

     The primary goal is to minimize food waste and enhance consumer decision-making by enabling real-time quality detection of fruits and vegetables using image classification.

2. **IDEATION PHASE**
   - 2.1 Problem Statement
   - 2.2 Empathy Map Canvas
   - 2.3 Brainstorming
3. **REQUIREMENT ANALYSIS**
   - 3.1 Customer Journey map
   - 3.2 Solution Requirement
   - 3.3 Data Flow Diagram
   - 3.4 Technology Stack
4. **PROJECT DESIGN**
   - 4.1 Problem Solution Fit
   - 4.2 Proposed Solution
   - 4.3 Solution Architecture
5. **PROJECT PLANNING & SCHEDULING**
   - 5.1 Project Planning
6. **FUNCTIONAL AND PERFORMANCE TESTING**
   - 6.1 Performance Testing
7. **RESULTS**
   - 7.1 Output Screenshots



Project: Smart Sorting

Smart Sorting is an AI-driven image classification system designed to detect whether fruits and vegetables are fresh or rotten using deep learning.

Sorting fruits and vegetables manually is time-consuming, inconsistent, and often inaccurate. Rotten items may go unnoticed, leading to customer dissatisfaction and increased waste. There is a growing need for an automated, scalable, and cost-effective solution that can reliably classify produce quality.

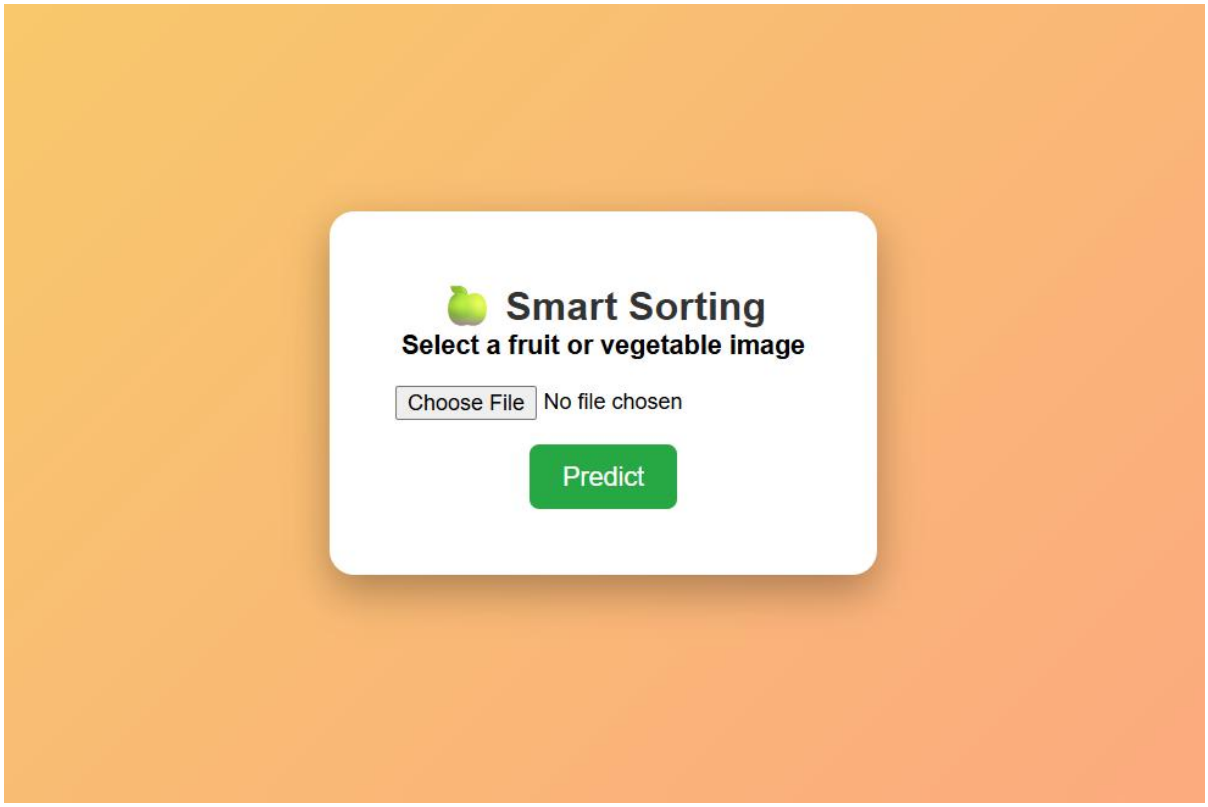
We propose a smart, deep learning-based solution that utilizes **transfer learning** with the **VGG16** architecture. By training on a labeled dataset of fresh and rotten produce across 28 categories, the model learns to differentiate between subtle patterns of decay, discoloration, and texture change.

Transfer learning allows us to leverage pre-trained models like **VGG16**, which have already learned powerful feature representations from millions of general images. Instead of training a model from scratch—which requires vast amounts of labeled data and computational resources—we fine-tune the last few layers of a pre-trained model on our smaller dataset of fruit and vegetable images.

This is especially useful in detecting rot or spoilage, where the visual differences (like subtle color changes, mold, or texture distortions) can be difficult to classify with traditional image processing. Transfer learning enables high accuracy even with limited training data, speeds up development, and improves generalization.

In short, transfer learning brings deep visual understa ur model—without needing to reinvent the wheel.

Next ⬇



🧠 Prediction Result

Predicted Class: Bellpepper__Healthy

Confidence: 99.07%

Result: ✅ Good to Eat

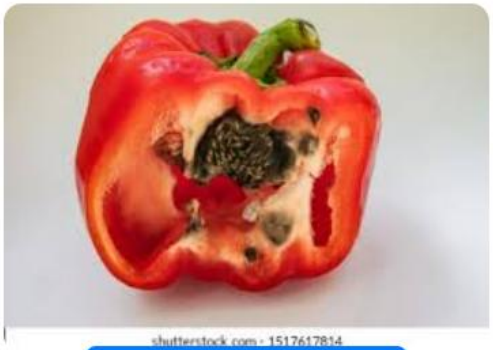
🔁 Predict Another

🧠 Prediction Result

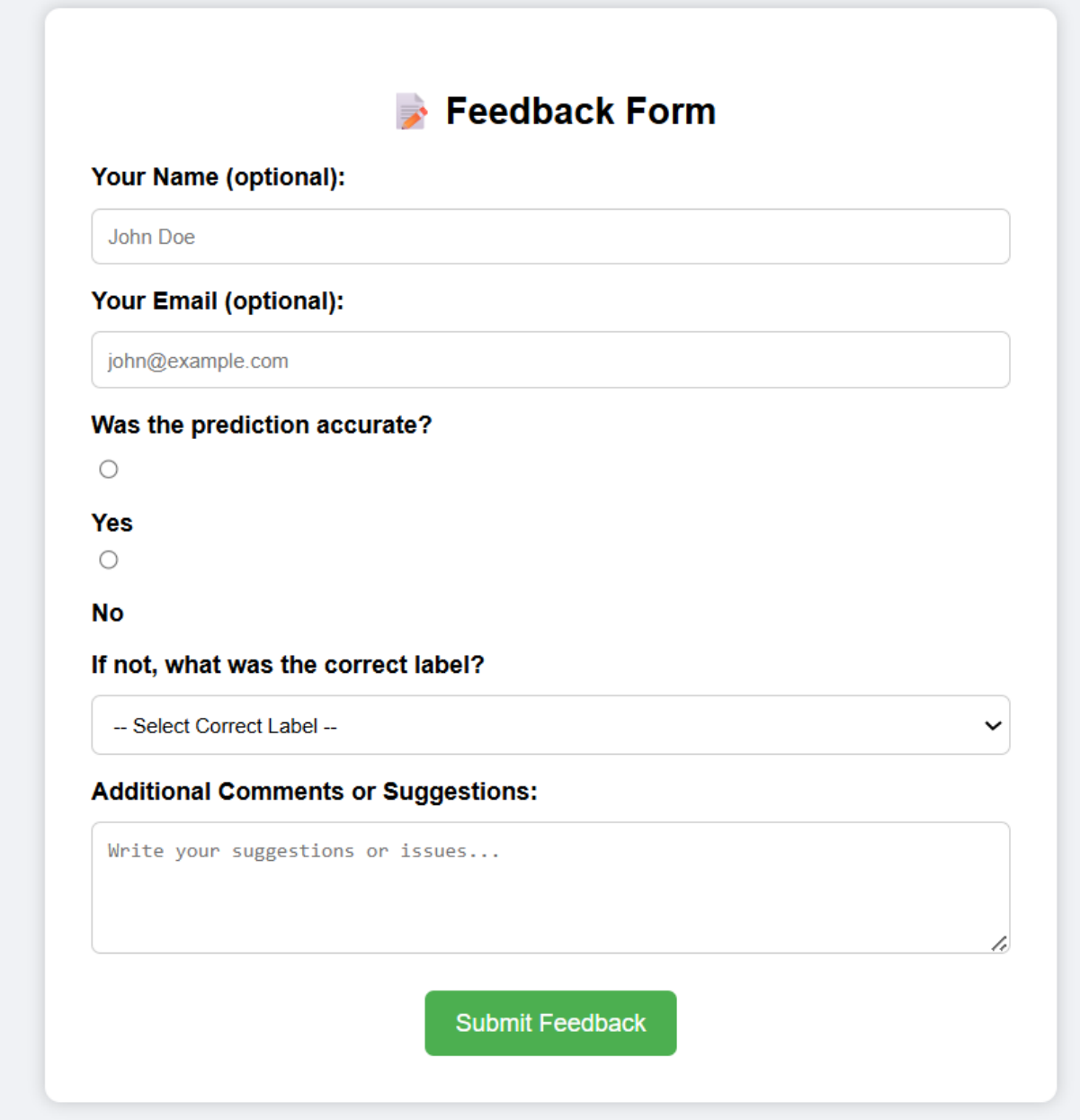
Predicted Class: Bellpepper__Rotten

Confidence: 99.89%

Result: ❌ Don't Eat



🔁 Predict Another



8. ADVANTAGES & DISADVANTAGES

Advantages	Disadvantages
Reduces food waste	Limited to image quality
Enhances decision-making	Depends on dataset diversity
Easy to use for all audiences	Needs stable internet for predictions
Fast and accurate predictions	Not a replacement for expert inspection in critical use cases
Portable web-based solution	Not a complete replacement for experts

9. CONCLUSION

Smart Sorting successfully demonstrates the use of deep learning (transfer learning with VGG16) to classify produce images into healthy or rotten categories. The integrated web application offers an intuitive user experience, promotes food safety, and empowers users with reliable decisions backed by AI predictions. This project can be further enhanced with more diverse datasets, mobile app support, and integration with supply chain tools for large-scale adoption

10. FUTURE SCOPE

- Add **user login** with JWT authentication
- Store **prediction history** in a database
- Convert backend from Flask to **FastAPI** for performance
- Add **mobile support/PWA version**
- Improve dataset with real-world captured images
- Enable **bulk image classification**

11. APPENDIX

11.1 Dataset Link

https://www.kaggle.com/datasets/muhammad0subhan/fruit-and-vegetable-disease-healthy-vs-rotten

11.2 GitHub & Project Demo Link

- GitHub Link

https://github.com/sanjayog/-Learning-For-Identifying-Rotten-Fruits-And-Vegetables.git