Airline Demand Forecasting
Summary

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Objective:

Demand forecasting is a critical portion of airline revenue management and has a great impact on the revenue. The goal is to use the advance booking method including the additive and multiplicative models to reduce the MASE (Mean Absolute Scaled Error) of our forecast for an increased forecasting accuracy compare to naïve forecast model. All models will take the input of Training and Validation Data. Our AirlineForecast function will give out the lowest MASE value calculated from all models with its respective final demand forecast table.

Additive and Rolling Median Additive Models

For our base Additive model, we use the median of remaining bookings corresponding to the days prior to the departure date, and the days of the week from our Training Data to add to the current cumulative bookings (cum_bookings) of the Validation Data to calculate forecast final demand. The advantages of using the median instead of mean is that we can ignore the outliers and allow us to exclude the extreme values in the data, that otherwise would strongly affect the mean.

We observed that the forecasted value from this base model is fluctuated a lot throughout the time, specially we see a spike in booking on the last 7 days before departure date.

Thus, we extended our model to the rolling median additive model by getting 21 days rolling median of forecast final demand from the base model.

Multiplicative and Rolling Median Multiplicative Models

The simple Multiplicative model takes average of current booking to final booking percentage (cum_booking/final_booking) corresponding to days prior and day of the week from Training Data. To get the forecast final demand we use current cumulative booking (cum_booking) from Validation Data divide by current booking percentage (calculated from Training Data).

We then extended our multiplicative model by using rolling median method similar to above approach on to the additive model.

Outcome/Results

Initially, our base additive model MASE value was 65.45%. With the extended model (rolling median additive model), we reduced the MASE value to 59.82%. Using the rolling median method, we also reduced MASE for Multiplicative Model from 97% to 82.38%. It is important to mention, that this model accuracy will vary depends on the datasets provide. Results must be validated over time.