**TECHNICAL REPORT ON CHOSEN ALGORITHM:**

### Problem Overview

The problem at hand involves forecasting a time series related to **local route traffic**. The dataset provided includes features such as the traffic volume on specific routes over time, indicators like **peak service**, whether it is a **weekend**, and the **monthly trend** of the data. The task is to predict the traffic volume for future days, which is essential for optimizing route planning, resource allocation, and enhancing operational efficiency.

**MODEL USED: SARIMAX**

SARIMAX is an extension of ARIMA model which is more effective for seasonal forecasting.  
The SARIMAX model was applied to the dataset by following these steps:

1. **Preprocessing**: The dataset was cleaned and processed to ensure it was ready for modeling. This included handling missing values, transforming the data into a time series format, and ensuring the time-based features were properly indexed.
2. **Feature Engineering**: External variables such as **weekend** indicators, **monthly trends**, and **peak service levels** were included as exogenous variables in the model. These features were crucial for predicting traffic volume more accurately.

· **Model Selection**:The AR, I, and MA parameters were chosen based on the data's autocorrelation patterns, typically using autocorrelation function (ACF) and partial autocorrelation function (PACF) plots.

* The seasonal parameters (P, D, Q) were selected based on the periodicity of the data. For example, if weekly patterns are present, the seasonal period was set to 7 (indicating weekly seasonality).

· **Model Fitting**: The SARIMAX model was trained using the past traffic data and external features. The training process involved optimizing the parameters to minimize prediction errors.

· **Forecasting**: After training, the model was used to predict future traffic volumes, incorporating both historical data and exogenous variables like the weekend indicator and peak service levels.