

FORECASTING ANALYTICS

**“Forecast daily demand for a month
in the top region
in terms of origination of bookings”**

Section A, Team 8:

Ankit Kansal

Garrett Butler

Rahul Gupta

Shruti Jain

Vikram Deshpande

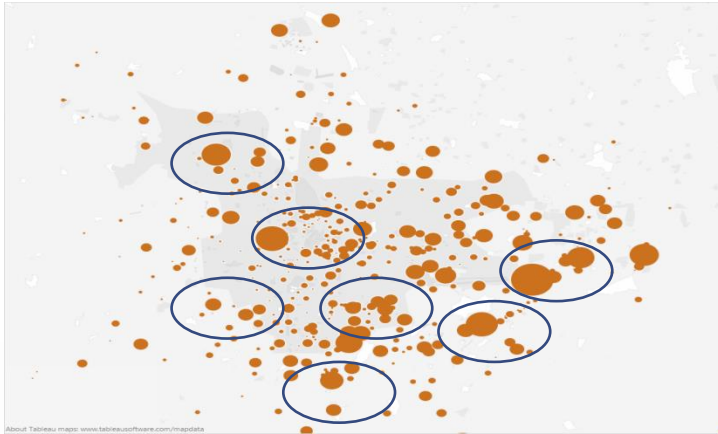
Business Objective

To predict the future demand from the top region in the city of Bangalore which will help manage capacity allocation and develop new vendor relationships which are critical to yourcabs' business model.

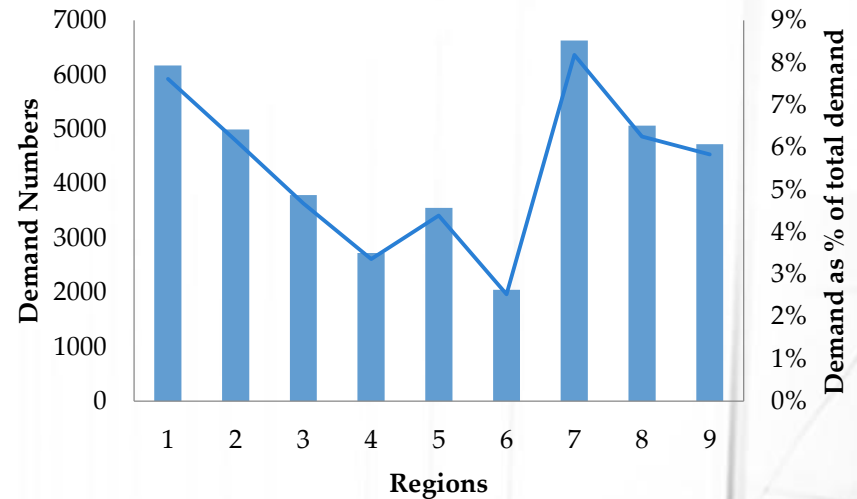
Forecasting Goal

- To forecast the daily number of total bookings for *yourcabs* from the city of Bangalore and then use it to forecast the demand from the top region in terms of bookings
- Our time horizon for forecasting the selected series is 4 weeks and the level of granularity is daily data, which we think will provide suitable time to *yourcabs* to manage regional capacity and manage its vendor relationships.

Region definition



- Divided the city into 9 regions based on concentration of demand numbers
- Each region was assumed to be around 5 km in diameter



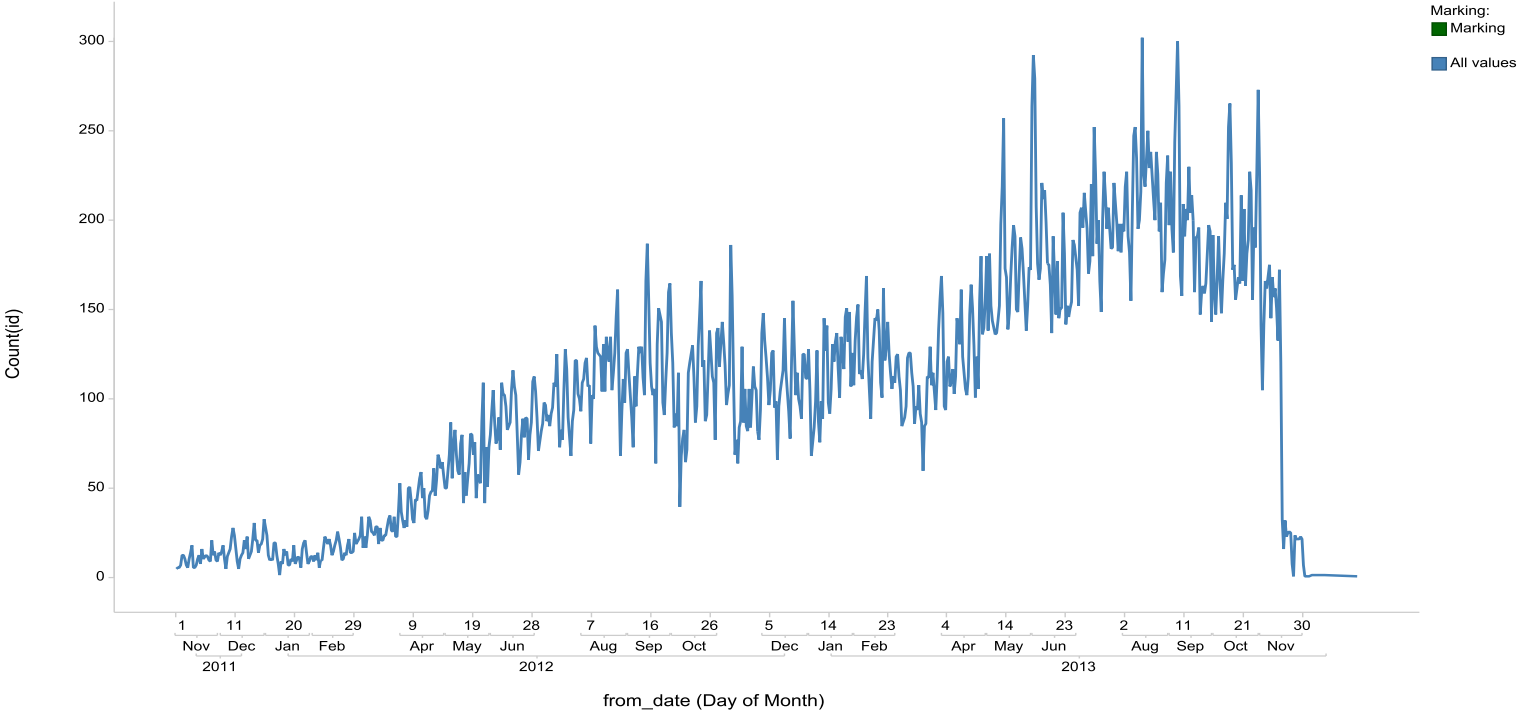
- Identified the region with highest ratio of total demand
- Both 1 and 7 have close demand ratios
- We have picked Region 1 (Airport area) for the regional demand forecast

Time-Series Analyzed

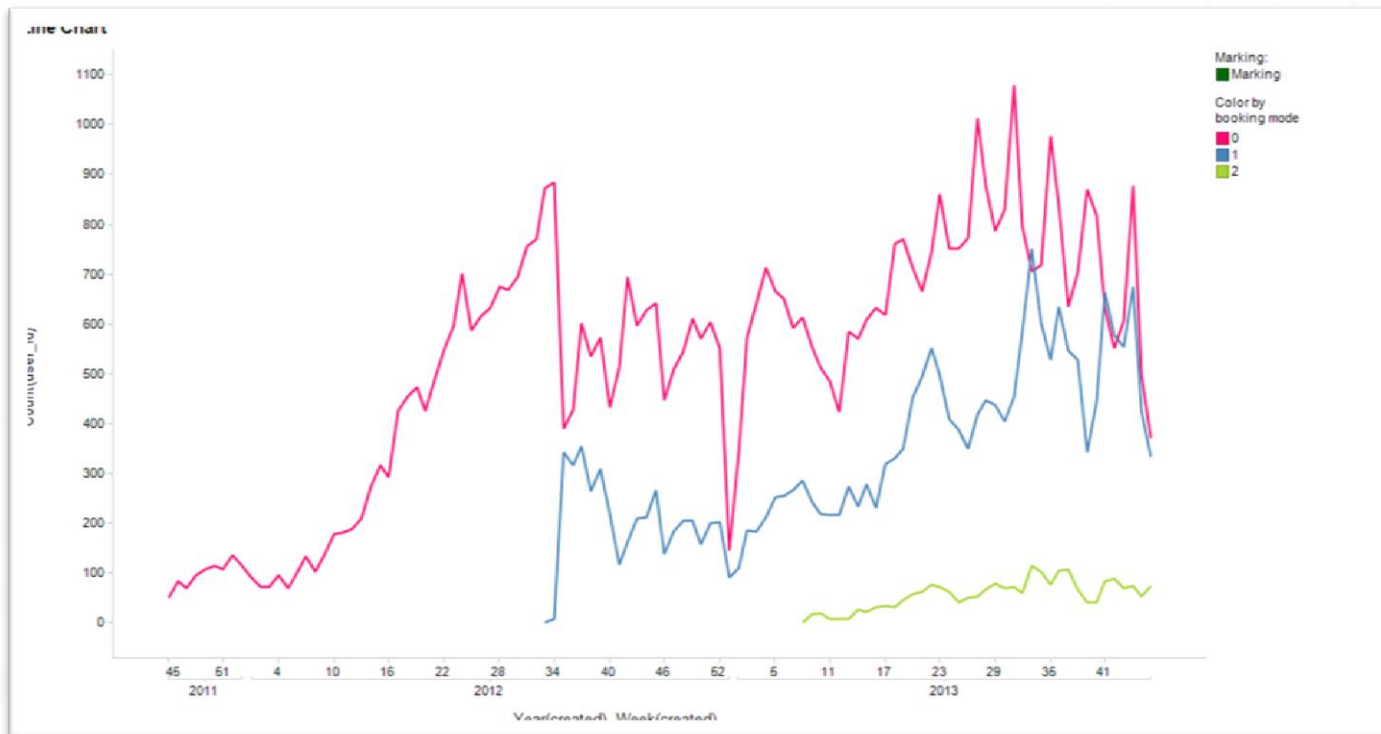
1. Total Demand (D)
2. Demand through phone bookings (P)
3. Demand through online site (O)
4. Demand through mobile site (M)
5. Ratio of demand D1 in the top demand region to the total demand D witnessed by *yourcabs* (R1)

Total demand time plot

Line Chart

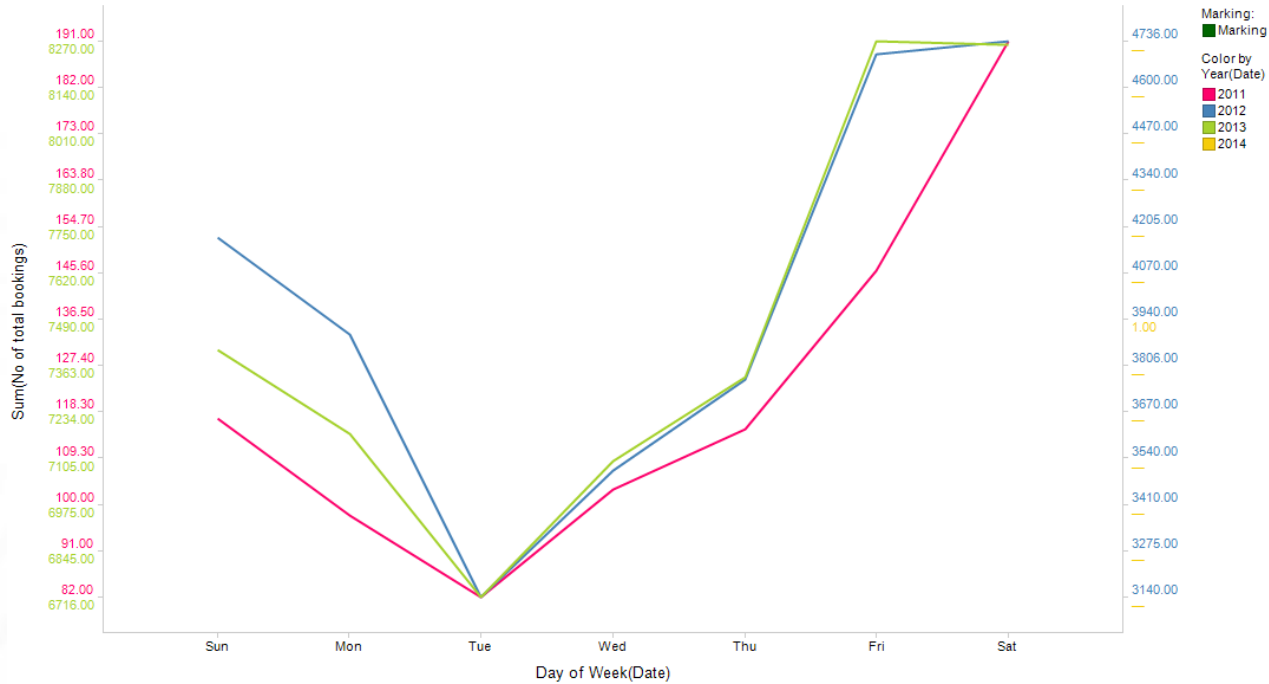


Booking from different modes (phone, online and mobile site)

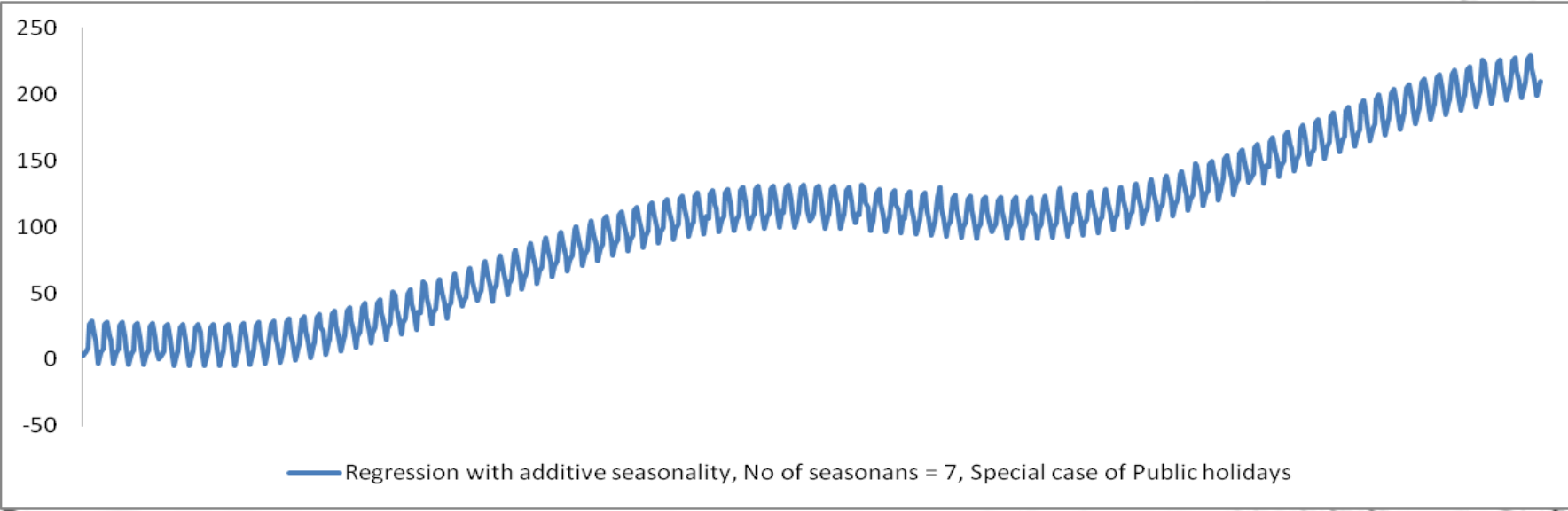
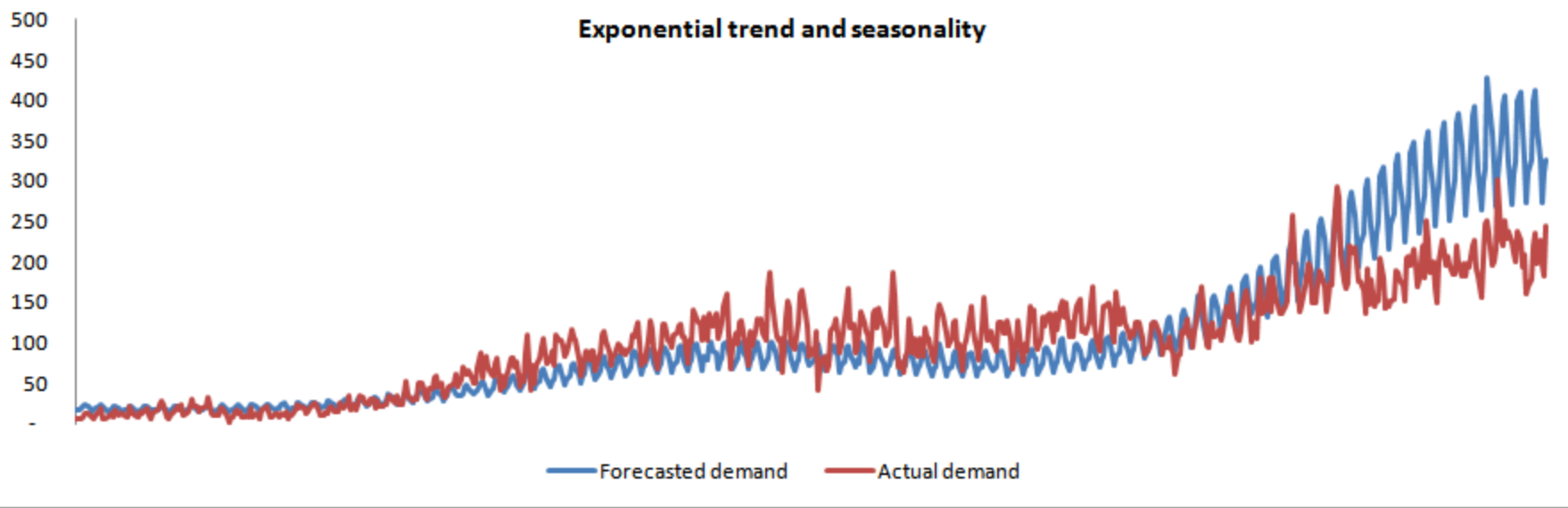


Weekly seasonality in total demand

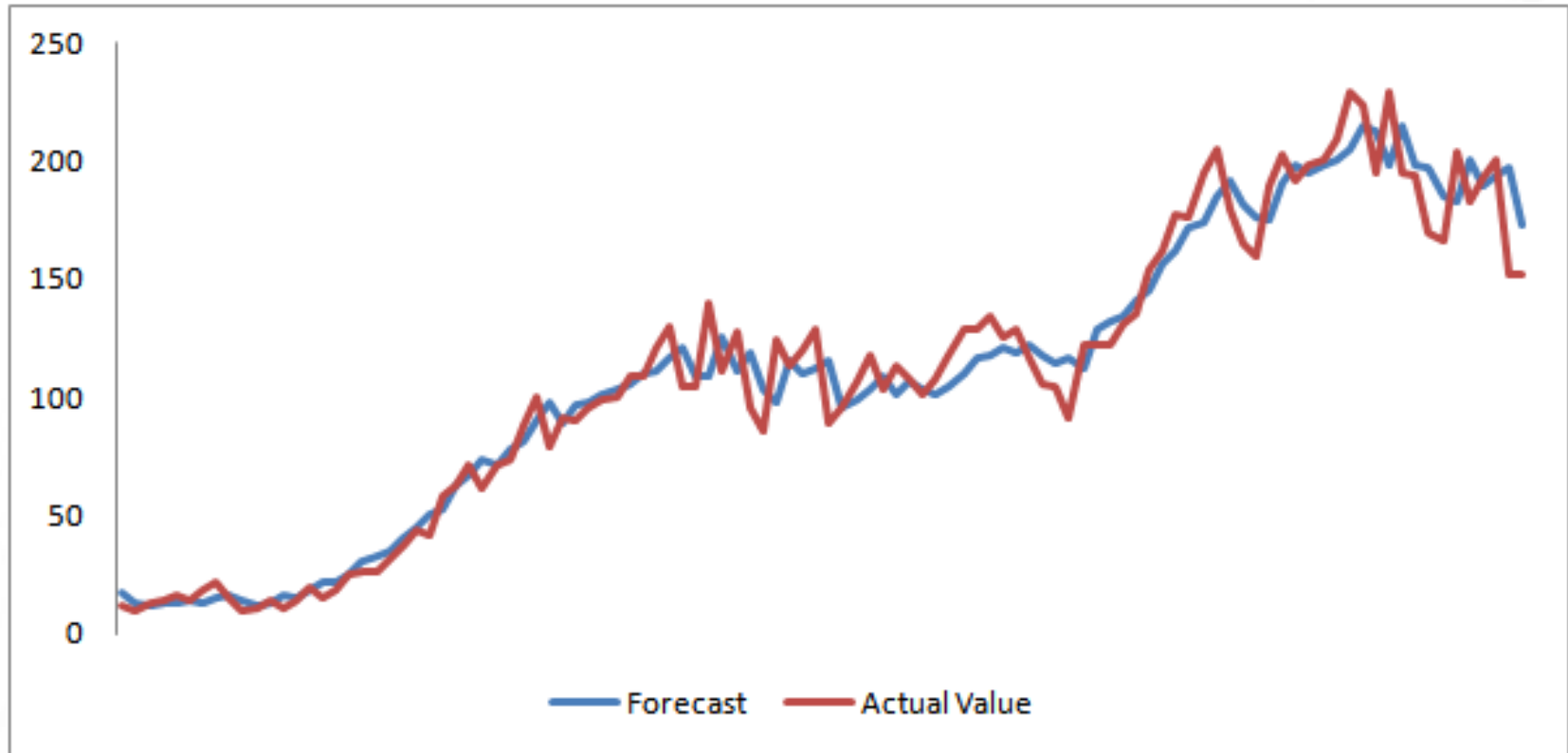
Line Chart



Exponential trend and seasonality



Forecasted vs actual total demand



Method

Naïve

Regression + AR(1)

Exponential Smoothing

Neural

MAPE

23%

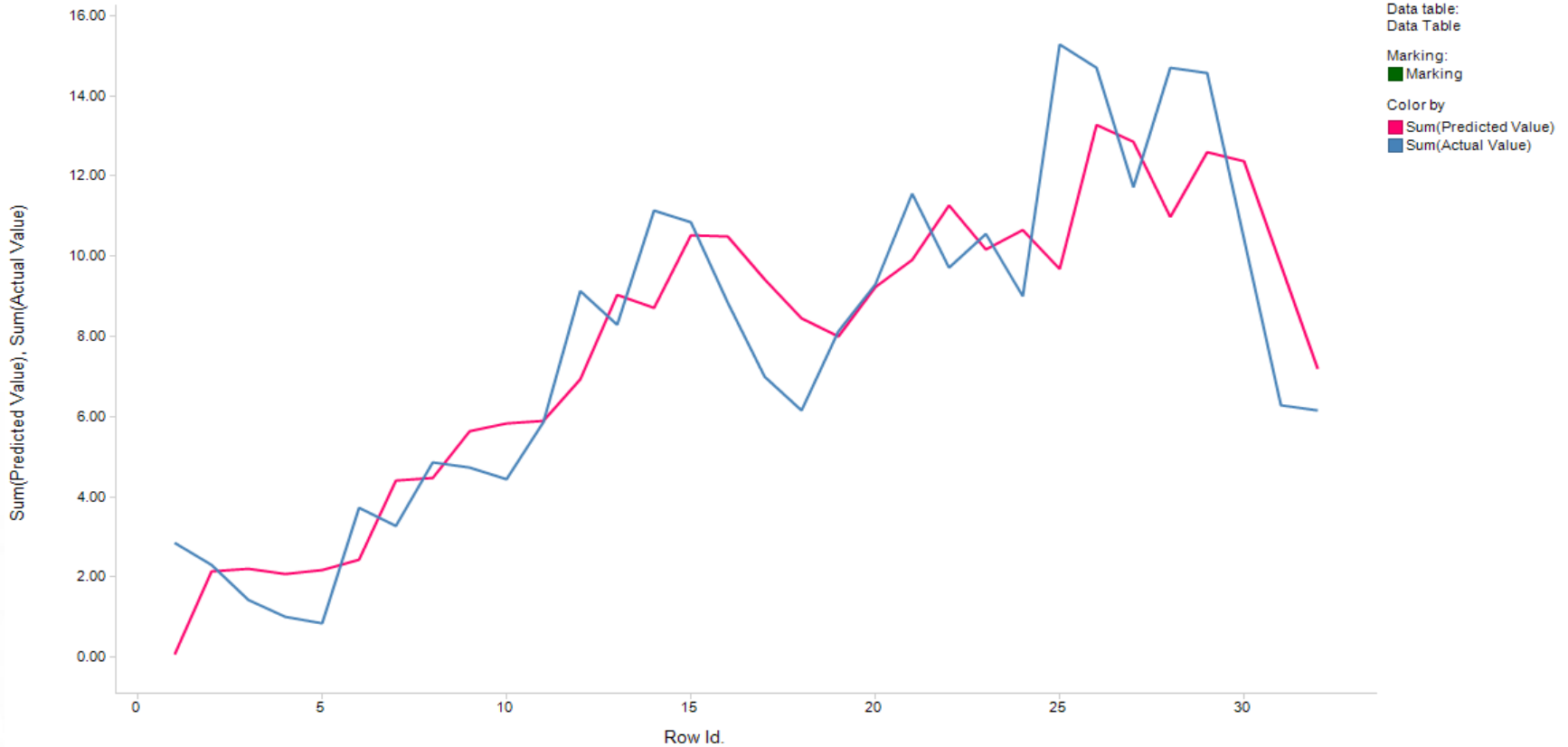
17%

28%

28%

Forecasted vs actual mobile site bookings

Line Chart



Forecasting method

Seasonal naïve

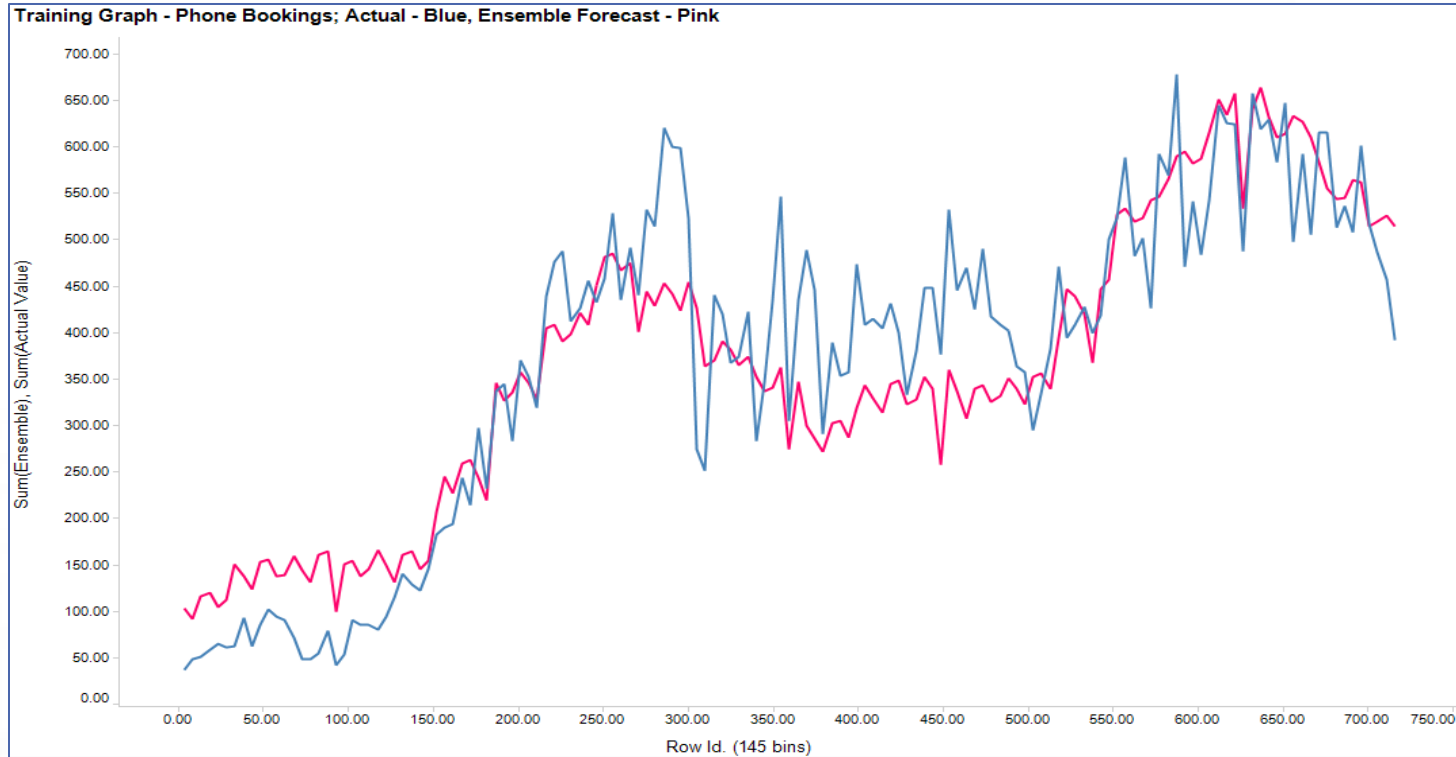
Regression + AR(1)

MAPE

66.07%

35%

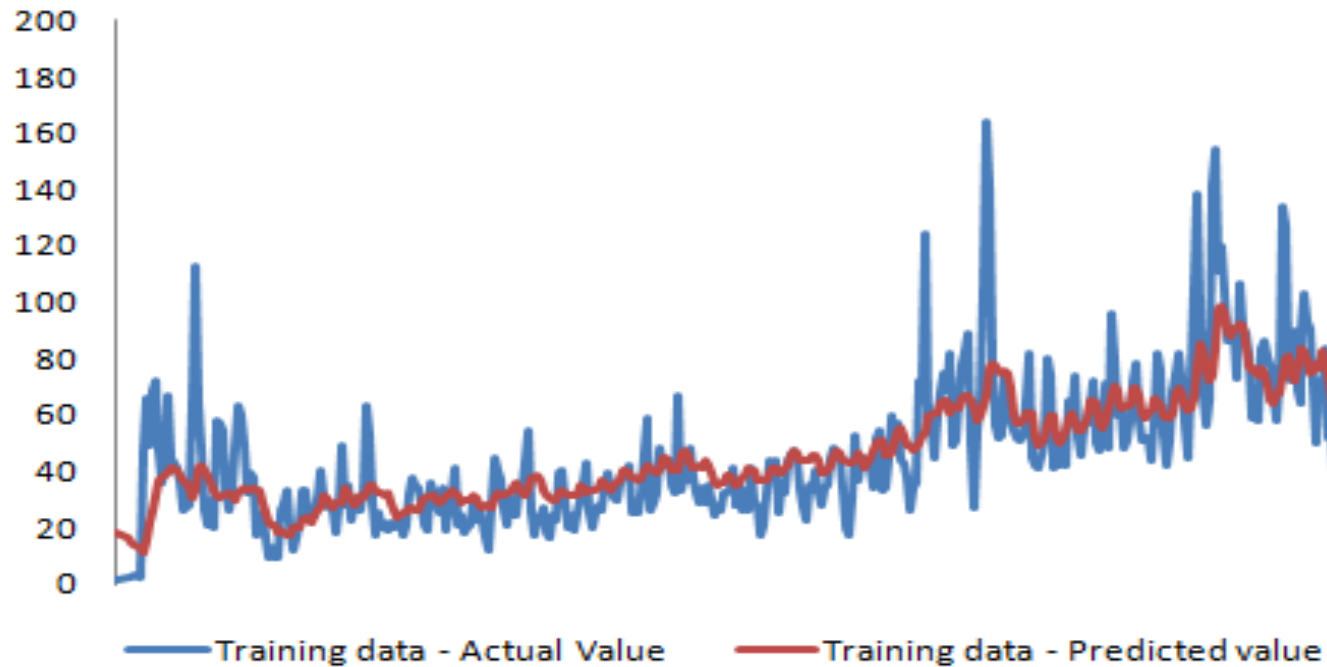
Forecasted vs actual phone bookings



Forecasting method
Ensemble –
70% lag_2, 30% NN

Ensemble RMSE	23.59835
Ensemble MAPE	26.09166
Naïve RMSE	33.26356
Naïve MAPE	30.91721

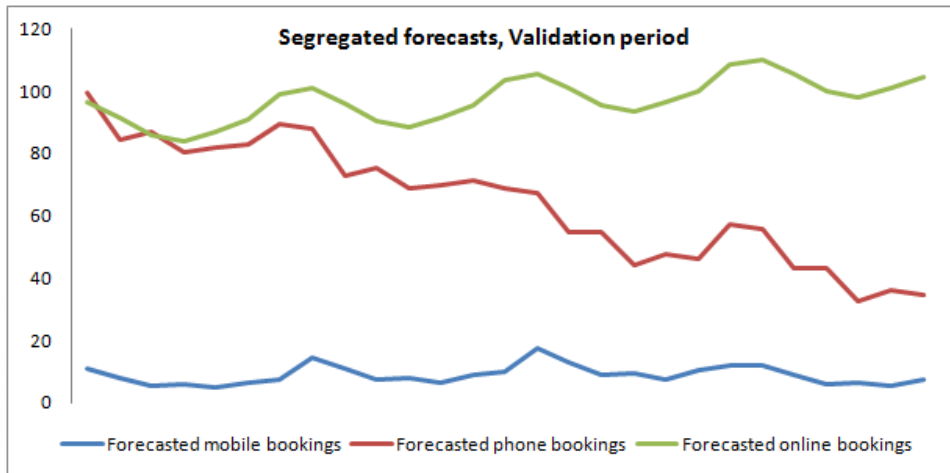
Forecasted vs actual online bookings



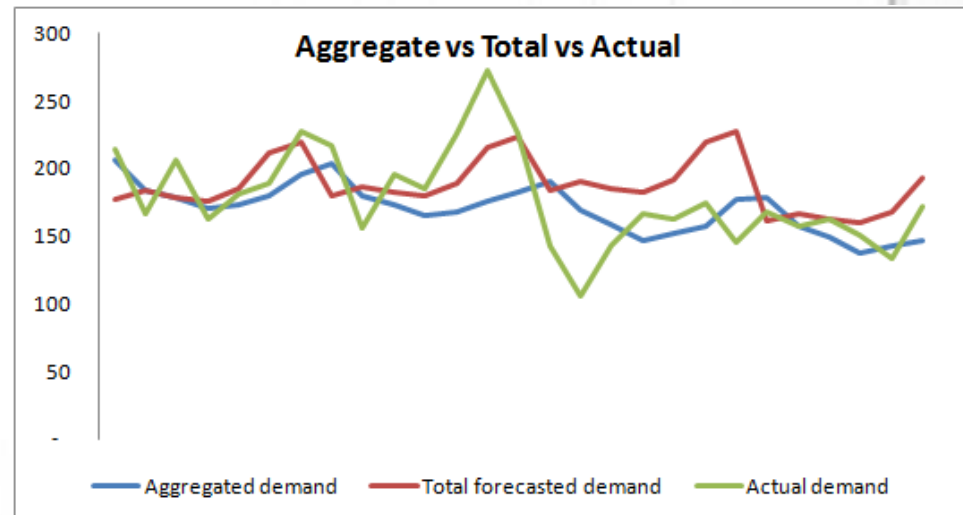
- Holt Winters model is used to capture the local minima and maxima; however, level remains high
- Regression is used to bring down the level
- Naïve model is lag 7

- RMSE Model - 35.01717248
- MAPE Model - 48.00089708
- RMSE Naïve -44.10863213
- MAPE Naïve 43.90495338

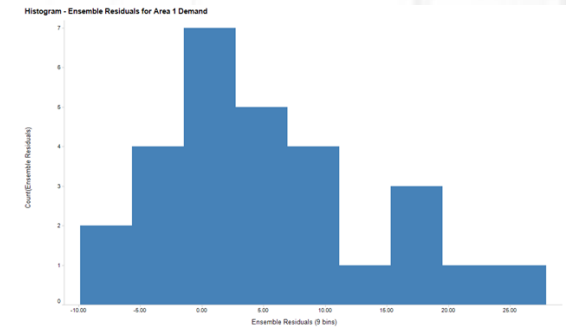
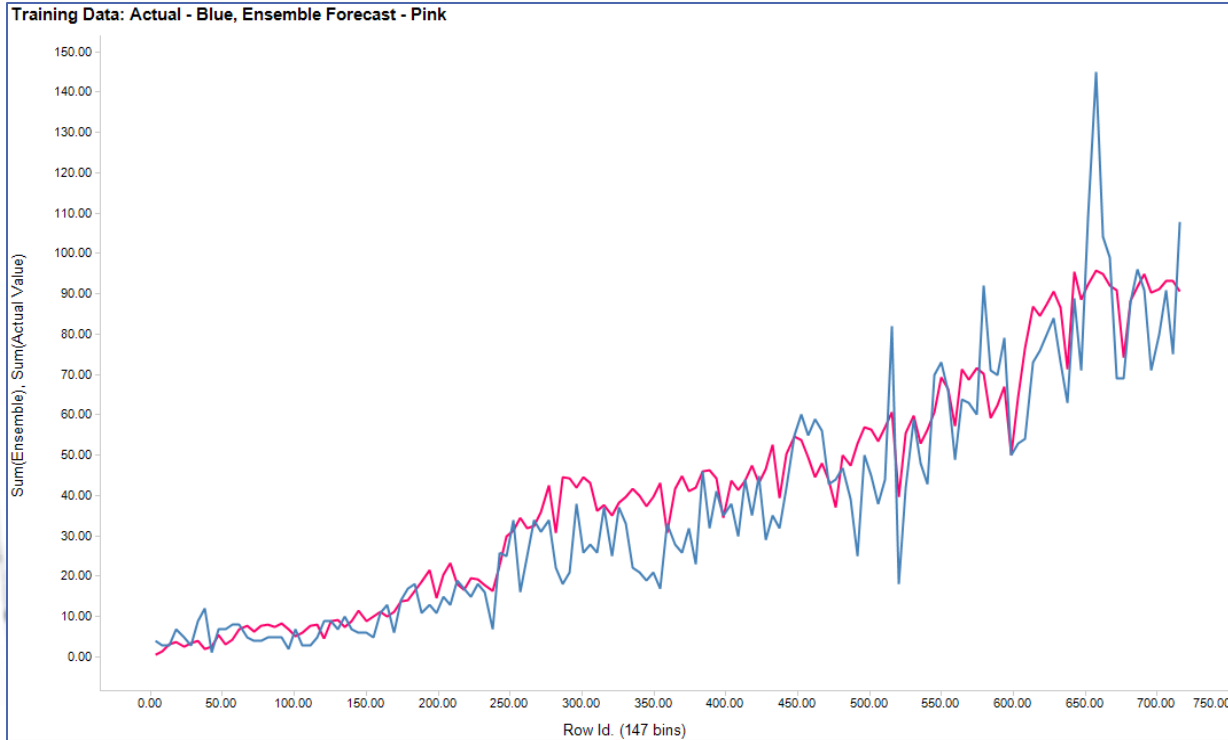
Total aggregated demand vs. total forecasted demand



	MAPE
Aggregate	14%
Total	17%



Region demand



Weighted RMSE **10.43509**

Weighted MAPE **89.12875**

Naïve RMSE **13.72693**

Naive MAPE **110.4779**

The background of the slide is a bright, overexposed photograph of a modern building's exterior. On the right side, there is a large window with a white frame. The rest of the image is mostly white and lacks detail due to overexposure.

Thank You