Capstone Project - Restaurant Classification

November 21, 2018

Business Question

Can we classify whether a food place in Stockholm county is "satisfactory" or "not satisfactory" before ordering in it?

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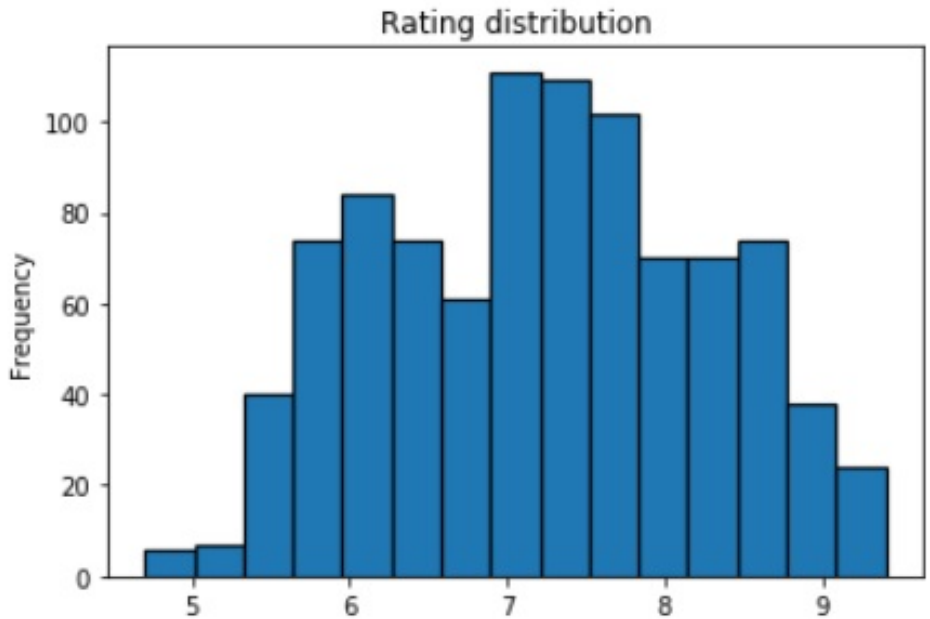
Which type of restaurant, in which price tier, and in which location maximizes the probability of being a "satisfactory" restaurant?

What is "satisfactory"?

Definition

We define a restaurant to be satisfactory if its customer rating is above average and "not satisfactory" otherwise.



Average rating: ~ 7.164

Input/Output of model

Inputs:

- **Venue Category**: One of 19 categories, one-hot encoded
- **Price Tier**: An integer 1-4
- **In Stockholm City**: A binary feature

Note: These inputs are easily observed by the user of the model.

Output:

- Probability p of restaurant being "satisfactory".

Analytical Model

- Binary classifier "satisfactory" is fuzzy so we use Bayesian approach.
- We therefore choose **logistic regression** as our analytical model.
- All data is standardized before model is fitted.
- Data is split 80/20 between training and test data.

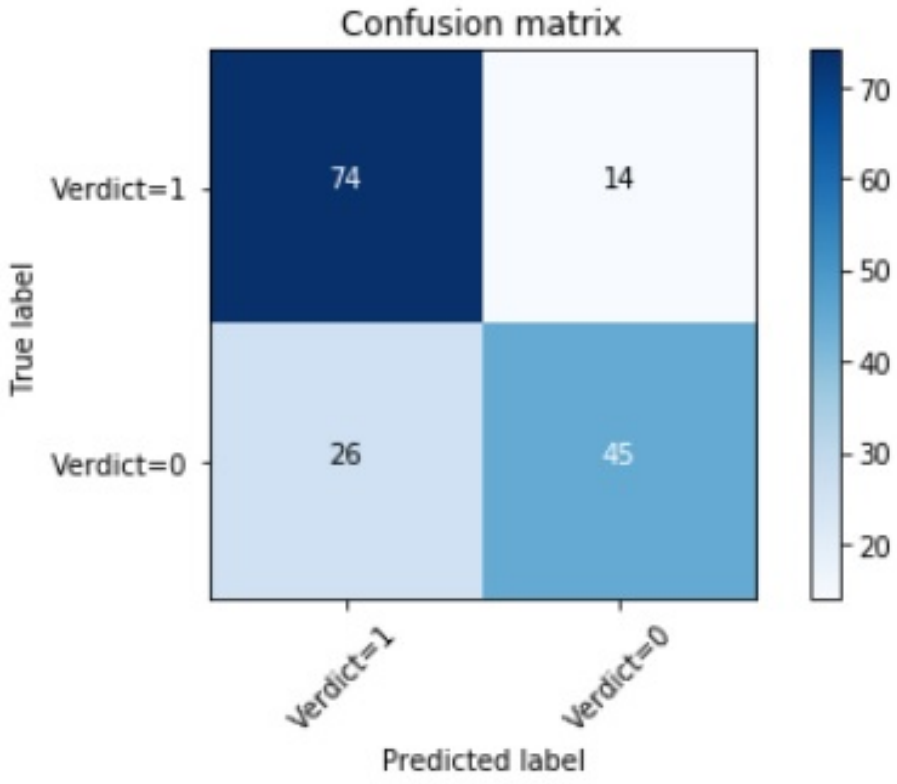
Modeling choices

- Using all city locations in Stockholm county and all venue categories leads to model with bad accuracy due to too many features.
- We limit venue categories to categories with at least 10 data points.
- Majority of data points belong to Stockholm city, so we reduce location data to a binary flag whether or not restaurant is in Stockholm city or not.
- Restaurants with rating but no price tier is filled in using the average price tier which is 2.

Data Sources

- Postcode and City information from SCB (Swedish government agency) spreadsheet.
- Geolocations via Here API
- Venue, Price Tier and Rating information via Foursquare API

Results



Verdict = 1 means "Satisfactory" and Verdict = 0 means "Not Satisfactory".

Precision = 75%, f1 score = 0.74, LogLoss = 0.6

Conclusion

An **expensive Scandinavian Restaurant in Stockholm City** has the maximum probability ($\sim 80\%$) of being a "satisfactory" restaurant according to customers.

A **cheap Fast Food Restaurant Restaurant not in Stockholm City** has the minimum probability ($\sim 50\%$) of being a "satisfactory" restaurant according to customers.