RECOGNITION AND CLASSIFICATION OF FLOWER IMAGES

USING TRANSFER LEARNING VGG16 MODEL

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INTRODUCTION

- Flower recognition and classification is a crucial task in computer vision.
- The task has various applications in fields like agriculture, ecology, horticulture, and environmental monitoring.
- Automatic recognition and classification of flowers can help in identifying plant species, monitoring plant health, and tracking plant growth and development.
- It can also help in identifying invasive plant species, which can have significant ecological and economic impacts.
- Flower recognition and classification is useful for farmers, ecologists, and horticulturists.
- The task has the potential to bring significant benefits to various industries and environmental management.

CHALLENGES

- Flower recognition and classification is challenging due to the large variability in appearance of different flowers.
- This variability can be caused by factors such as lighting conditions, camera angle, background clutter, and occlusions.
- Flowers within the same species can have significant visual differences, further complicating the task.
- Additionally, some flowers may have similar visual characteristics, making it difficult to distinguish between them.

TRANSFER LEARNING MODEL

- Researchers have developed various computer vision techniques for flower recognition and classification to address the challenges.
- One such approach is transfer learning, which uses a pre-trained deep neural network for training a new model on a different task.
- Transfer learning is useful for cases where the dataset for a new task is small.
- It allows the model to leverage the knowledge learned from a larger dataset, improving accuracy.
- Transfer learning is an effective technique for improving flower recognition and classification performance

VGG16 MODEL

- The VGG16 model is a deep neural network used for transfer learning.
- The model was trained on the ImageNet dataset, which contains over a million images across 1000 classes.
- It consists of 16 layers, including 13 convolutional layers and 3 fully connected layers.
- The VGG16 model has achieved state-of-the-art performance on various image classification tasks.
- It has been used as a starting point for transfer learning in many applications.

OUR PROJECT'S GOAL

The goal of our project is to evaluate the performance of the transfer learning VGG16 model for flower recognition and classification, and to compare the performance of the two transfer learning strategies: freezing and fine-tuning the layers. We hypothesize that fine-tuning the VGG16 model layers will lead to better performance, due to the ability of the model to adapt to the new task by adjusting the weights of the layers to avoid overlapping.

PROPOSED METHODOLOGY

- Initially training the model completely with no freezing(32 Epochs with 32 steps per epoch and is the same throughout)
- Freezing the first 17 layers and training the model
- Freezing only the last 5 layers and training the model
- Finally, performing fine-tuning and unfreezing all the layers, then training the model
- We are also performing morphological transformations with threshold value as 150 and also plotting an image’s RGB channels

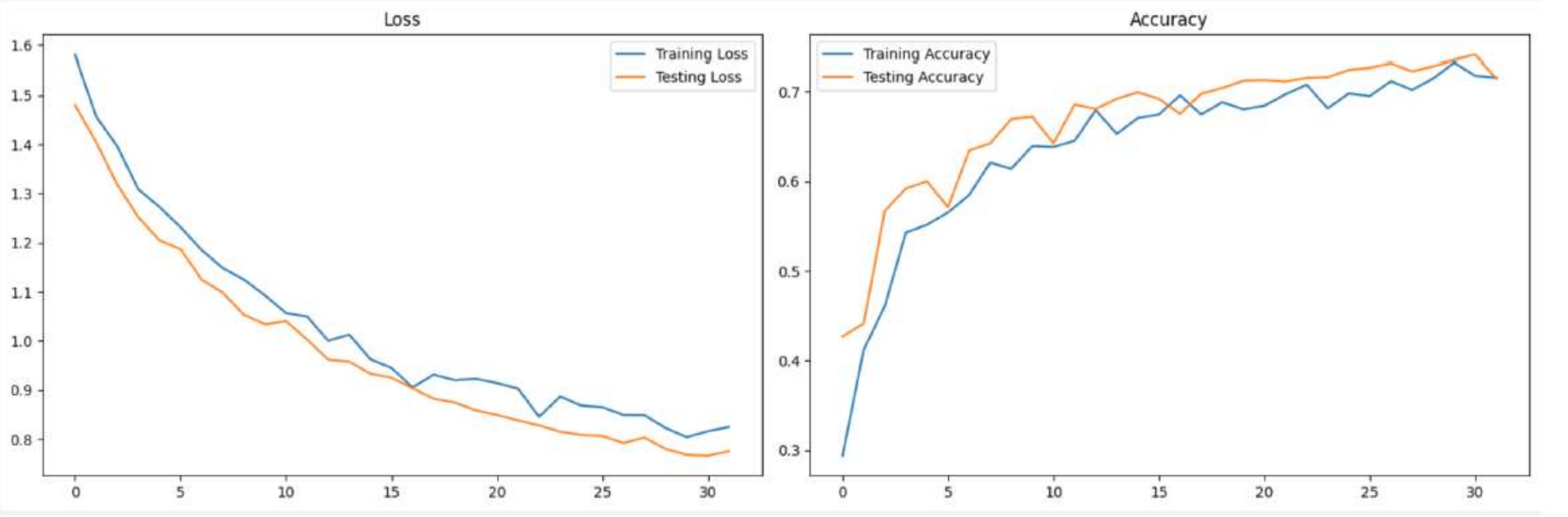
PROCEDURE

- The study uses a dataset of approximately 4500 flower images, with 900 images for each of the five flower types.
- The dataset is split into training, validation, and testing sets.
- The model is trained on the training set.
- The performance of the model is evaluated on the validation and testing sets.
- The performance of the freezing and fine-tuning strategies is compared.

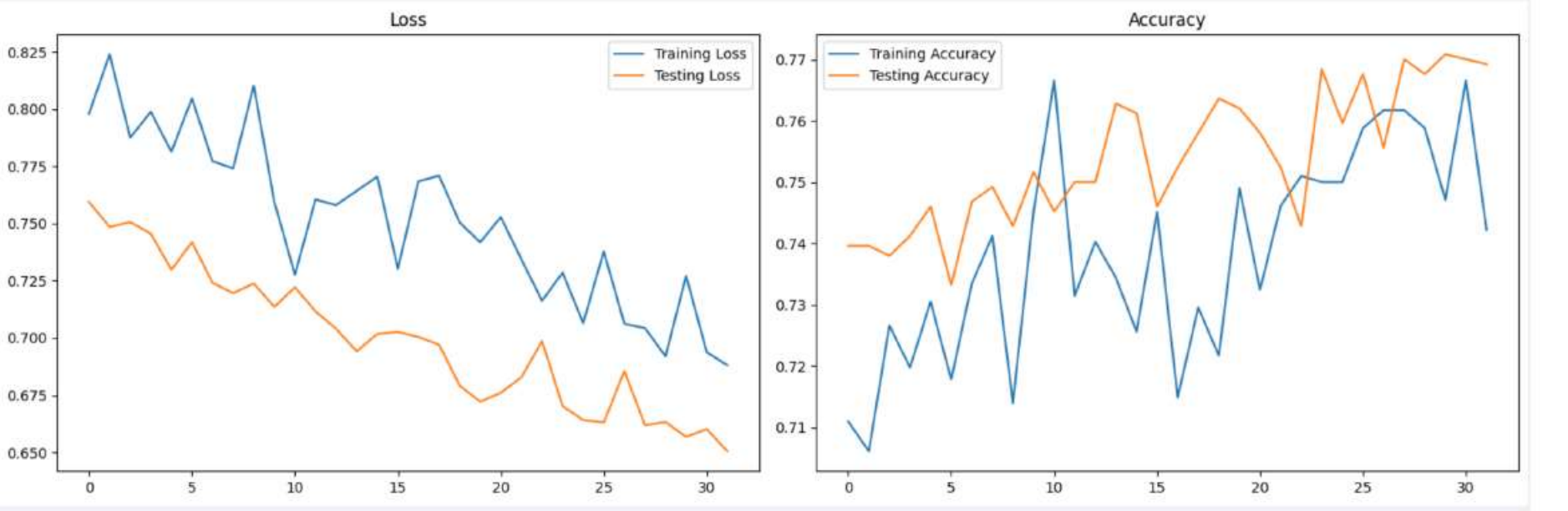
RESULTS AND ANALYSIS

The results of this study have the potential to inform the development of more accurate and robust methods for flower recognition and classification, with applications in various domains. By leveraging the power of transfer learning and deep neural networks, we aim to contribute to the development of more effective and efficient methods for plant species identification and monitoring

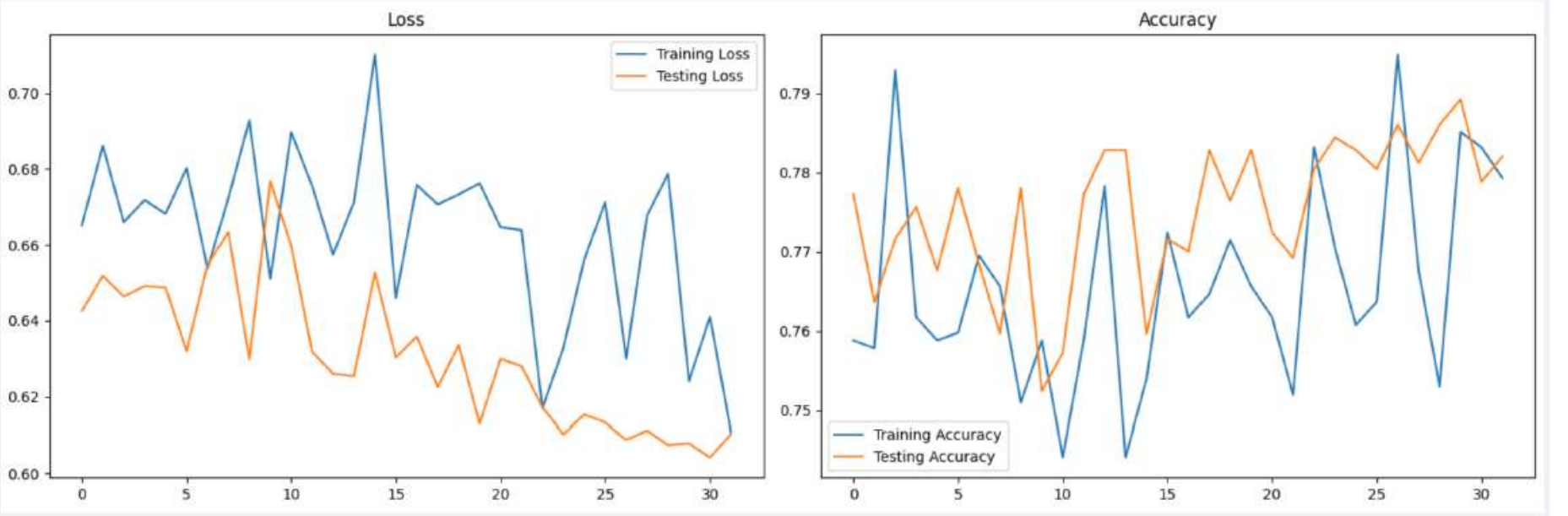
INITIALLY TRAINING THE MODEL WITH NO FREEZING



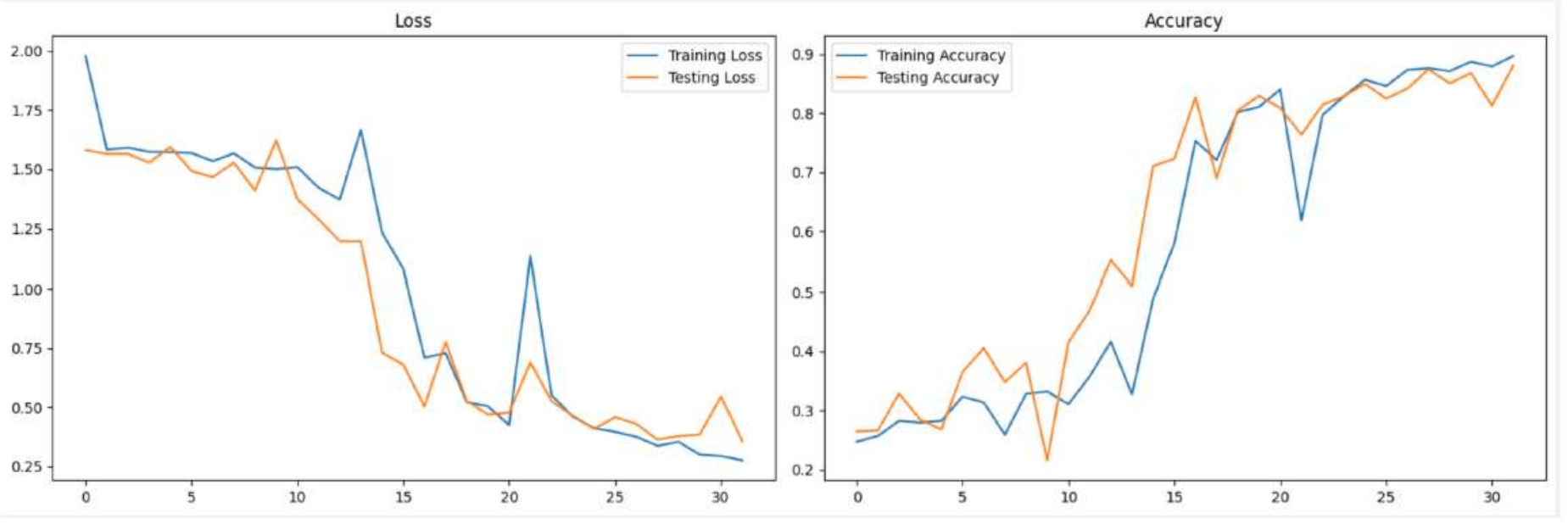
FREEZING THE FIRST 17 LAYERS AND TRAINING THE MODEL



FREEZING ONLY THE LAST 5 LAYERS AND TRAINING THE MODEL



FINE-TUNING AND UNFREEZING ALL LAYERS AND TRAINING MODEL



MODEL RECOGNIZING AND CLASSIFYING FLOWERS

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1/1 [==============================] - 0s 27ms/step
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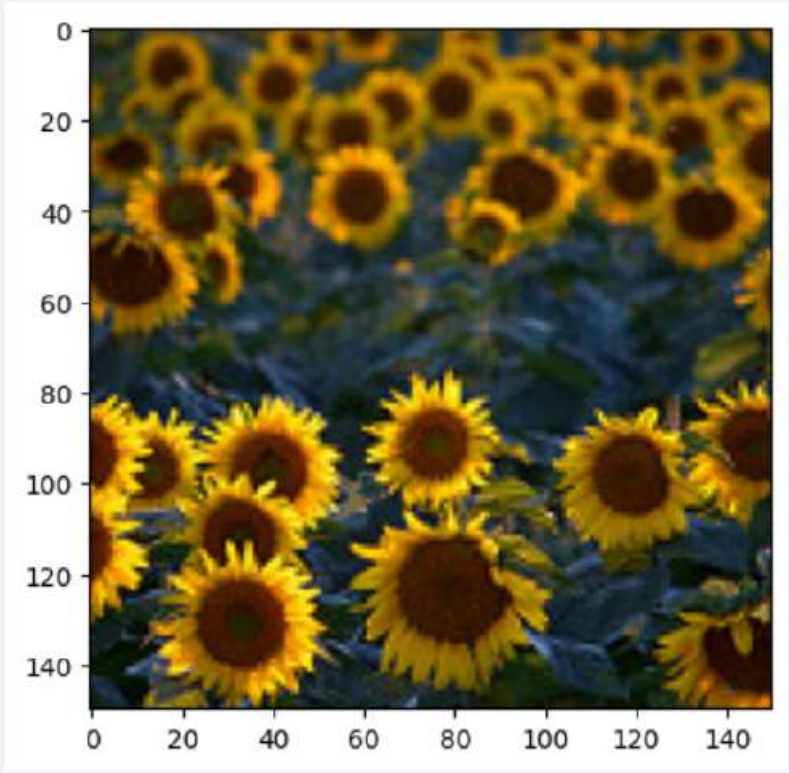


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The given image is : sunflower
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MODEL RECOGNIZING AND CLASSIFYING FLOWERS

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1/1 [==============================] - 0s 21ms/step
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The given image is : daisy
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