2-5 Data Preprocessing

Before training on the CIFAR-10 dataset, I did several preprocessing steps to ensure consistent input scaling and proper label representation.

(1) Normalization

- The pixel values of all images were originally in the range [0, 255].
- Each pixel was divided by 255 to rescale the data into [0, 1].
- This normalization accelerates convergence and prevents gradient explosion by ensuring that all input features have similar numerical ranges.

(2) Dataset Splitting

- The original dataset, 50,000 samples were used for training, and 10,000 for testing.
- After splitting, 45,000 samples were used for training, 5,000 for validation, and 10,000 for testing.

(3) One-Hot Encoding

- The class labels (0–9) were converted into one-hot vectors of length 10 using `to_categorical()`
- This representation allows the model's softmax output layer to interpret class probabilities correctly for multi-class classification.