Assignment 1 – Initiate

1. Reference:

1. Deep Residual Learning for Image Recognition" (ResNet)
   Available at: https://arxiv.org/abs/1512.03385
2. Very Deep Convolutional Networks for Large-Scale Image Recognition" (VGG)
   Available at: https://arxiv.org/abs/1409.1556

2. Topic Selection:

For my project, I chose to center on "Image Classification in Computer Vision." My previous proficiency with image processing from my last project led me to choose this subject those I have done my bachelor's as a final year project. I am familiar with the concepts of image recognition, feature extraction, and classification as I have worked on a variety of image analysis and manipulation projects.
Building on this knowledge, I want to use common models like VGG and ResNet to investigate additional deep learning techniques for image classification. I shall be enabled to compare current architectures and get a more understanding of convolutional neural networks by assessing how they perform on a dataset such as CIFAR-10.

3. Project Type:

For my assignment, I've chosen to use the **"Bring Your Own Method"** project type. I may employ to evaluate present modern neural network architectures with this type of studies. Given my previous experience in image processing and my experience with image classification issues, I thought that using popular algorithms such as VGG and ResNet could provide a helpful and informative approach for improving my comprehension of deep learning.
Both VGG and ResNet are well recognized for their strong image classification abilities, and an array of tutorials, code, and documentation are easily available. This helps the task of put these models into effect and improving them for my dataset. In addition, rather than wasting energy creating a new architecture from begin, this project type will enable me to focus on comparing the efficiency of multiple designs and hyper parameters.
By choosing this type, I aim to gain hands-on experience with two popular architectures, experiment with various techniques, and understand their performance on the **CIFAR-10** dataset.

4. Project Summary

a. Short Description of the Project Idea:

This project's objectives is to classify images from the CIFAR-10 dataset through using and comparing two famous convolutional neural network architectures: VGG and ResNet. I will going to investigate how well these models perform on a smaller dataset, like CIFAR-10, after they have demonstrated state-of-the-art performance in image classification tasks.

I will train both models and assess their results using ResNetthat employs residual connections to solve the vanishing gradient problem, and VGG, which focuses depth with basic 3x3 filters. Metrics such as accuracy, training time, and computing efficiency are going to be the main focus of the comparison.
This project takes reference of current studies on deep learning architectures and builds on my previous experience in image processing. My plan is to evaluate these models using modern machine learning methods to gain a deeper understanding of how different network setups affect performance.

b. Dataset Description:

The CIFAR-10 dataset, consists of 60,000 32x32 color images of cars, airplanes, birds, and other objects, is used for this project. The images have been divided into 10 different classes. Since the dataset is pre-labeled, it can be used for image classification tasks and is frequently employed as a benchmark in deep learning research.

The reasonable size of CIFAR-10 makes it perfect for training and assessing convolutional neural networks, enabling effective experimentation while still presenting a classification challenge. The dataset may be readily incorporated into machine learning frameworks like TensorFlow or PyTorch, and as it is publically available, neither data collection nor human labeling are necessary.

c. Work-Breakdown Structure:

The following is the work-breakdown structure for the project, detailing the individual tasks, time estimates, and adjusted dates:

Task	*Time Estimate*	*Dates*
Dataset Collection/Preprocessing *Downloading the CIFAR-10 dataset and preparing it for model training.*	4 days	October 22, 2024 – October 25, 2024
Model Setup (VGG and ResNet) *Implementing both VGG and ResNet architectures using Keras or PyTorch.*	1 week	October 26, 2024 – November 1, 2024
Model Training & Fine-Tuning *Training both models on the CIFAR-10 dataset and adjusting hyperparameters to optimize performance.*	2 weeks	November 2, 2024 – November 15, 2024
Model Evaluation & Comparison	1 week	November 16, 2024 – November 22, 2024

*Evaluating the models' performance based on accuracy, training time, and computational efficiency***.**		
Building an Application	5 days	November 23, 2024 – November 27, 2024
*Developing a simple interface to present model predictions and results***.**		
Final Report Writing	5 days	November 28, 2024 – December 2, 2024
Summarizing the project's findings, methods, and results in the final report.		
Presentation Preparation	3 days	January 3, 2025 – January 5, 2025
Preparing slides and visual aids for the final presentation of the project.		