



DAILY WORK
REPORT
TR-02

INFOWIZ

27 JUNE 2024

Day 20: Time Series Analysis Basics

Summary: Today, we delved into Time Series Analysis, a specialized field of data analysis focused on understanding and predicting patterns in sequential data points indexed by time. We explored fundamental concepts, techniques for data preprocessing, modeling approaches, and practical applications of time series analysis.

Key Learnings:

1. Introduction to Time Series:

- **Definition:** Defined time series as a sequence of data points collected at regular intervals over time, where each data point represents observations in chronological order.
- **Characteristics:** Discussed key characteristics of time series data, including trend (long-term movement), seasonality (repeating patterns), and noise (random fluctuations).

2. Time Series Components:

- **Trend Analysis:** Analyzed trends in time series data to identify long-term changes or patterns, distinguishing between upward, downward, and stationary trends.
- **Seasonality and Decomposition:** Explored seasonal patterns within time series data, using decomposition methods (e.g., additive and multiplicative decomposition) to isolate trend, seasonal, and residual components.

3. Data Preprocessing for Time Series:

- **Handling Missing Values:** Addressed methods for handling missing data points in time series, such as interpolation or forward/backward filling.
- **Normalization and Scaling:** Normalized time series data to ensure consistent scale across different features, facilitating accurate model training and comparison.

4. Modeling Approaches:

- **Traditional Methods:** Introduced traditional time series models like Autoregressive Integrated Moving Average (ARIMA) and Seasonal ARIMA (SARIMA) for forecasting based on historical patterns and trends.
- **Machine Learning Techniques:** Explored machine learning approaches such as Recurrent Neural Networks (RNNs) and Long Short-Term Memory networks (LSTMs) for capturing complex temporal dependencies in data.

5. Practical Application:

- Applied time series analysis techniques to real-world datasets, such as forecasting stock prices, predicting sales trends, or analyzing seasonal patterns in weather data.
- Implemented time series models using Python libraries like statsmodels, TensorFlow, or PyTorch, evaluating model performance based on forecasting accuracy and error metrics.

Today's session provided a foundational understanding of time series analysis, equipping us with essential techniques to analyze and forecast temporal data patterns effectively. The exploration of time series components and modeling approaches prepares us for applying advanced forecasting methods and handling diverse time-dependent datasets in future projects.

