Assignment 2

Objective

To perform feature extraction using the VGG19 pre-trained model at different layers and evaluate the performance of various machine learning algorithms (Logistic Regression, SVM, KNN, Random Forest, Decision Tree) using metrics such as accuracy, F1 score, precision, and recall. The goal is to identify the combination of layer and ML algorithm that yields the best results.

Dataset

- Get the CIFAR-10 dataset provided by tensorflow.keras.datasets
- Data preprocessing: Normalize pixel values and split the data into training and testing datasets.

Following Libraries may be used:

```
import numpy as np
import tensorflow as tf
from tensorflow.keras.applications import VGG19
from tensorflow.keras.models import Model
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler,
LabelBinarizer
from sklearn.metrics import accuracy_score,
classification_report
from sklearn.linear_model import LogisticRegression
from sklearn.svm import SVC
from sklearn.neighbors import KNeighborsClassifier
from sklearn.ensemble import RandomForestClassifier
from sklearn.tree import DecisionTreeClassifier
```

Evaluation and Report

Metrics

- **Accuracy**: Ratio of correctly predicted observations to total observations.
- **Precision**: Proportion of positive identifications that were actually correct.
- **Recall**: Proportion of actual positives that were identified correctly.
- **F1 Score**: Weighted average of precision and recall.

Reporting Results

1. Tabulate the results for each combination of layer and ML algorithm.
2. Highlight the best combination in the table.