Recruit Restaurant Visitor Forecasting

March 12, 2018

Prepared by:

Foodie Analytics

Our Team

Shipra Sethi - *Engagement Leader with 15 years of analytics and consulting experience in hospitality, regulatory risk, and financial services industry. Adept in using quantitative and qualitative methods to generate actionalble insights for the clients.*

Dong Bing - *Data Architect with over 10 years experience in synthesizing a wide range of data sources and transforming unorganized raw data into actionable strategic knowledge.*

Daniel Colvin - *Data Analytics professional with skills in descriptive and predictive modeling, as well as strengths in customer interaction.*

Subba Muthurangam - *Lead Developer with 20 years of experience in machine learning, data analytics, and applied statistical methods. Proficient in using Python, R, Java, Elasticsearch and NoSQL.*

Erik Platt - *Business Intelligence and Data Analytics professional adept at automation, visualization and dashboard development, as well as a variety of modeling and statistical techniques.*

Agenda

Problem Statement

Project Goals

Exploratory Data Analysis

Model Overview

Dashboard Demo

Mobile Application Demo

Web Application Demo

Conclusions and Recommendations

Next Steps

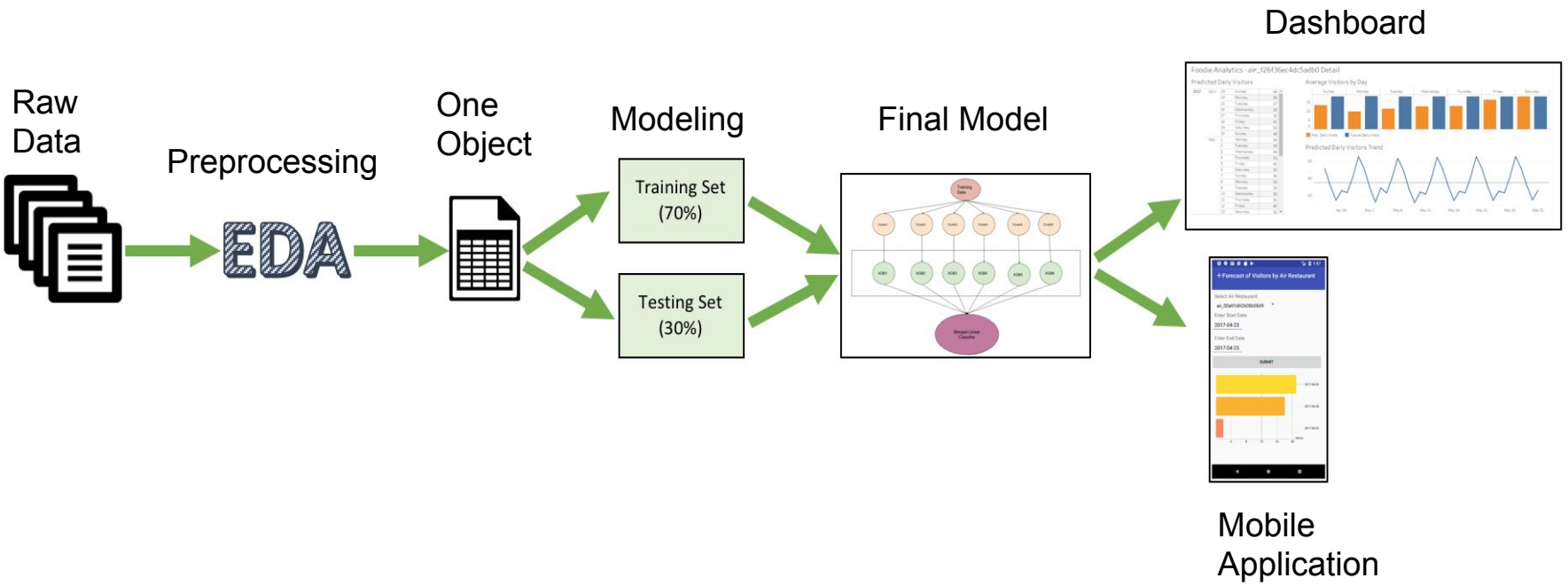
Problem Statement

- Restaurant start-ups are facing a **notoriously high failure rate**; an appetizing menu simply isn't enough to guarantee traffic
- Increase in **utilization of online reservation systems** has offered an opportunity to gain a **competitive advantage** through customer data
- Using existing datasets within Hot Pepper Gourmet and AirREGI platforms, Foodie Analytics has built a predictive model to **inform customer traffic patterns**
- Understanding when and where customers plan to dine **allows the opportunity** for efficient staffing, fresh ingredients, and an idealized experience

Project Goals

- **Customer traffic flow**: How many customers are expected to visit a restaurant on any given day?
- **Location**: Where should the next restaurant be opened to generate the highest amount of foot traffic?
- **Competition**: What's the competitive landscape for any existing or new restaurant?
- **Preference**: What type of restaurants are most popular?
- **Delivery Platform**: How can data insights be delivered on the go?

Project Overview

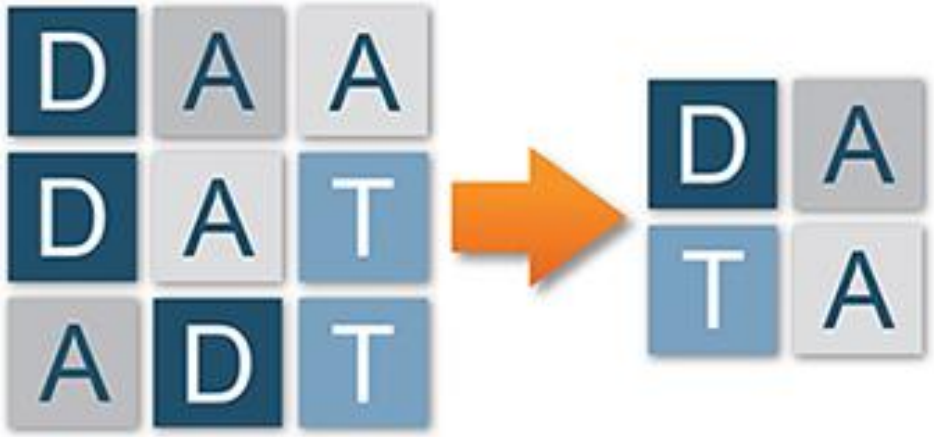


Data Overview

- Analyze the components of each dataset to better understand the business goals

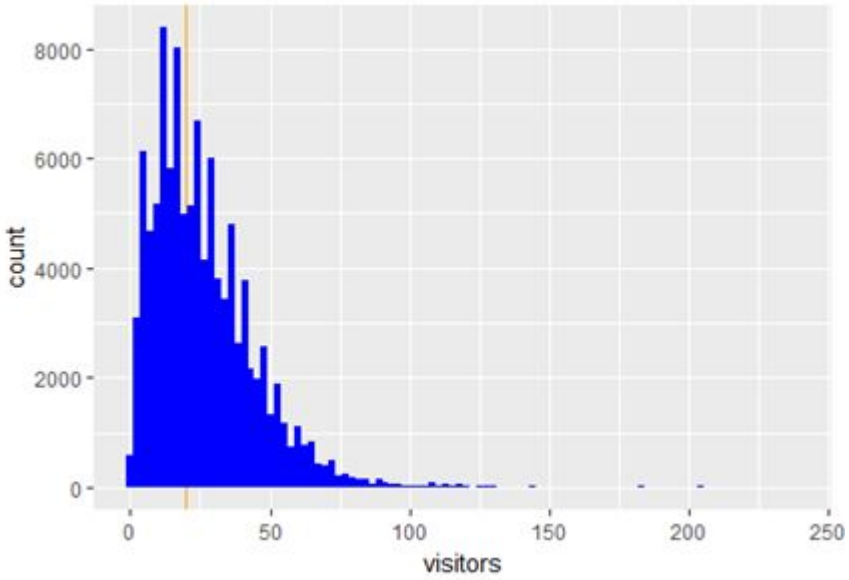
Category	Description
Number of Sources	2
Total Number of Datasets	8
Number of Unique Records	963,705
Number of Fields	10
Number of Observations with Missing Values	57
Location of Restaurants	Japan
Time Frame of Observations	1/1/2016 - 4/23/2017

Data Merging and Transformation



Missing Values and Outliers

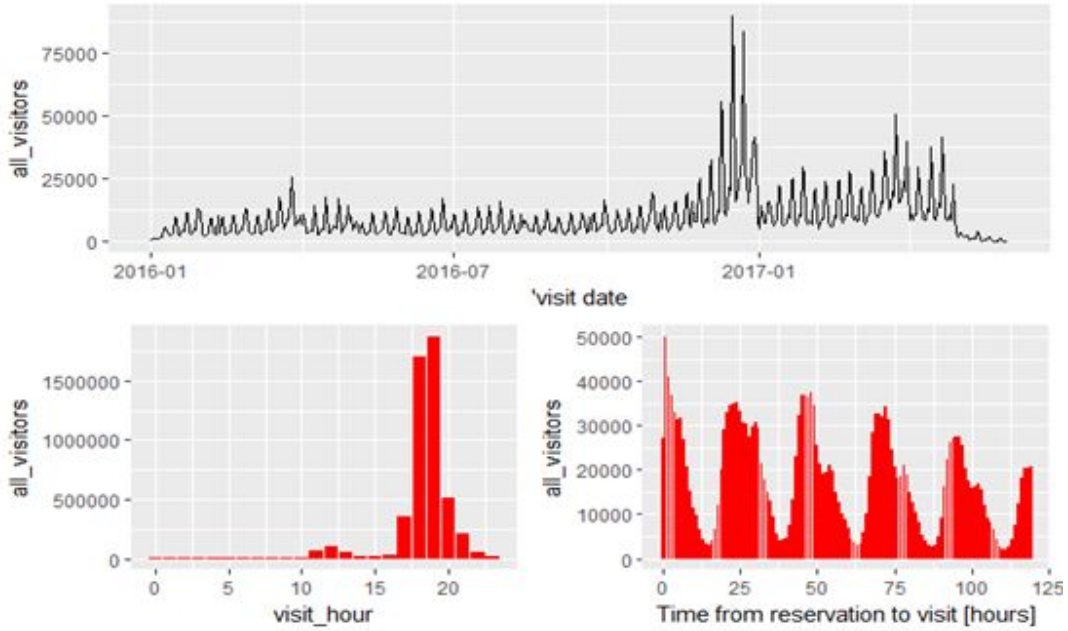
- Identify missing values, potential outliers, and/or missing information



Variable	Missing value count
hpg_store_id	51,232
reserve_datetime	19
reserve_visitors	19

Data Trends and Business Insights

- Seasonality
- System Usage
- Japanese Holiday Impact

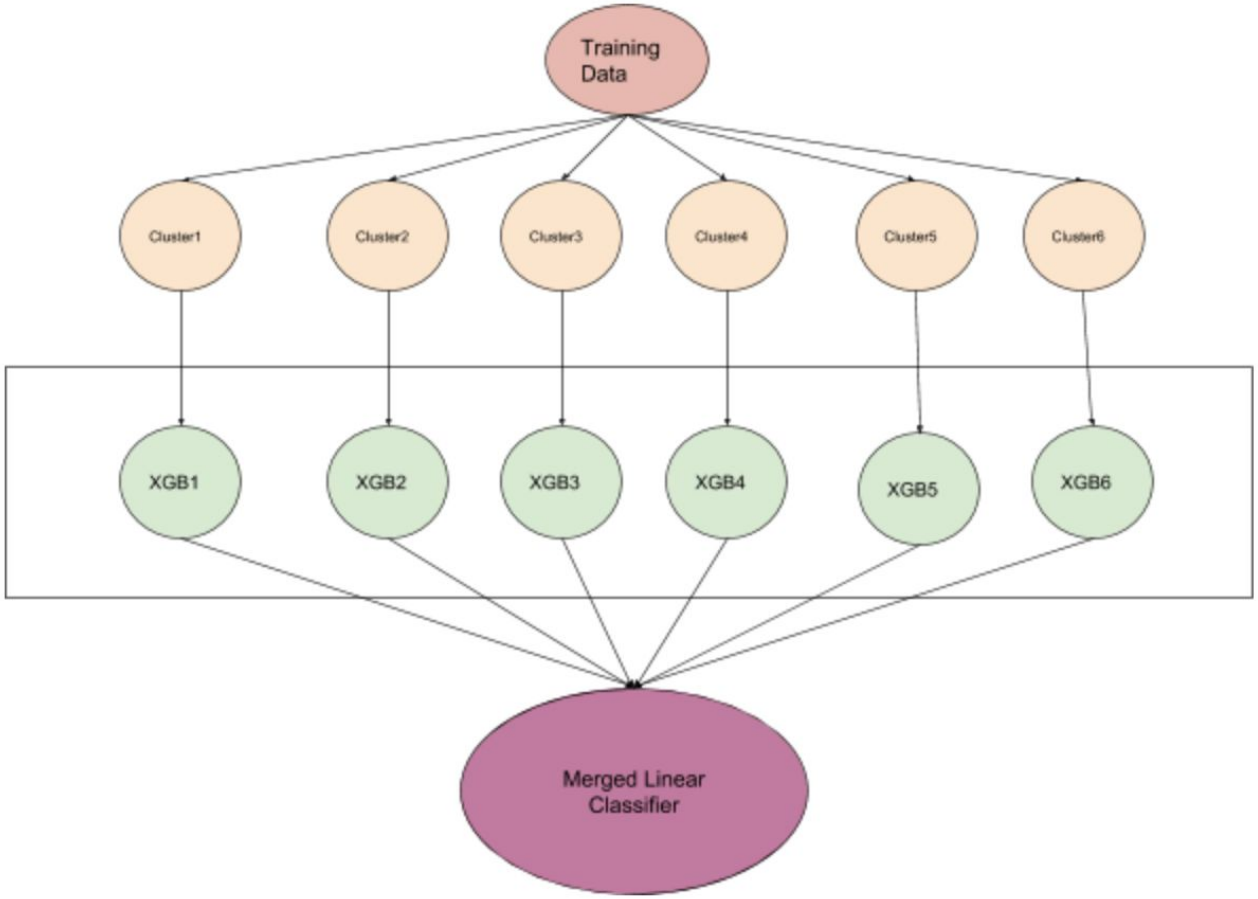


Model Development and Validation

- Traditional “vanilla” models vs Machine Learning
  - Random Forest
  - Correlation
  - Number of Records
- Accuracy metric: Root Mean Squared Logarithmic Error (RMSLE)

Model/Technique	RMSLE (Test Set)
XGBoost	0.52
H2O	0.512
LightGBM	0.525
K-Means with XGBoost	0.47
Random Forest	0.48

Final Model - **K-Means with XGBoost**



Mobile Application Demo

- Screen Design
- Android vs iOS
- Live Demo

Web Application Demo

- Responsive Design
- CSS3
- Live Demo

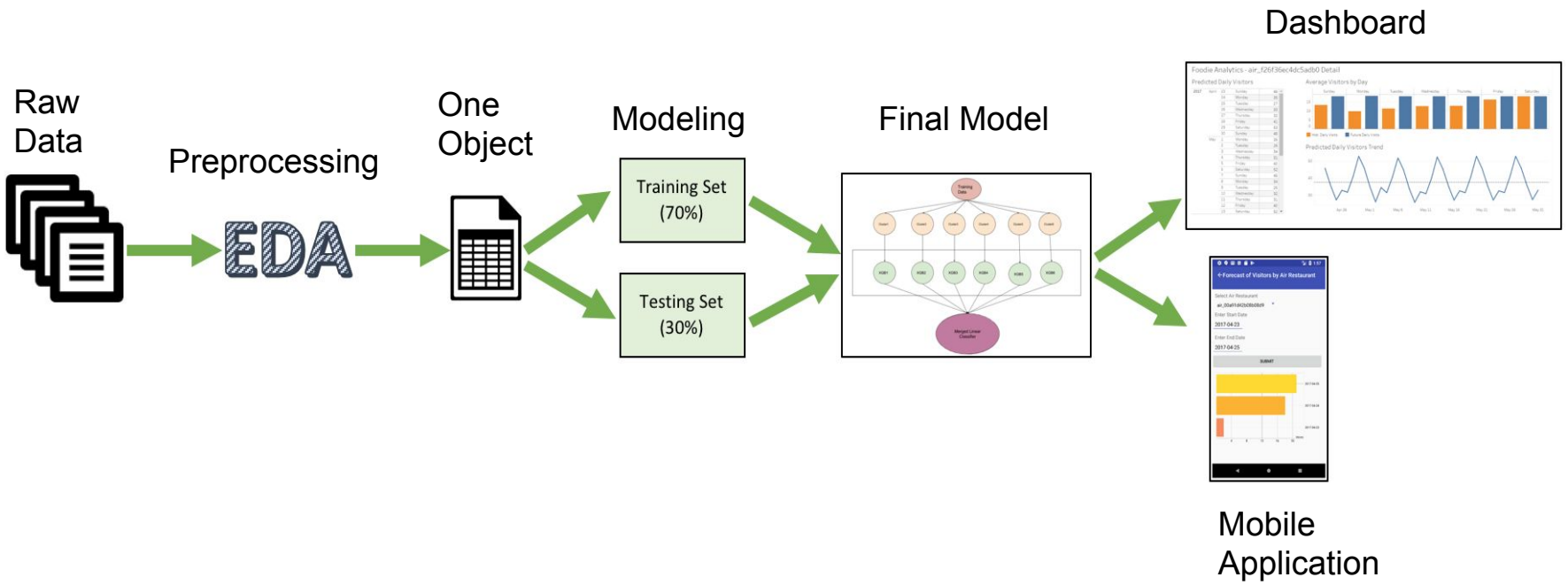
Web Application Link

Dashboard Demo

- Based in Tableau
- Assist new restaurant owners
  - Locate best genres for specific areas
  - Better understand competition
  - Analyze predicted customer patterns
- Assist current restaurant owners
  - Compare one restaurant to another
  - Customer visitation traffic by day of the week
  - Informed business decisions based on prediction

Dashboard Link

Conclusion


Raw Data
Preprocessing
EDA
One Object
Modeling
Training Set (70%)
Testing Set (30%)
Final Model
Dashboard
Mobile Application

Recommendations

- New Restaurant Owners
  - Area predictions
  - Genre predictions
  - Impacts of holidays
- Existing Restaurant Owners
  - Average vs. Predicted visitation
  - Competition Analysis
  - Genre popularity over time

Next Steps

- iPhone application
- Training to Recruit Holdings' development team
- Enhance the current model
- Mobile and web interfaces testing
- Mobile and web app authorization or authentication

Presentation Recording

- https://youtu.be/EXdwp8OigaU