Midterm report

Introduction:

In this project, we will perform analysis of economic data, focusing on the Federal Reserve's interest rates and their interaction with critical economic indicators like inflation, interest rates and unemployment. Our mission is to study historical trends, observe correlations, and apply a few machine learning techniques to predict future economic conditions.

Research Goals:

1. Analyzing the Federal Reserve Interest Rates dataset to understand historical trends and patterns.
2. Comparing the relationships between Federal Funds Target Rate, Inflation Rate, and Unemployment Rate.
3. Developing predictive models to forecast Interest, Inflation, and Unemployment rates in the near future, enabling better economic policy planning and decision-making.

Methodologies used/will use:

1. **Data Preprocessing Techniques**: We conducted various data preprocessing steps, including data cleaning, handling missing values, and normalizing data to ensure data quality and consistency.
2. **Feature Selection with PCA (Principal Component Analysis):** PCA was used to identify the most important features within the dataset. This dimensionality reduction technique helps in simplifying the dataset while retaining the most relevant information.
3. **Visualization:** Planning to visualize the results and insights obtained from the analysis for a better understanding of the economic conditions and Federal Reserve interest rate changes over the years.

Algorithms planning to use:

1. **Linear Regression:** Linear regression models might help understand the linear relationships between Federal Funds Target Rate, Inflation Rate, and Unemployment Rate. This can help in forecasting these features in the future.
2. **Support Vector Machine (SVM):** SVM was used to build regression models for predicting future values of Interest, Inflation, and Unemployment rates. SVM is effective in handling non-linear relationships.
3. **XGBoost:** XGBoost is a gradient boosting algorithm that was applied to enhance prediction performance, particularly in forecasting future values of economic indicators.
4. Will be researching on various other forecasting Algorithms
5. Planning to use either or all of Mean Absolute Error (MAE), Mean Squared Error (MSE), and R-squared (R2) to measure forecasting accuracy.

Experiment Setting:

The experiments were conducted using a time-series approach, considering the sequential nature of economic data(from 1954-2017).

Will divide the dataset into training and testing sets, with a focus on the most recent data for testing to access the model better.