# HOW BUSY WILL MY RESTAURANT BE TOMORROW?

# FORECASTING THE DAILY NUMBER OF CUSTOMERS IN EACH RESTAURANT.

**BAFT GROUP 6**

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# GOAL

- **Business Goal**
  Let manager of each restaurant know how busy they will be tomorrow
- Client: Manager of the restaurant
- Stakeholder: iCHEF, Restaurants (owner, staff, customer)
- Challenge/Opportunity : daily job arrangement, Mental preparation

- **Forecasting Goal**
  Forecasting the daily number of customers in each restaurant
- Prospective
- (5 restaurants) * (Daily # of customers dine-in) = 5 series
- t = day ; k = 1
  yt : Daily number of dine-in customers in each restaurant

# DATA DESCRIPTION

- Source: iCHEF
- Measure :
  SUM(people), as.Date(timestamp)
- Time period :
- From 04/01/2016 to 10/31/2016: 2 restaurants - 7months
  From 05/04/2016 to 10/31/2016: 1 restaurant - 6months
  From 05/05/2016 to 10/31/2016: 1 restaurant - 6months
  From 07/18/2016 to 10/31/2016: 1 restaurant - 3months and a half
- Frequency of collecting data: Daily
- Pre-processing :
  (1) Remove “New opening days”
  (2) Missing values handling : use “last week” value

| timestamp | people |
|---|---|
| 2016-07-18 | 144 |
| 2016-07-19 | 137 |
| 2016-07-20 | 123 |
| 2016-07-21 | 163 |
| 2016-07-22 | 133 |
| 2016-07-23 | 182 |
| 2016-07-24 | 190 |
| 2016-07-25 | 109 |
| 2016-07-26 | 155 |
| 2016-07-27 | 110 |
| 2016-07-28 | 93 |

# METHODS

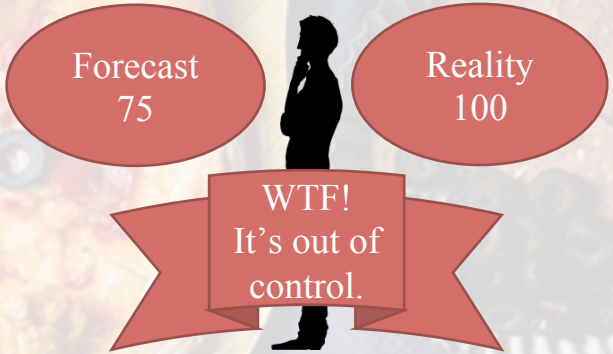
- Partition →Validation period : the last 28 days
- Seasonal naïve → as benchmark
- One day ahead roll forward
  - ✓Exponential smoothing
  - ✓Regression
  - ✓Neural network
  - ✓Ensemble

| Data Partition | Training Period | Validation Period |
|---|---|---|
| 1 | 5/16 – 10/3 | 10/4 |
| 2 | 5/16 – 10/4 | 10/5 |
| 3 | 5/16 – 10/5 | 10/6 |
| … | … | … |
| 28 | 5/16 – 10/30 | 10/31 |

# EVALUATION

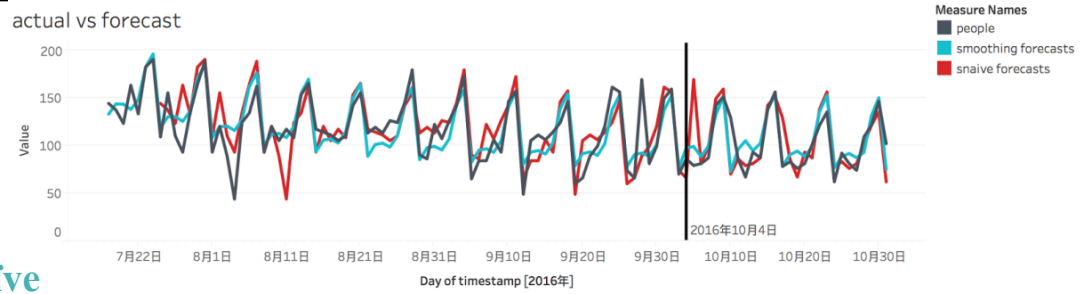
- We prefer over-forecasting since it might not increase manager's pressure.
- Check:
  - ✓MAE
  - ✓MAPE
  - ✓RMSE
  - ✓Time plot (actual+predict , residual)
  - ✓Error distribution

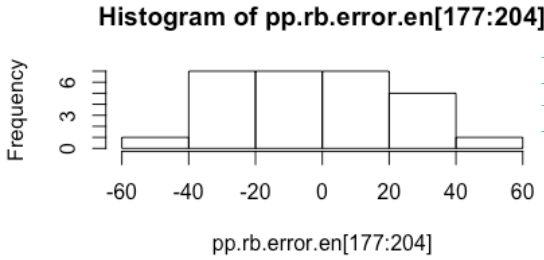
Under-forecast




Over-forecast

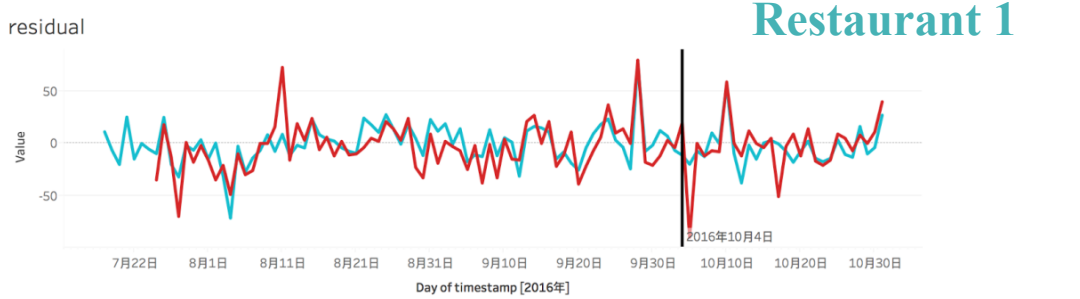
# RESULT



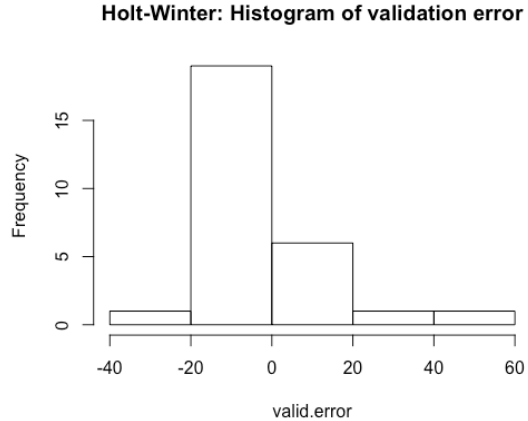

**Red: seasonal naïve**

**Blue: best model**

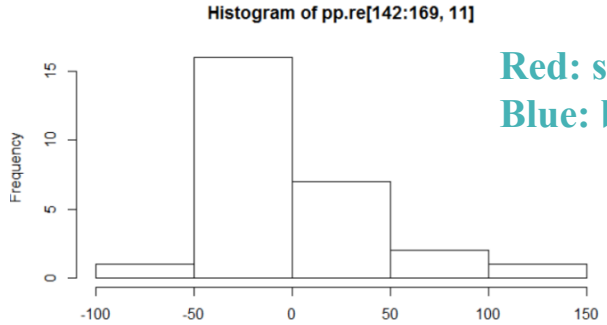



## Restaurant 1

## Restaurant 2



# RESULT

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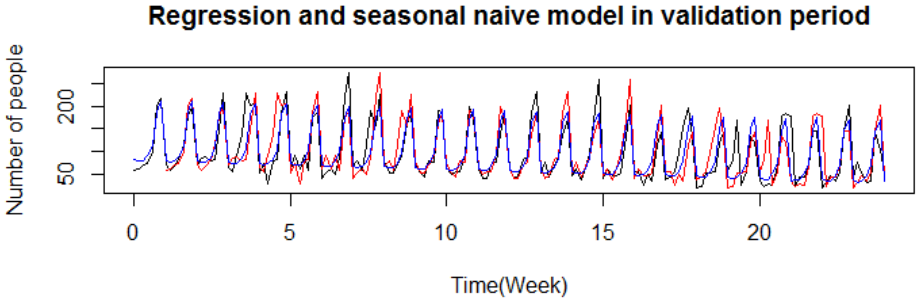
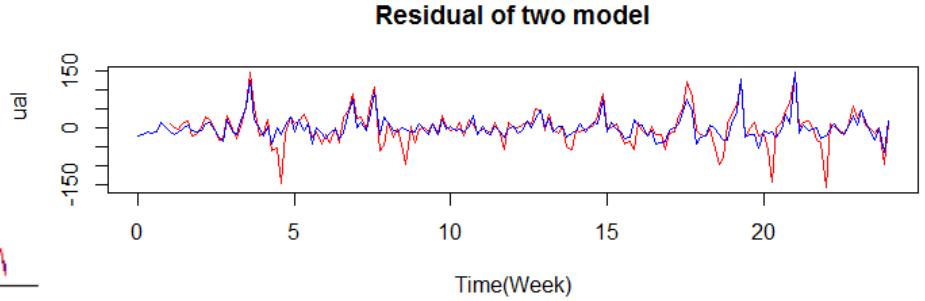
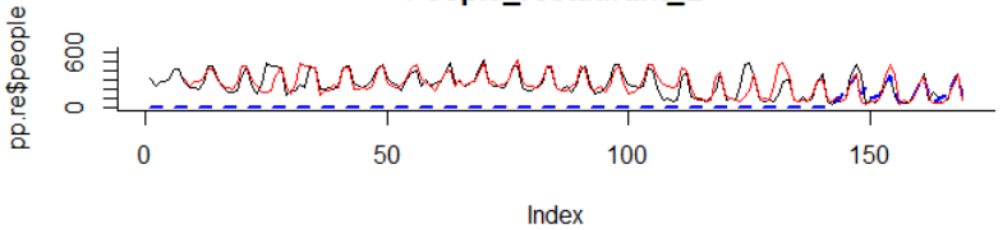
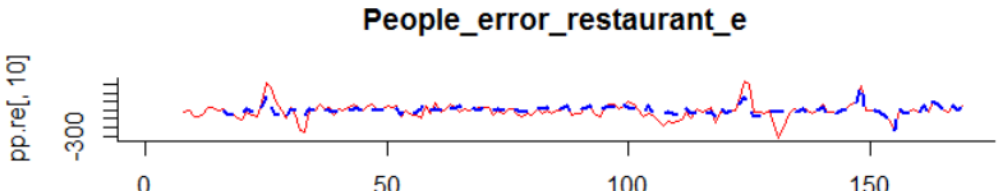


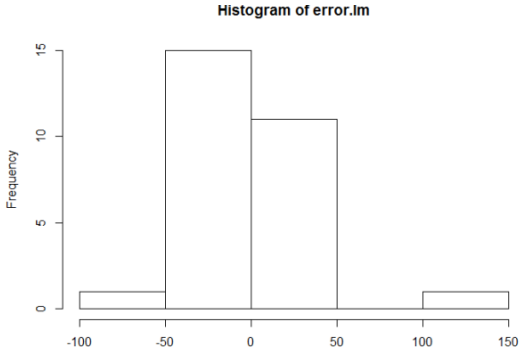

## Restaurant 4



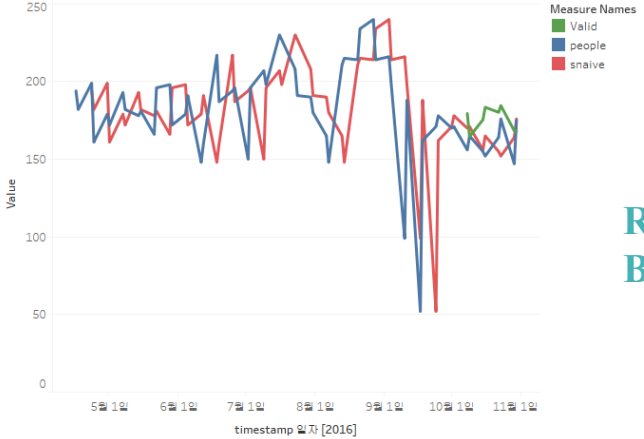

## Restaurant 5



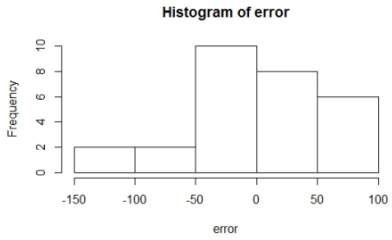



# RESULT

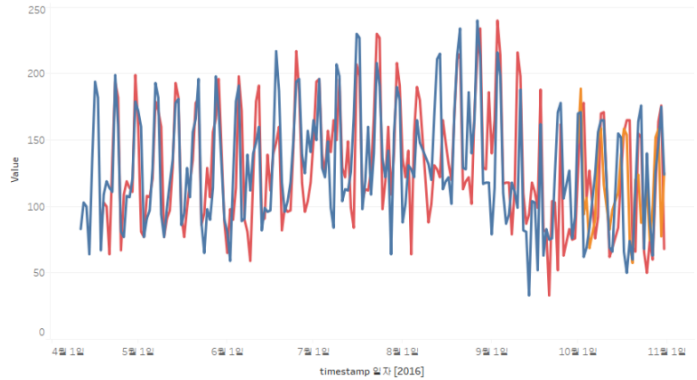
Linear Regression_Weekend




The trends of Valid, people and snaive for timestamp Day. Color shows details about Valid, people and snaive.




'ANA' Holt-Winter

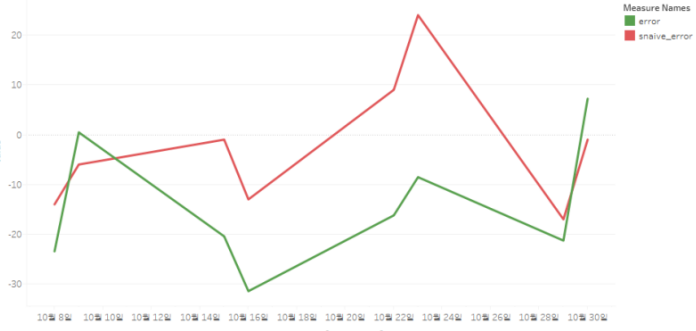


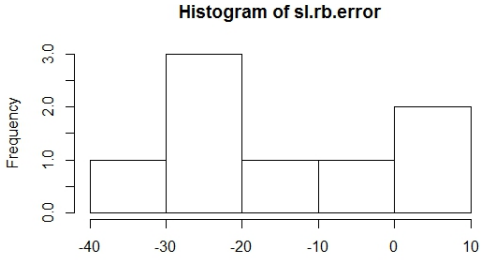

The trends of people, valid and Snaive for timestamp Day. Color shows details about people, valid and Snaive.

**Red: seasonal naïve**
**Blue: best model**

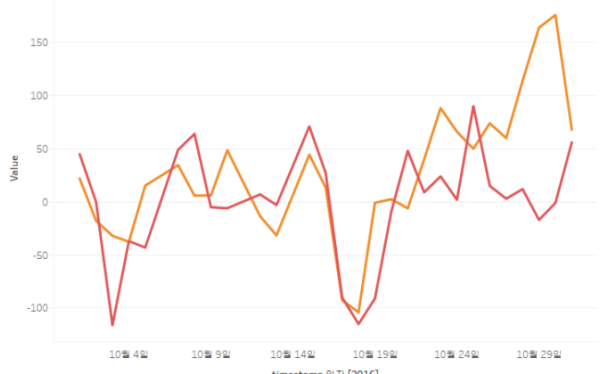
## Restaurant 3

near Regression_Error_Validation




'ANA' Holt-Winter_Error



# RECOMMENDATIONS

- For the client:

We had done 7 days ahead forecast for one restaurant. We found the performance of 2 and 3 three days ahead is not so bad. As the result, we can try 3 or more days ahead forecast in the future. The client can get the data earlier, so its forecast result might be more valuable.

- For the people who want to continue developing this forecast:

We tried one external information(weekday/weekend) in our forecasting model, but it only one restaurant perform well. It can be added more external information so that the forecasting result would be better.

Thank you for your attention!