Demand Forecasting:

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Problem Statement

ABC is a car rental company based out of Bangalore. It rents cars for both in and out stations at affordable prices. The users can rent different types of cars like Sedans, Hatchbacks, SUVs and MUVs, Minivans and so on.

In recent times, the demand for cars is on the rise. As a result, the company would like to tackle the problem of supply and demand. The ultimate goal of the company is to strike the balance between the supply and demand inorder to meet the user expectations.

The company has collected the details of each rental. Based on the past data, the company would like to forecast the demand of car rentals on an hourly basis.

Objective

The main objective of the problem is to develop the machine learning approach to forecast the demand of car rentals on an hourly basis.
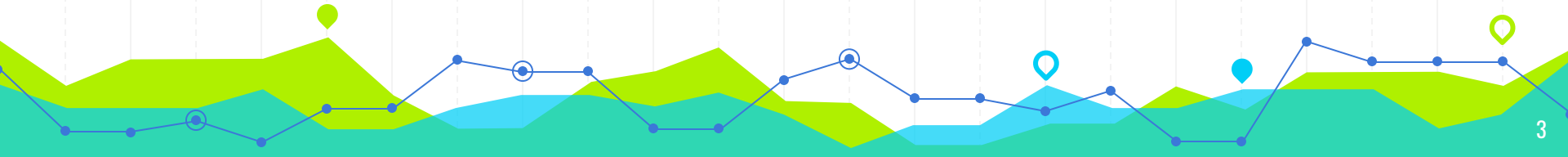
Approach used

The dataset contains information on the date , hour and demand for cars.

After initial data inspection, following are the done before feeding data into model.

- ◉   Date and hour has been typecast into datetime format and joined together for feature engineering.
- ◉   Upsampled the datetime index into Hourly basis and forward fill the values
- ◉   To handle Outliers, whisker value is found and replaced outliers above whisker values with forward-fill method.
- ◉   Features like year, quarter, month, week, day, hour, dayofyear, weekday are extracted datetime column.
- ◉   I used Tuned RandomForestRegressor algorithm to train the model and generated demand forecast on hourly basis for 1 year.

Data Preprocessing & Features worked

- Target Encoding is done to generate additional features like Monthly_average, weekly_average and day_average.

- The Features like year, hour, Monthly_average, _week_average, day_average shows high feature coefficient value and gives more information into the model

- During EDA, and Time series decomposition, daily seasonality was inferred.

Final Model & Prediction

After trying Simple moving average, Weighted Moving average ,Exponential smoothing methods, ARIMA, SARIMA, Prophet, Linear Regression, and Random forest,

Random forest with n_estimator =150, Max_depth= 6, , min_samples_split =20
 gives the lowest RMSE score.

Later forecast is made for next 1 year starting from 1/03/2021 to 28/03/2022 and submission file is populated.

Thank you.