**CS-559 HW#4**

**Question 1 [ 40 Points ] - Support Vector Machines (SVMs)**

1. [25 points ] Download [this](https://archive-beta.ics.uci.edu/dataset/53/iris) dataset, split it as a 80% training and 20% test set. and implement the support vector algorithm from scratch using Numpy and Pandas.
2. [10 points ] Report the accuracies for the train and test sets. Comment on whether your model has overfit.
3. [5 points] Test your model performance with the scikit-learn model. Comment on the difference in accuracy.

**Question 2 [ 40 Points ] - Decision Trees**

Follow the instructions and fill in the functions in the notebook.

1. [5 points] Complete the test\_split function.
2. [5 points] Complete the gini\_index function.
3. [5 points] Complete the get\_split function.
4. [15 points] Complete the split function.
5. [10 points] Print the tree.

**Question 3 [ 20 Points ] - Random Forests and Boosting**

1. [10 points] Implement the Random Forest algorithm using scikit-learn on [this](https://archive-beta.ics.uci.edu/dataset/19/car+evaluation) dataset. Report its accuracy on the test and train set.
2. [10 points] Implement the Gradient Boosting Classifier algorithm using scikit-learn on [this](https://archive-beta.ics.uci.edu/dataset/19/car+evaluation) dataset. Report its accuracy on the test and train set.
3. Compare the performance of both the models.