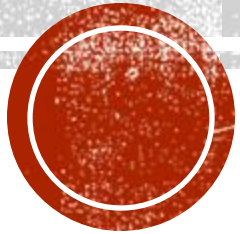
PREDICTING FOREIGN EXCHANGE RATES

Using Hidden Markov Models and Mixture Models



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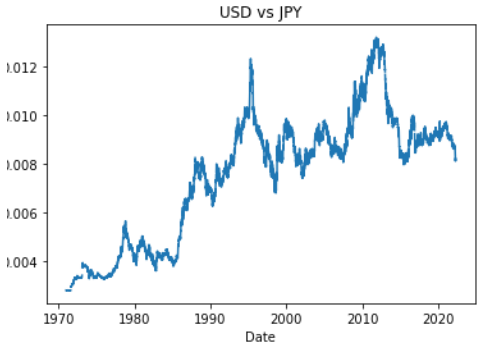
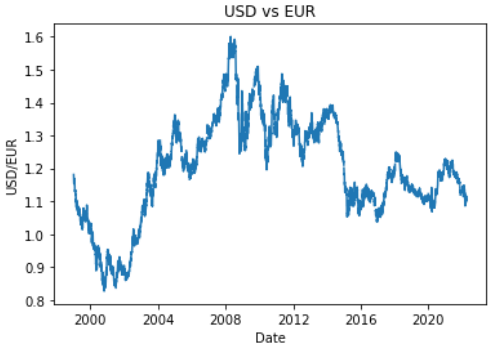
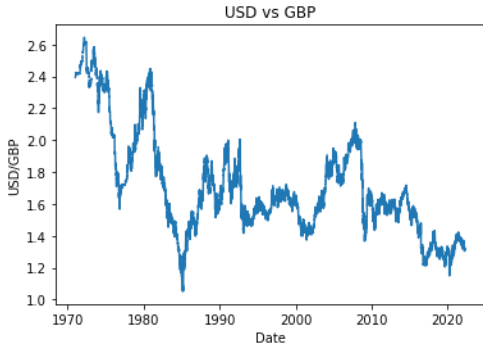
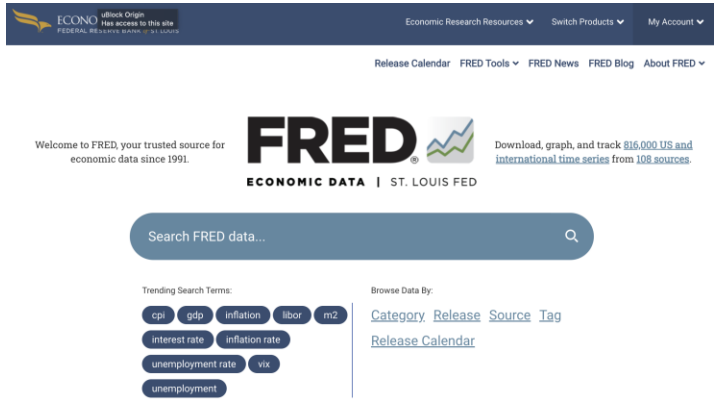






PROBLEM STATEMENT

- The currency exchange rate is one of the most important determinants of a country's relative level of economic health.
- The foreign exchange or forex market is the largest financial market in the world – larger even than the stock market, with a daily volume of $6.6 trillion.
- Market participants use foreign exchange contracts to hedge against international currency and interest rate risk, speculate on geopolitical events, and diversify portfolios, among several other reasons.
- The forex market is volatile in nature which adds complexity to the forecasting process. The ability to accurately forecast potential future market movement is crucial in shaping hedging, trading strategies, and managing exposure.
- This project presents the application of Hidden Markov Model and Mixture Models as forecasting tools for the prediction of changes in the foreign exchange rate of the US dollar with major currencies.



DATA SOURCES

- FRED – Federal Reserve Economic Data
  - Macroeconomic indicators
    - GDP
    - Stock index prices
- Bloomberg Terminal
  - Foreign Exchange Prices
  - Commodity prices

METHODOLOGY

- Hidden Markov Models
  - The measure of exchange rate changes will be considered the hidden state.
  - We use Baum-Welch to calibrate the parameters of the transition matrix.
  - The transition matrix estimated is used to predict the exchange rates one time period forward.
- Gaussian Mixture Models
  - The parameters for the mixture models are estimated using the Expectation-Maximization algorithm.

THANK YOU