Time Series Clustering & Characterization
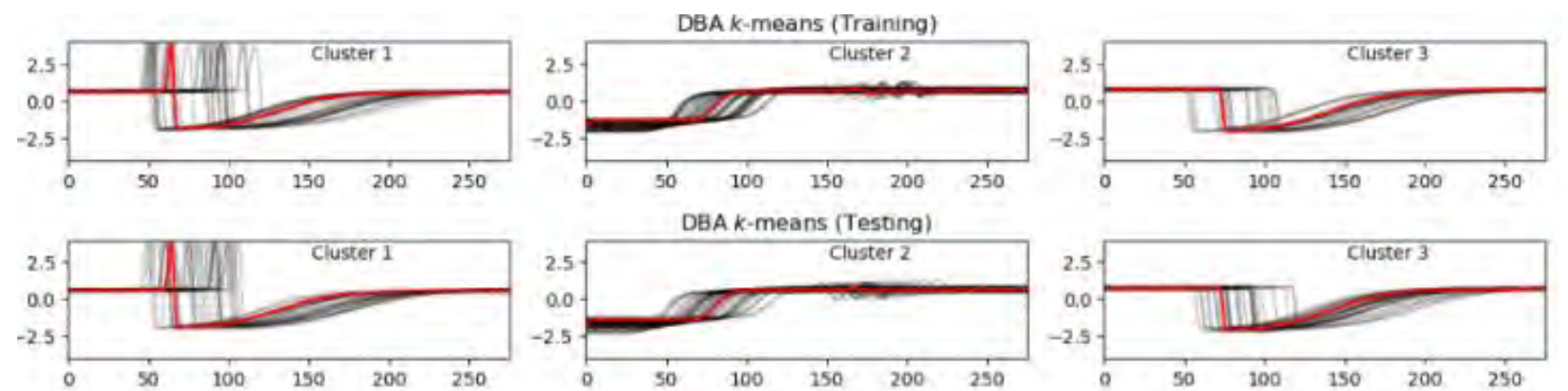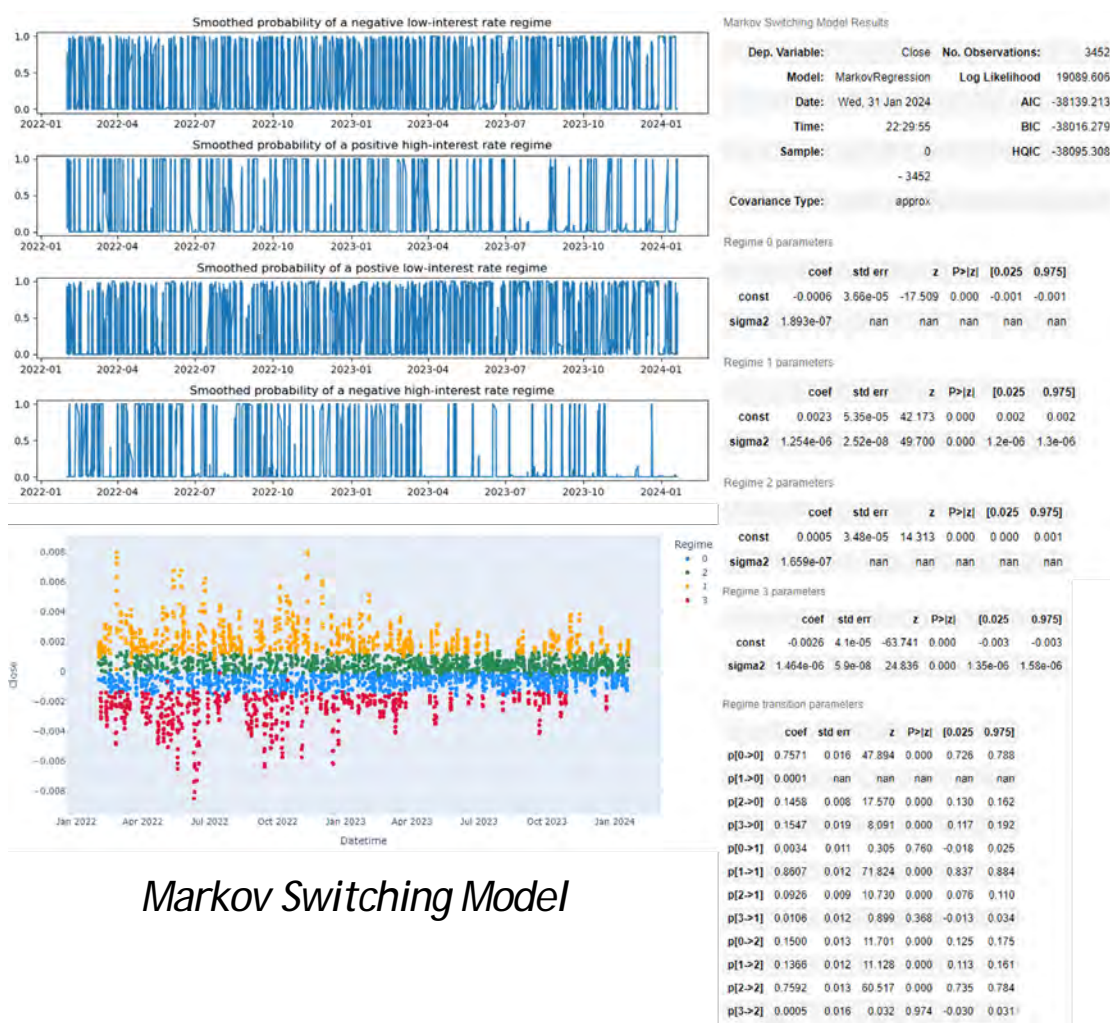## of Financial Time Series for Market Regime Analysis

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Markov Switching Model

Cluster Results of Trace Dataset

Cluster Results of SP500

Project Objectives:

Among the vast volumes of data generated daily in our modern digital world, time series data represents a major category with broad applicability. Time series clustering is a specific branch of time series analysis that plays a pivotal role in grouping time series into homogeneous clusters based on their temporal trends and underlying characteristics. I have chosen to explore the clustering of financial time series for market regime analysis, recognizing it as one of the lesser-known yet compelling applications of clustering. Even in modern wealth management funds, it plays a crucial role in guiding key investment decisions and portfolio rebalancing as market conditions change. The applicability of regime analysis extends to diverse industries such as environmental science, engineering, healthcare, politics, and the social sciences.
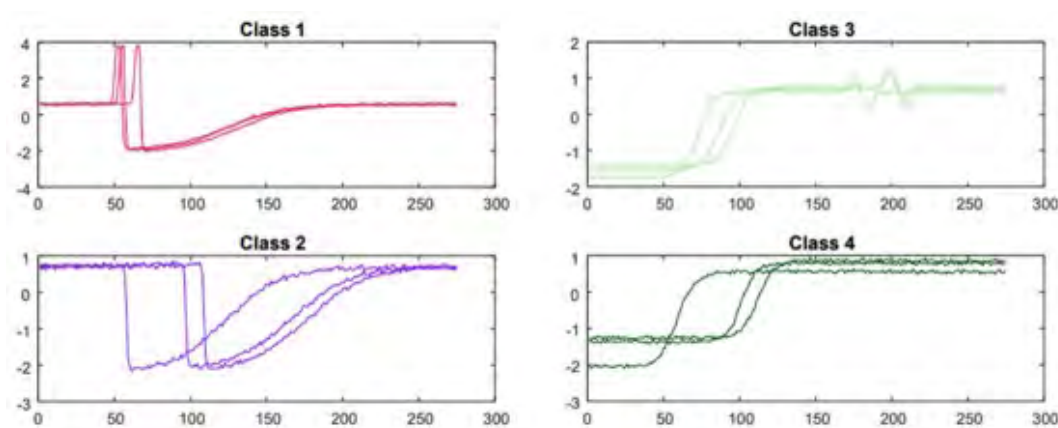
Experiments are conducted on a synthetic data and real-world SP500 asset prices

UCR Trace Dataset

Past 2 years of SP500

3 Types of Clustering Algorithms were evaluated

Shape-Based   **Feature-Based**   **Model-Based**
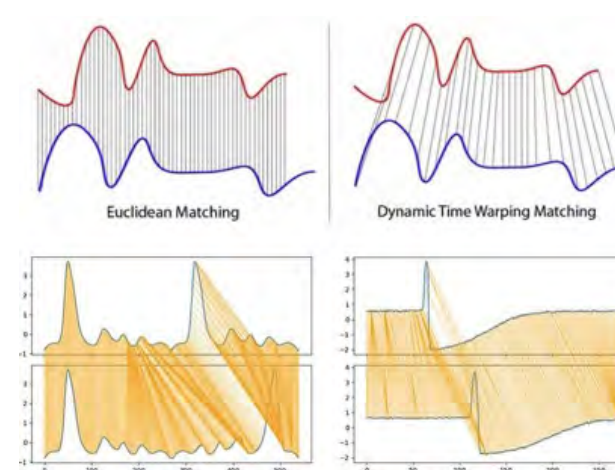
Dynamic Time Warping

PCA Analysis