

## References to Scientific Papers

- a. "Deep Residual Learning for Image Recognition" by Kaiming He et al ([Link](#))
- b. "EfficientNet: Rethinking Model Scaling for Convolutional Neural Networks" by Mingxing Tan and Quoc V. Le ([Link](#))

## Summary of the Project

The goal of this project is to improve image classification performance using deep learning, focusing on modifying the ResNet architecture. By implementing various data augmentation techniques (rotation, flipping, color shifts) and experimenting with different optimizers (Adam, SGD, RMSProp), the aim is to increase accuracy on the CIFAR-10 dataset. The project will compare the performance of the modified ResNet against its baseline version and present the results.

## Dataset Description

The **CIFAR-10** dataset will be used. It consists of 60,000 32x32 color images in 10 classes, with 6,000 images per class. This dataset is commonly used for benchmarking image classification algorithms and is publicly available for download.

## Work Breakdown Structure with Time Estimates

- a. Dataset Collection and preprocessing**
  1. Time Estimate: 2-3 days
  2. Download CIFAR-10 and perform preprocessing (normalization, resizing) and data augmentation.
- b. Designing and Modifying the Network**
  1. Time Estimate: 4-5 days
  2. Use the ResNet architecture, apply modifications such as different regularization techniques (dropout, batch normalization) and adjust hyperparameters.
- c. Train the model**
  1. Train the modified ResNet model on the CIFAR-10 dataset.
  2. Fine-tune hyperparameters (learning rate, batch size, epochs).
- d. Building an Application**
  1. Build a simple web interface using a framework like Flask or Streamlit to display the classification results.
  2. Allow users to upload images and get classification results.
- e. Writing the Final Report**
  1. Write a detailed report including methodology, results, and improvements over the baseline.
  2. Include charts and visualizations (e.g., loss/accuracy curves).

**f. Preparing the Presentation**

1. Create a presentation to explain the key ideas, the approach used, the results obtained, and possible improvements.