**Assignment 04 – Explainable Models**

This assignment will deal with tuning the hyperparameters for the [Telco Customer Churn](https://www.kaggle.com/datasets/blastchar/telco-customer-churn) dataset. Please start with a random.seed(last four digits of your GUIDg).

Since this is a classification dataset, for the first part, you will follow the steps in assignment 2 (and some more) as shown below. The code is already with you, and you can use that.

**I have intentionally misspelled some explanations in assignments. When you copy the text, make sure to spell check it. I will drop points for incorrect spelling and grammar (-5 points). Please also provide explanations/ reasoning for utilizing a command and describe the output. Failure to describe/ explain will result in lower points. Also, make sure to add a g#groupnumber (for example, g01) suffix to each variable, so we will know you are not just copy-pasting the given example code.**

# Load the dataset, drop customerid column and show the dataframe. (1)

# Describe pandas Dataframe by using describe. (1)

# A few variables need type change so typecast them into categorical variables. You can either use label encoding from sklearn or use pandas typecast as cat.codes. Make sure it is a function or a class.

# Change the total charge variable into a categorical variable by selecting five bins. Also, make sure to drop all the missing values.

# Create a function that takes input as model, data, and labels. This function should spit out train and test accuracies of each model and its training time. (1)

# Perform classification routine by using, Naïve Bayes, Logistic regression(), DecisionTree(), RandomForestClassifier(), GradientBoostingClassifier(), Multipalayer Perceptron. Output the accuracy box plot independently, as we have seen in class. (22)

# Create Lime Explanation Plot for the six models trained. (25)

# Create Shap Explanations for a randomly selected data point for random forests and explain the force plot. Also plot the beeswarm plot for the test dataset (25)