

Practice Project Overview: Fruit Classification Using Transfer Learning

Estimated Reading Time: 15 minutes

Project overview

In this practice project, you will learn to classify images of fruits into different categories using transfer learning. The pre-trained VGG16 model will be used as the base, and custom layers will be added to fine-tune the model for our specific task. This approach allows us to leverage the knowledge learned from a large dataset (ImageNet) and apply it to a smaller, custom dataset with minimal computational resources and data.

Aim

The aim is to classify images of different fruits using a machine learning model. You will train a convolutional neural network (CNN) to recognize various fruit categories using the power of transfer learning with a pre-trained model.

Final Output

A trained model capable of classifying fruit images into specified categories with good accuracy.

Learning objectives

After completing this project, you will be able to:

- Prepare data into a directory structure
- Create sample images
- Verify the directory structure and images
- Set up the data generator
- Build and compile the model
- Train and evaluate the model using callbacks
- Plot and visualize the model

Prerequisites

- Basic knowledge of Python and Keras
- TensorFlow installed in your Python environment

- A dataset of fruit images organized in subdirectories for each class

Instructions

You need to perform the following tasks to complete the project after preparing the data:

- Task 1: Print the version of TensorFlow
- Task 2: Create a test generator using the `test_datagen` object
- Task 3: Print the length of the train generator
- Task 4: Print the summary of the model
- Task 5: Compile the model
- Task 6: Plot accuracy curves for training and validation sets
- Task 7: Plot loss curves for training and validation sets (fine-tuned model)
- Task 8: Plot accuracy curves for training and validation sets (fine-tuned model)
- Task 9: Plot a test image using the Extract Features Model
- Task 10: Plot a test image using the Fine-Tuned Model

Key Takeaways

- Transfer learning enables leveraging pre-trained models for custom tasks with limited data.
- Data augmentation helps improve model generalization on small datasets.

Let's start this guided project and train a convolutional neural network (CNN) to recognize various fruit categories using the power of transfer learning with a pre-trained model.