**Assignment on CIFAR-10 (Assignment 2)**

This dataset consists of 60000 **32x32** color images. These images are divided into 10 different classes. There are **50000** training images and **10000** test images. The test-set contains randomly selected images from each class. Each image is a 32x32 color image, resulting in a total of **3,072** pixels.

# Firstly, we import all necessary libraries as required for our project. Then, the dataset is loaded from in-built library sklearn. They contain images and are in the form of array representations with array elements ranging from 0 to 255.

# In the second step, we normalize those array elements by dividing with 255.

# We reshape the elements such that the shape of training set (i.e., 50000, 32, 32) gets transformed to (50000, 3072). We also use Robust Scaler to scale the dataset. Robust scaler is considered to be more robust and less sensitive to outliers.

# Model chosen for analysis are two: Logistic Regression and Random Forest. The model is fitted to train set and the test results are as follows:

**Logistic Regression**

**ACCURACY : 40.14%, PRECISION : 39.85%, RECALL : 40.14%, F1-SCORE : 39.91%**

**Random Forest (n\_estimators = 50, this is kept smaller to reduce computational time)**

**ACCURACY : 45.08%, PRECISION : 44.65%, RECALL : 45.08%, F1-SCORE : 39.91%**

It was observed that for the random forest, as the number of estimator parameters was increased, the evaluation scores like accuracy, precision, and recall also increased. (Upto 49.95 accuracy for **n\_estimators = 500**)

It was observed while performing validation using methods like “Validation set approach” (20-80 split), k-fold cross-validations for k values = **3, 5, 10**  also gave, more or less, similar results as that of the accuracy without validation. (Please refer code)

**Note** : We use only one method i.e Logistic Regression to reduce our time for code run as it is computation intensive.

The same experiments were performed on GrayScale images too and it was observed that there was a drop by almost 8-10% in evaluation scores for both models. The model performed well on colored images. Further investigation is necesssary and tuning of hyper-parameters may help improve the accuracy and other scores.

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