# Project Overview

This project involves building a CNN model to classify 15 types of vegetables. It is useful for smart agriculture and retail systems.

# Objective

- Classify vegetable images into 15 categories  
- Achieve high accuracy using CNN  
- Deploy with a basic user interface

# Dataset Description

- 15,000 training images (1000 per class)  
- 3000 validation images  
- 3000 test images  
- Real-world background and lighting conditions

# Data Preprocessing

- Rescaled images to 150x150  
- Normalized pixel values to [0,1]  
- Used ImageDataGenerator  
- Enabled shuffling in training

# Model Architecture

- 3 Conv2D layers (32, 64, 128 filters)  
- 3 MaxPooling2D layers  
- Flatten, Dense, Dropout, and final Softmax layer

# Model Architecture Explanation

- ReLU activation in hidden layers  
- Dropout used to prevent overfitting  
- Softmax activation for multi-class output

# Training Process

- 10 epochs  
- Categorical crossentropy loss  
- Adam optimizer  
- Accuracy reached above 92%

# Evaluation Results

- Test Accuracy: 92%  
- Loss: Low  
- High generalization across unseen images

# Tools and Technologies

- Python 3.11  
- TensorFlow/Keras  
- Google Colab  
- Streamlit  
- NumPy, Matplotlib

# Conclusion

The CNN model is accurate and efficient for classifying vegetables. Further improvements can include data augmentation and model deployment on mobile.