**Definition of the Business Problem and Analysis Scope**

**Business Problem**:

The goal is to develop predictive models for the U.S. unemployment rate (U3) to understand labor market dynamics better and provide actionable insights for policymakers and economists. This involves providing the best prediction in terms of accuracy for the December U3 rate, and potentially identifying economic indicators influencing unemployment and forecasting unemployment rates over short-term horizons.

**Analysis Scope:**

The analysis focuses on time series data from various economic indicators from 1948 to the present. The prediction strategy involves leveraging historical data to predict unemployment rates for future periods. Datasets will be combined, preprocessed, and modeled to identify trends and relationships between the outcome variable (unemployment rate) and predictors.

| **Source** | **Date Range** | **Frequency** | **# Rows** | **# Cols** |
| --- | --- | --- | --- | --- |
| [**CPI**](https://fred.stlouisfed.org/series/CPIAUCSL) | **1948-01 to 2024-09** | **Monthly** | **933** | **1** |
| [**EFFR**](https://fred.stlouisfed.org/series/EFFR) | **2000-07-03 to 2024-11-09** | **Daily** | **1828** | **1** |
| [**IMPGS**](https://fred.stlouisfed.org/series/IMPGS) | **1948 Q1 to 2024 Q3** | **Quarterly** | **233** | **1** |
| [**EXPGS**](https://fred.stlouisfed.org/series/EXPGS) | **1948 Q1 to 2024 Q3** | **Quarterly** | **233** | **1** |
| [**GDI**](https://fred.stlouisfed.org/series/GDI) | **1948 Q1 to 2024 Q3** | **Quarterly** | **233** | **1** |
| [**GDP**](https://fred.stlouisfed.org/series/GDP) | **1948 Q1 to 2024 Q3** | **Quarterly** | **233** | **1** |
| [**WAPT**](https://fred.stlouisfed.org/series/LFWA64TTUSM647S) | **1977-01 to 2024-09** | **Monthly** | **572** | **1** |
| [**CPI\_Rent**](https://fred.stlouisfed.org/series/CUSR0000SEHA) | **1981-01 to 2024-09** | **Monthly** | **524** | **1** |
| [**Annual Inflation**](https://fred.stlouisfed.org/series/FPCPITOTLZGUSA) | **1960-01-01** | **Yearly** | **64** | **1** |
| [**Gas Price**](https://fred.stlouisfed.org/series/GASREGW) | **1990-08-20** | **Weekly** | **1786** | **1** |
| [**Disposable Personal Income**](https://fred.stlouisfed.org/series/DSPI) | **1959-01-01 to 2024-09** | **Monthly** | **788** | **1** |
| **Total Capital Expenditures** | **1946 Q4 to 2024-Q2** | **Quarterly** |  | **1** |
| **Industrial Production** | **1919-01 to 2024-10** | **Monthly** |  | **1** |
| **Health Expenditures per Capita** | **2000 to 2024** | **Yearly** |  | **1** |

| **source** | DatsRange | frequency |
| --- | --- | --- |
| **Civilian Labor Force Level** | 1948 Q1 to 2024 Q3 | Monthly |
| **Labor Force Participation Rate** | 1948 Q1 to 2024 Q3 | Monthly |
| **Employment Level** | 1948 Q1 to 2024 Q3 | Monthly |
| **Employment-Population Ratio** | 1948 Q1 to 2024 Q3 | Monthly |
| **Employed, Usually Work Full Time** | 1968 Q1 to 2024 Q3 | Monthly |
| **Employed, Usually Work Part Time** | 1968 Q1 to 2024 Q3 | Monthly |
| **Unemployment Level** | 1948 Q1 to 2024 Q3 | Monthly |
| **Unemployment Rate** | 1948 Q1 to 2024 Q3 | Monthly |
| **Average Weeks Unemployed** | 1967 Q1 to 2024 Q3 | Monthly |
| **Not in Labor Force** | 1967 Q1 to 2024 Q3 | Monthly |
| **Total unemployed** | 1948 Q1 to 2024 Q3 | Monthly |
| **Multiple Jobholders** | 1967 Q1 to 2024 Q3 | Monthly |
|  |  |  |
| **Multiple Jobholders as a Percent of Employed** | 1979 Q1 to 2024 Q3 | Monthly |

**Prediction Strategies**

**Objective:**

Predict the unemployment rate att+1 (e.g., December 2024) using all available data up to time 𝑡 (e.g., November 2024).

**Approach:**

Treat all data as time series.

Impute or calculate missing values as needed.

Test various statistical and machine learning models, selecting the best-performing one based on accuracy.