Forecasting AsiaYo's 1 month ahead Daily Room Occupancy in Different Cities for Supply Preparation

Team 1
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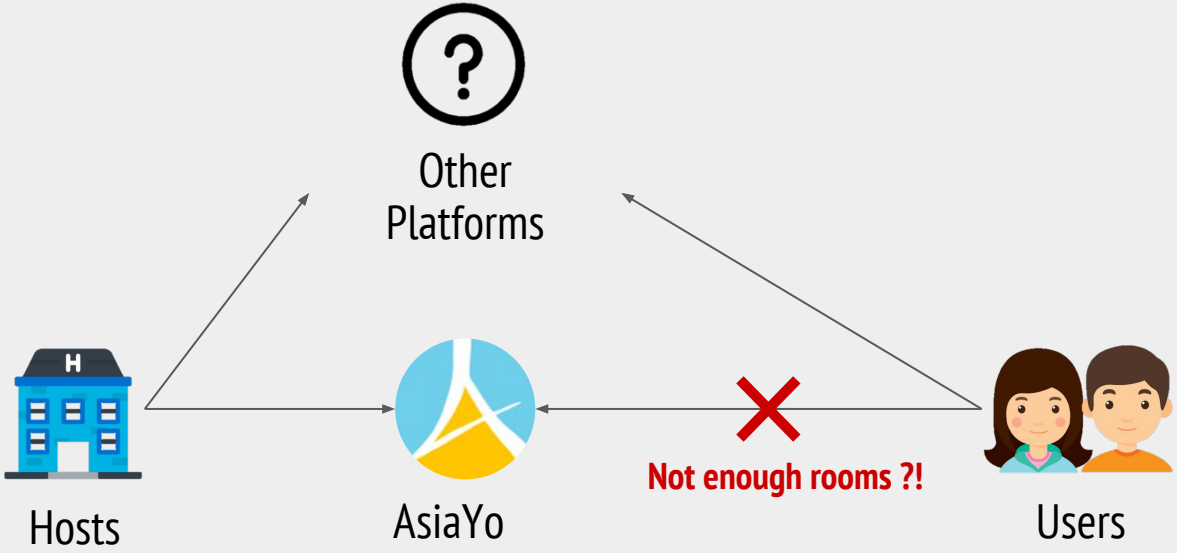
Business Problem

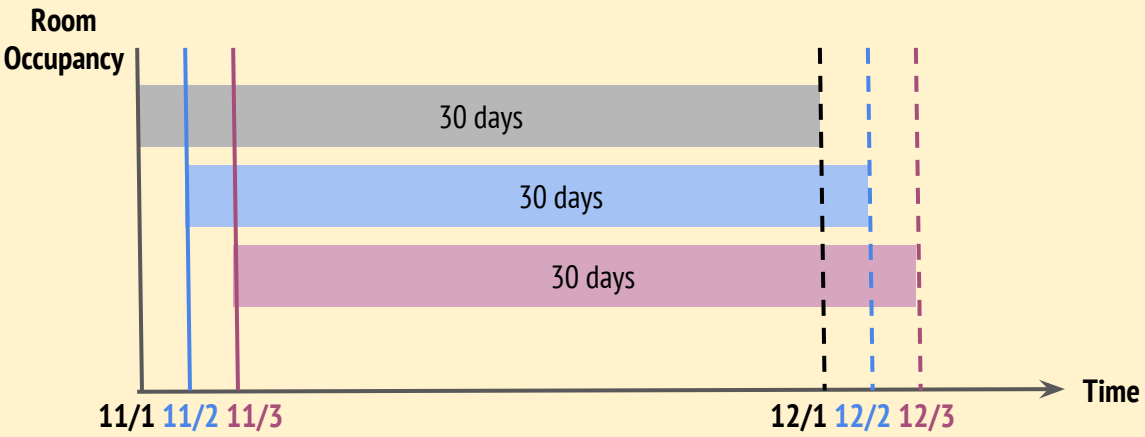


Especially on Holidays !!

Business & Forecasting Goal

Business Goal : Prepare for **supply deficiency** to prevent revenue losts
Client : COO, Operation Team
Opportunities : Supply preparation, Goal reference
Challenges : Not important or useful on ordinary days

Forecasting Goal: Forecast one month ahead Daily Room Occupancy in different cities



Data Description

AsiaYo

Booking Orders Data
2016/1/1 ~ 2017/12/31
(730 days)

Sum across all orders based on check-in & check-out dates

Room Occupancy Data
2016/1/1 ~ 2018/8/31
(973 days)

day	num
2016/1/3	2
2016/1/4	3
2016/1/5	2
2016/1/6	5
2016/1/7	2

order_date	o_no	country	city	check-in	check-out
2016/01/01	201601010001	Taiwan	Taipei City	2016/01/09	2016/01/10
2016/01/01	201601010002	Taiwan	New Taipei	2016/01/19	2016/01/20
2016/01/01	201601010003	Taiwan	Taipei City	2016/01/03	2016/01/04
2016/01/01	201601010005	Taiwan	Tainan City	2016/01/11	2016/01/12

Taiwan: 2016/5/20 ~ 2017/12/31
Japan : 2017/1/01 ~ 2017/12/31

Recalculate as 15/30/60 days before

Split by Country and City

DATA.GOV.TW API

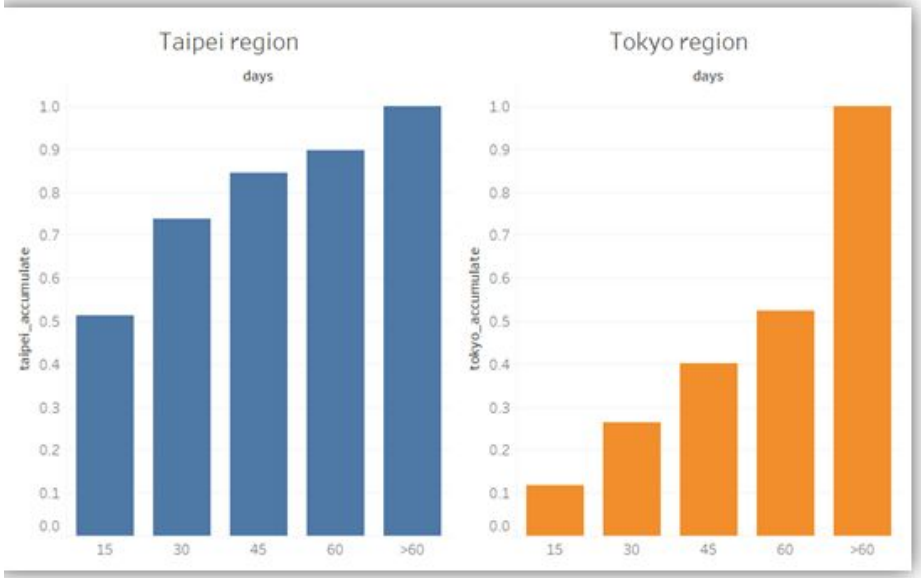
Taiwan Public Holidays Data

N days before ordered Data

Top 5 cities in Taiwan
Top 4 cities in Japan
9 Time series

Forecasts

Data Exploration



Methods

✔ **Linear Regression**

Predictors : Trend + External Data

External Data :

- **Holidays (Taiwan / Japan)**
- **Sakura Season**
- **Sum of ordered rooms N days before (15, 30, 60 days)**

✖ **Smoothing**

✖ **Neural Net**

✖ **ARIMA**

Benchmark : SNaive (Last Year) 、SNaive (Last Month)

Prefer **Over-Forecast** than Under-Forecast

Evaluation :

✔ RMSE

✔ Time Plot

✔ Error Plot

Training Period :

Taiwan - 2016/5/20 ~ 2017/11/1 (~12/1)

Japan - 2017/1/01 ~ 2017/11/1 (~12/1)

Validation Period :

Roll-Forward

2017/12/1~2017/12/31

Evaluations

RMSE among different cities (valid)

Taiwan

	Taipei	Yilian	Tainan	Taichung	Kaohsiung
RMSE 15	**27.98**	**12.21**	**9.66**	**25.04**	**7.14**
RMSE 30	55.97	25.87	29.95	83.13	10.50
RMSE 60	88.15	22.19	44.12	45.37	13.77

Japan

	Tokyo	Kyoto	Osaka	Fukuoka
RMSE 15	**2.25**	**0.79**	**3.94**	**0.57**
RMSE 30	5.62	1.39	4.64	0.62
RMSE 60	7.78	1.72	5.45	1.63

RMSE of Holiday & Not-Holiday days (valid)

Taipei

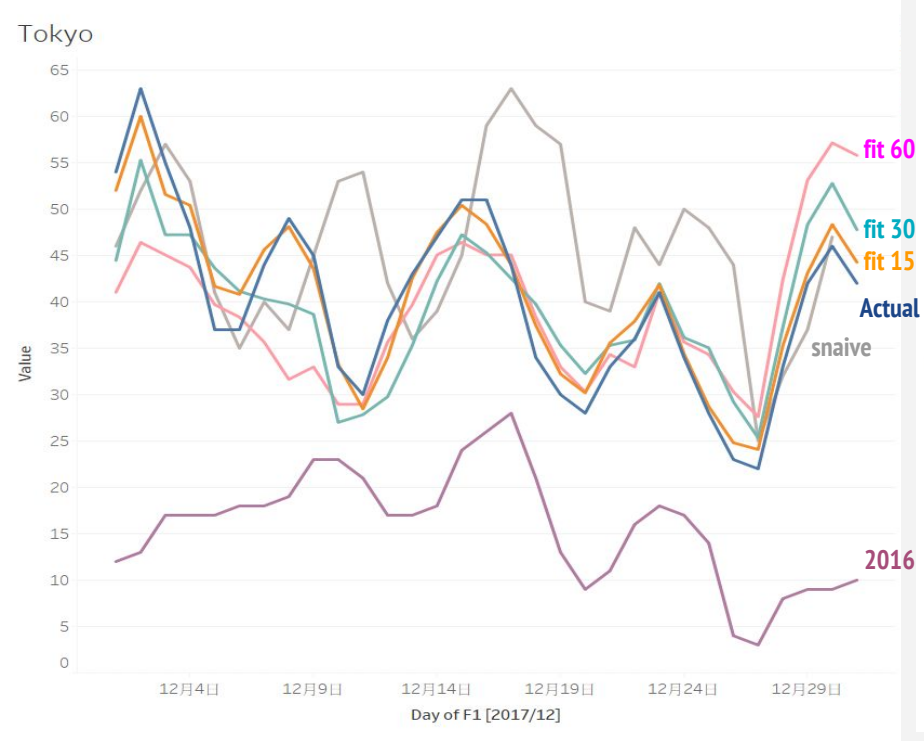
	Holiday	Not-Holiday
RMSE 15	18.43	12.96
RMSE 30	41.78	22.01
RMSE 60	86.84	29.14

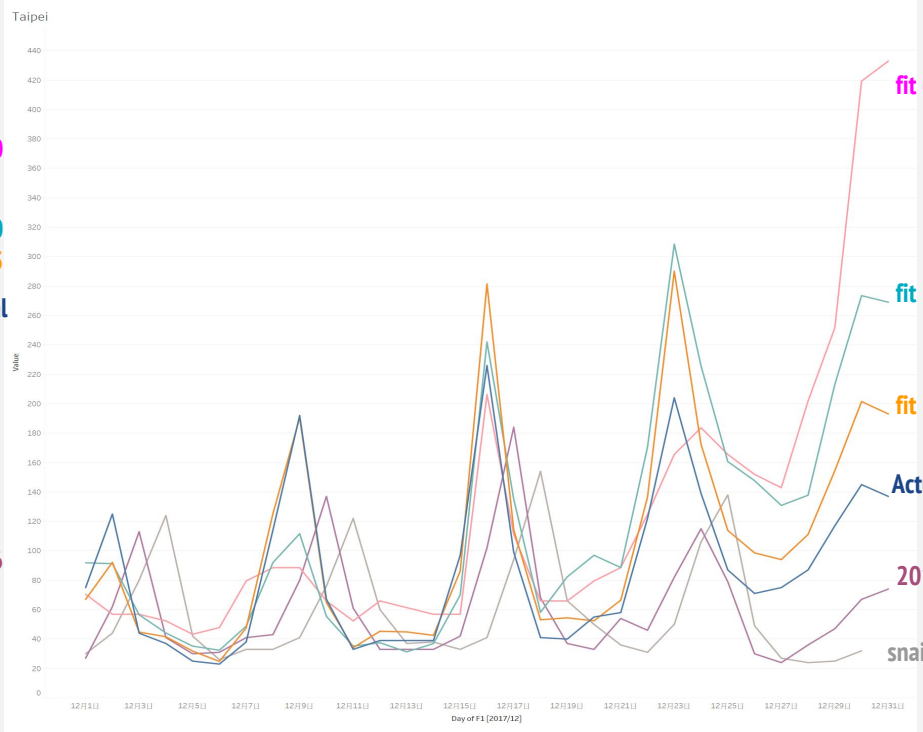
Tokyo

	Holiday	Not-Holiday
RMSE 15	2.55	2.16
RMSE 30	5.69	4.19
RMSE 60	9.34	7.40

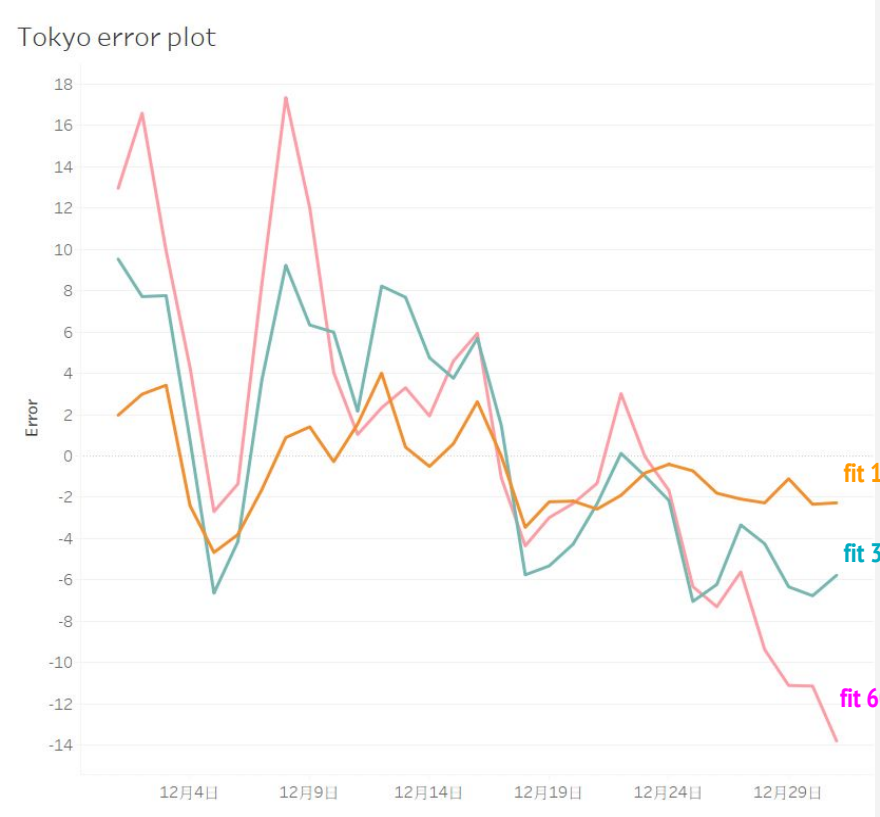
Evaluations

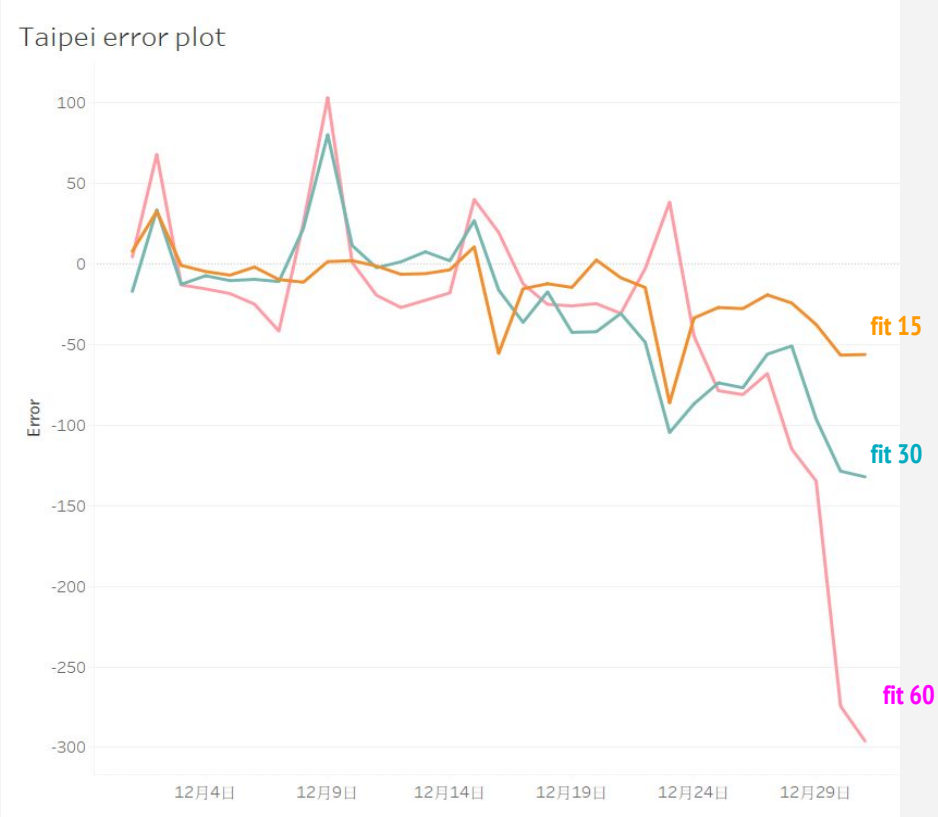
Time Plots of forecasted values (Validation Period, Roll-forward)





Evaluations





Results & Recommendations

- Under-Forecast on ordinary days

  Over-Forecast on Holidays
- Performance on holidays should be improved. (Real important period)
- Japan has better performance than Taiwan, due to different booking behaviors.

  ➔ Try different models for different countries

  ➔ Try Ensemble
- Manual adjustment on some non-official holidays