Final Project Report

Title: Smart Sorting: Transfer Learning for Identifying Rotten Fruits and Vegetables
Team ID: LTVIP2025TMID43537
College: *SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY*
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Abstract

In the agriculture and food industry, identifying spoiled produce is essential to prevent contamination and reduce waste. Manual sorting of fruits is time-consuming, inconsistent, and prone to human error. This project proposes a smart solution using deep learning and transfer learning to automatically classify fruits as fresh or rotten.

A MobileNetV2-based model is fine-tuned and trained on a labeled dataset of fruits. The system is deployed using a Flask web application, enabling users to upload images and get real-time predictions. The model achieves high accuracy with minimal resources and can significantly aid the food industry.

🎯 Objectives

Develop a model that classifies fruits as fresh or rotten.

Reduce human involvement in fruit quality inspection.

Provide a real-time interface using a web application.

Apply transfer learning for efficient training and high accuracy.

🛠️ Technologies Used

Python

TensorFlow / Keras

MobileNetV2

Flask

HTML / CSS

Google Colab

Pillow (for image handling)

🗀 Dataset

The dataset used includes labeled images of common fruits (apples, bananas, oranges) categorized as fresh or rotten. The dataset was collected from online sources and split into:

70% Training

20% Validation

10% Testing

Images were resized to 224x224 and normalized for consistent input to the CNN model.

🔬 Methodology

Data Preprocessing: Images were resized and normalized.

Data Augmentation: Flip, zoom, and rotation techniques were applied.

Model Building: MobileNetV2 used as a base with custom dense layers.

Model Training: Model trained with early stopping on validation loss.

Deployment: A Flask-based web app accepts images and shows predictions instantly.

📈 Results

Achieved ~94% accuracy on validation data

Fast predictions (<1 second)

Works across multiple fruit types

Lightweight model using transfer learning

📄 Web Application Interface

Screenshot showing the prediction UI

(Insert the screenshot image below the title in your Word/Docs file)

Caption: “Flask Web App – Predicting Rotten Fruit”

👥 Team Details

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 Conclusion

This project demonstrates the effective use of transfer learning for automating fruit quality inspection. It reduces manual labor and errors, offering a scalable and efficient system for use in agriculture and food processing industries. The web app can be extended with camera input and deployed on IoT devices for real-time monitoring.

References

TensorFlow Documentation – https://www.tensorflow.org

Keras API – https://keras.io

MobileNetV2 Paper – https://arxiv.org/abs/1801.04381

Flask Framework – https://flask.palletsprojects.com

Roboflow Datasets – https://roboflow.com