**ISL Project**

**Instructions:**

1. Select a dataset for analysis.
2. Perform Data Preprocessing on the dataset.
3. Apply statistical learning techniques to analyze the dataset.
4. Present your findings, results, and insights in a final project report or presentation.
5. Based on your findings, iterate on your project to improve model performance or explore additional questions.

**Essential topics:**

**Regression:**

* Define an appropriate regression problem based on your dataset.
* Apply multiple linear regression to create a baseline model and evaluate its performance using metrics such as mean squared error (MSE) and R-squared.
* Apply Forward Stepwise Selection, Backward Stepwise Selection and compare the resulting models to determine which one works best for the dataset and modeling goals.
* Apply PCA to the dataset to reduce its dimensionality while preserving as much information as possible!
* Apply higher-order regression model using polynomial features and compare its performance with the baseline model.
* Visualize the relationships between predictor variables and the target variable using scatter plots and regression diagnostics.
* Explore and implement advanced regression techniques, such as ridge regression, lasso regression, and compare their performance.

**Classification:**

* Define an appropriate multi-class classification problem (at least four class) based on your dataset.
* Apply logistic regression as a baseline classification model and evaluate its performance using metrics such as accuracy.
* Implement dimensionality reduction techniques (e.g., PCA) to reduce the number of features while preserving information.
* Implement a tree-based classification model (e.g., decision trees, random forests) and compare its performance with the logistic regression baseline.
* Use visualizations to illustrate the separation between different classes in the feature space.
* Explore and implement one advanced classification technique such as k-nearest neighbors, naive Bayes, etc. Compare their performance with the baseline.