

Mapstaurant - Restaurant Recommendation System In Las Vegas

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Introduction

Problem:

1. An interactive restaurant recommendation map system.
2. Incorporate COVID19 related information (ex: delivery supported restaurant).
3. Detect and reduce the effect of fake reviews.

Why it is important:

1. Millions of people try to find restaurants everyday.
2. Restaurant ratings could be biased due to fake reviews.
3. Information retrieval might be inefficient if it's not systematically categorized or filtered.

Data

Data Resource:

We choose to use Yelp Open Data set from its official website - <https://www.yelp.com/dataset> as origin data.

`Yelp_academic_dataset_business.json` & `yelp_academic_dataset_review.json`

Characteristics:

To scale down reasonably,

1. Only choose the restaurant of Las Vegas. (total 5520 rows).
2. Filter and compress data from 963MB to 2.6MB.

Approach

Data Processing

Extract Keywords
Get Top Reviews

Data Visualization & Interaction

Front-end Filter
Front-end Search Result
Front-end Map
`jQuery`
`Leaflet`
`MarkerCluster`

Mobile Responsive Platform
`Material.js`

New Grading System

Sentiment-Usefulness Grading System

$$\text{Modi_score} = \sum_{i=1}^m \frac{(\text{useful}[i] + 1) \cdot \text{Sentimentscore}}{\text{numberofreview} + \text{useful}[i]}$$

What's New?

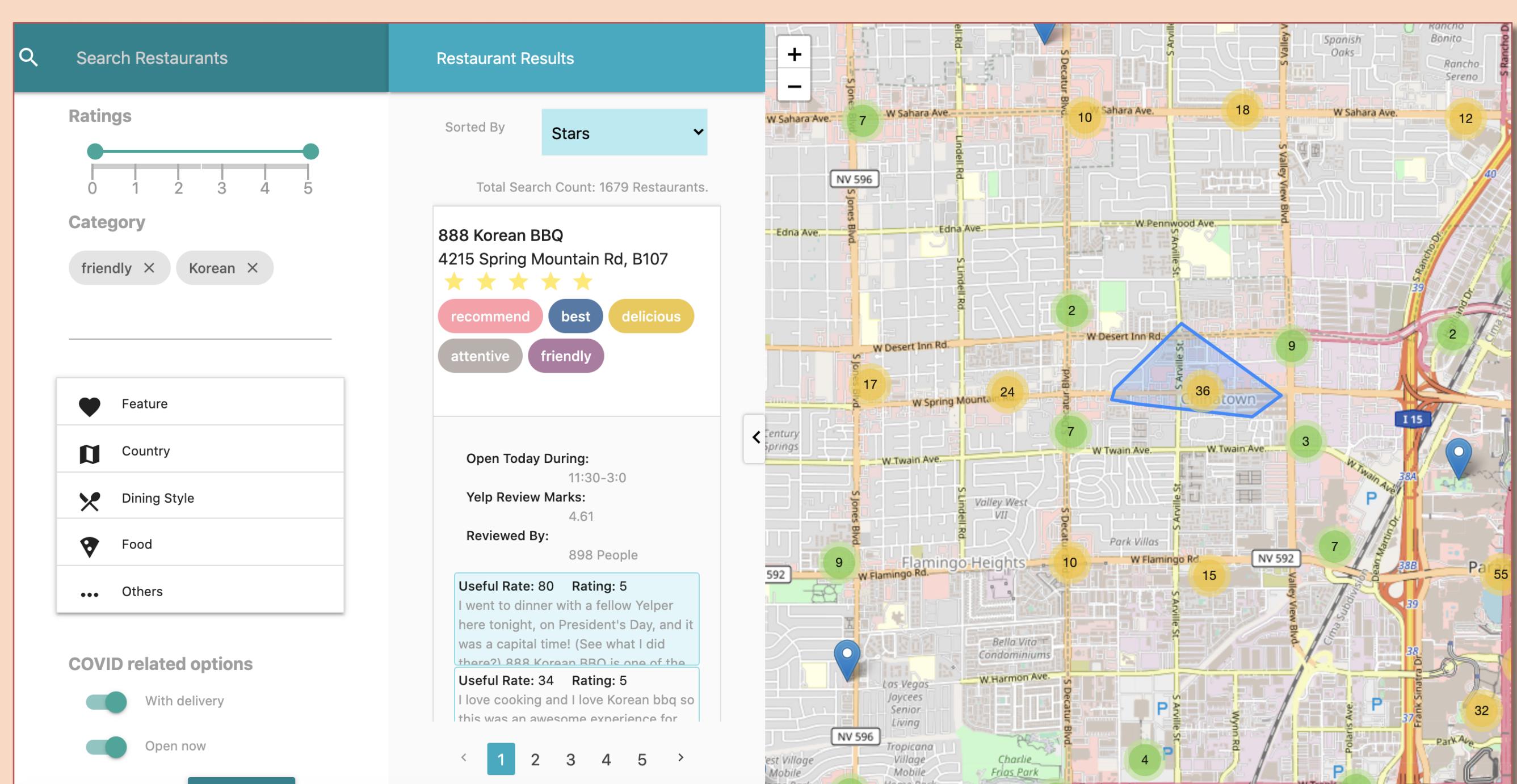
- (1) Improve the grading system according to the review content and usefulness grades.
(based on [Naive Bayesian\(TextBlob package\)](#)).
- (2) Incorporate COVID-19 related data into front-end application, such as hours and delivery options.
- (3) Take keywords from reviews of restaurants.

Why This Approach Works?

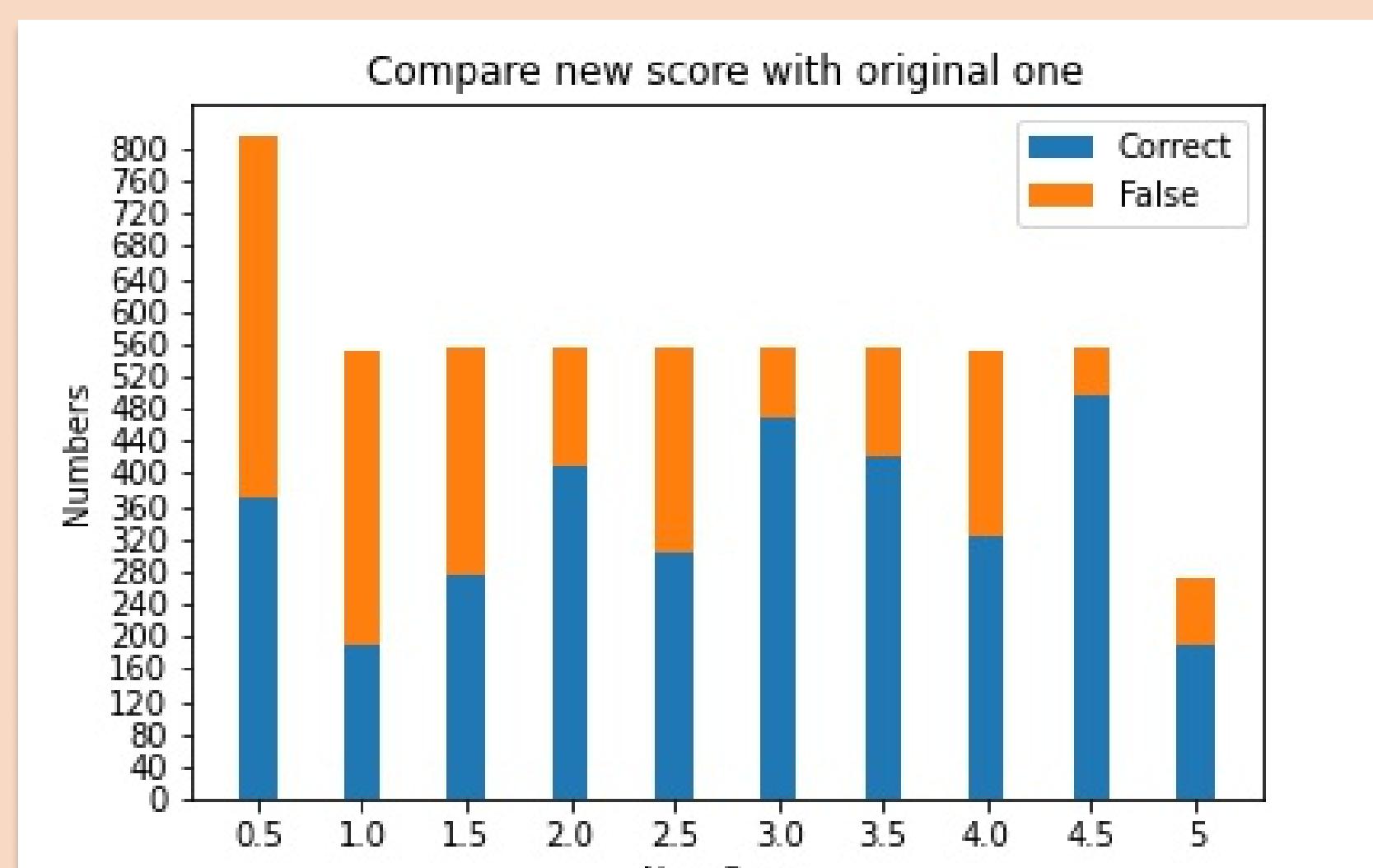
- (1) Performing sentiment analysis on reviews to generate usefulness marks will better display the true rating of a restaurant comparing to Yelp, which is a simple average.
- (2) The UI design allows users to clearly see why certain restaurants are recommended through displaying top 5 keywords from the reviews.

Experiments and Results

Website Interface:



Fake Review Corrected Restaurant Rating:



Many high score restaurants in original Yelp grading are now at the low score region in proposed Sentiment-Usefulness Grading. This is resulted from the phenomenon where some poor restaurants have biased high scores.

User Experience Survey:

A Google questionnaire with questions Q1~Q13 was designed and collected feedback from users. The results show our rating filter is the most admired, and the comparison with Google Map and Yelp indicates our system is competitive.

Feature	Average Score
Rating Filter (Q2)	2.82
Map Zooming (Q10)	2.73
Restaurant Information on Map (Q11)	2.64
Category Filter: "Dining style" (Q5)	2.55
Category Filter: "Food" (Q6)	2.45
Result List Display (Q9)	2.41
COVID19 Related Filter (Q8)	2.36
Category Filter: "Country" (Q4)	2.27
Search Bar (Q1)	2.18
Category Filter: "Feature" (Q3)	2.09
Category Filter "Others" (Q7)	1.95

Our Feature	% of participants thinks better than :	
	Google Map	Yelp
Search Bar (Q1)	41.18	60
Rating Filter (Q2)	47.06	80
Category Filter (Q3~7)	29.41	80
COVID19 Related Filter (Q8)	35.29	80
Result List Display (Q9)	29.41	20
Map Browsing (Q10~11)	23.53	80

(scoring range: 0.0~3.0)

Features:

1. Direct Keyword Search Bar
2. Restaurant Rating Filter
3. Categorized Keyword Filtering
4. COVID19 Related Information Filter
5. Sorted Result Listing
6. Clustered Zooming Map