

**DATA MINING**

**Project**

**Name:** Shaaban Abdullah, Muhammad Junaid Zafar

**Roll No:** 21I-1722, 21I-2690

**Section:** DS-M

**Comprehensive Forecasting System with User Interface for Multiple Sectors**

**Objective:**

The main objective of this project is to develop a forecasting system that not only implements and compares different time series models but also includes a user-friendly front-end interface for visualizing data and forecasts. The system will cater to multiple sectors, including finance, energy, and environmental sectors, providing valuable insights and forecasts to stakeholders.

**Data Sources and Preprocessing:**

The project utilizes data of monthly stock prices from the S&P 500 index for the finance sector The data undergoes preprocessing steps such as cleaning, normalization/standardization, and stationarization to ensure its quality and suitability for modeling.

**Tools and Technologies:**

The system is built using Python for backend development.The frontend is developed using ReactJS for building a dynamic and responsive user interface, coupled with HTML/CSS for layout and styling. Data science tools such as Pandas, NumPy, Matplotlib, Seaborn, Statsmodels, and TensorFlow/Keras are used for data analysis and modeling. SQLite is used for storing processed data and results, enabling quick retrieval for visualization. Git is used for code management and version control.

**Model Development:**

The system implements and compares different time series models, including ARIMA, ANN, Hybrid ARIMA-ANN, SARIMA, Exponential Smoothing (ETS), Prophet, Support Vector Regression (SVR), and Long Short-Term Memory (LSTM). Each model is configured, tuned, and trained using appropriate techniques and algorithms to provide accurate forecasts for the respective sectors.

**Hybrid Models Integration:**

The system integrates ARIMA and ANN models to leverage the strengths of both approaches. The forecast results from the ARIMA model are used as input features to the ANN, which then models the residuals, enhancing the overall forecast accuracy by handling residuals effectively.

**Frontend Development:**

The frontend interface is designed to be intuitive and user-friendly, allowing users to interact with the system easily. It includes interactive charts and graphs for visualizing data and forecasts, providing stakeholders with valuable insights into the forecasted trends and patterns.

**Conclusion:**

In conclusion, the comprehensive forecasting system developed in this project provides a valuable tool for businesses and organizations to make informed decisions based on accurate forecasts across multiple sectors. The system's user-friendly interface, coupled with its robust backend and accurate forecasting models, makes it an asset for stakeholders seeking to anticipate trends and plan effectively.

**Contribution:**

Junaid: Front-end, Database, Report and GitHub

Shaaban: Back-end(Model Training)

**Github:** https://github.com/Shaaban234/Data-Mining