**Traffic Data Analysis and Forecasting**

**Overview**

This project provides an in-depth analysis and forecasting model for traffic data using various statistical methods and machine learning techniques. The code is organized into a Jupyter notebook that includes data loading, exploratory data analysis (EDA), statistical testing, model building, and forecasting.

**Features**

* **Data Loading**: Load traffic data from a CSV file.
* **Data Cleaning and Preprocessing**: Convert timestamps, remove unnecessary columns, and prepare data for analysis.
* **Exploratory Data Analysis (EDA)**: Visualize the trends and seasonal variations in traffic data.
* **Statistical Decomposition**: Decompose the time series into observed, trend, seasonal, and residual components.
* **Autocorrelation Analysis**: Analyze autocorrelation to understand the dependencies in the data.
* **Model Building**: Build and evaluate ARIMA and SARIMAX models for time series forecasting.
* **Forecasting**: Forecast future traffic trends and visualize the predictions.

**Prerequisites**

* Python 3.x
* Pandas
* NumPy
* Matplotlib
* Seaborn
* Statsmodels
* PyTorch (Optional, if using neural networks)

**Installation**

To set up your local environment to run this notebook, follow these steps:

1. Clone the repository:

bash

 git clone <repository-url>

 Install the required packages:

bash

 pip install pandas numpy matplotlib seaborn statsmodels torch

 Open the Jupyter Notebook:

bash

1. jupyter notebook traffic.ipynb

**Usage**

After installing the necessary packages and opening the notebook, you can run each cell sequentially to load the data, perform analysis, and generate forecasts. Adjust the parameters in the ARIMA and SARIMAX models as needed to fit different datasets or improve the model's accuracy.

**Contributing**

Contributions to this project are welcome. Please feel free to fork the repository, make improvements, and submit pull requests.

**License**

This project is open-sourced under the MIT license.