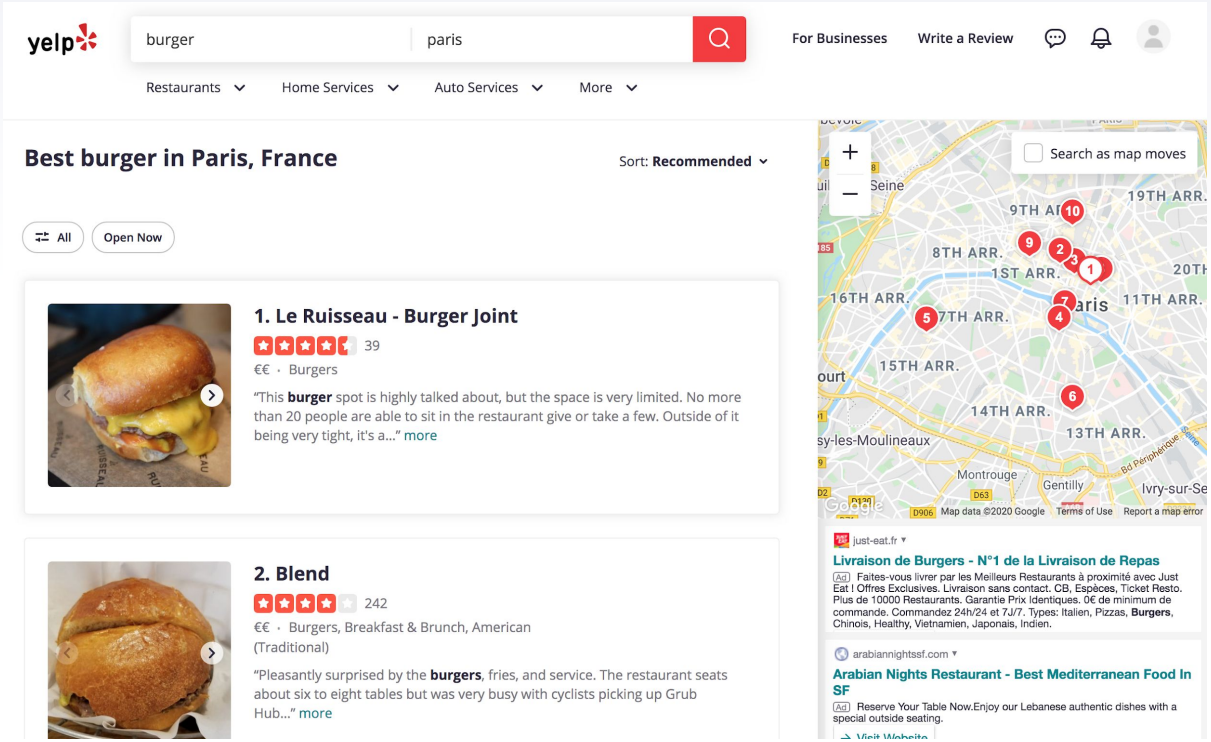
Yelp for Restauranteurs

Mirae Kim

Currently, Yelp is primarily geared towards Restaurant Seekers and not for Restaurant Owners

Yelp Search view has limited information



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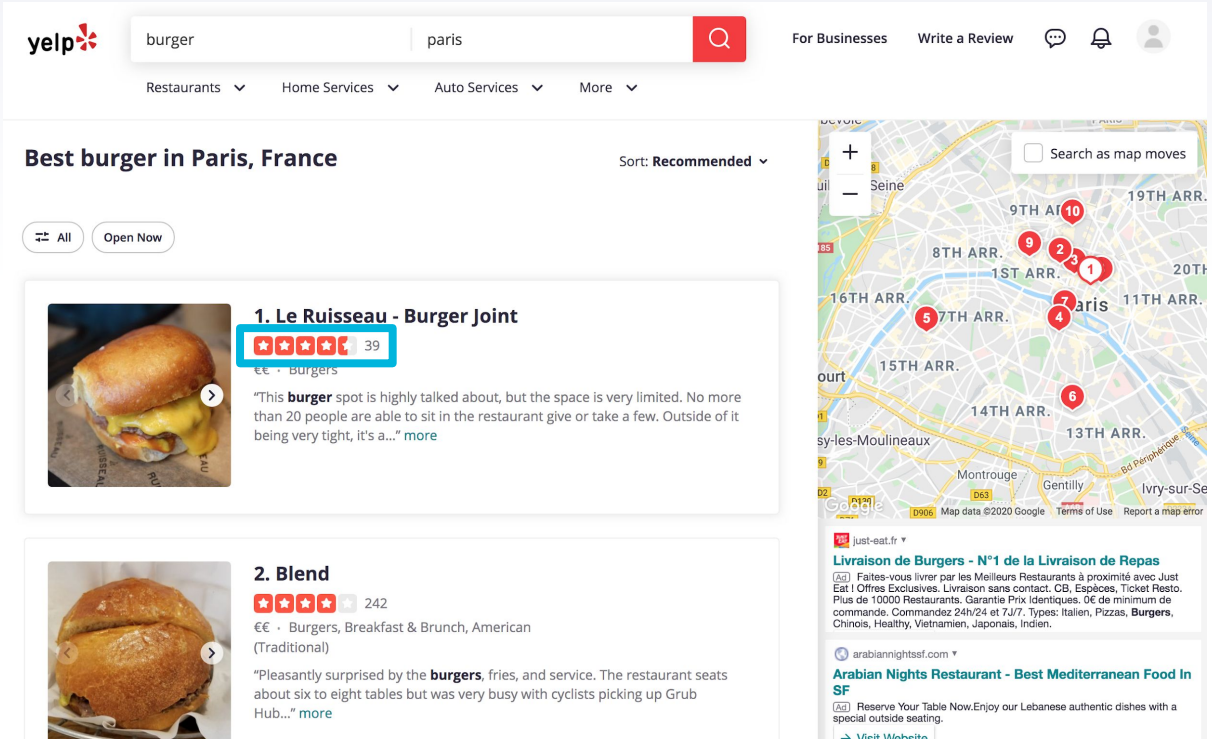

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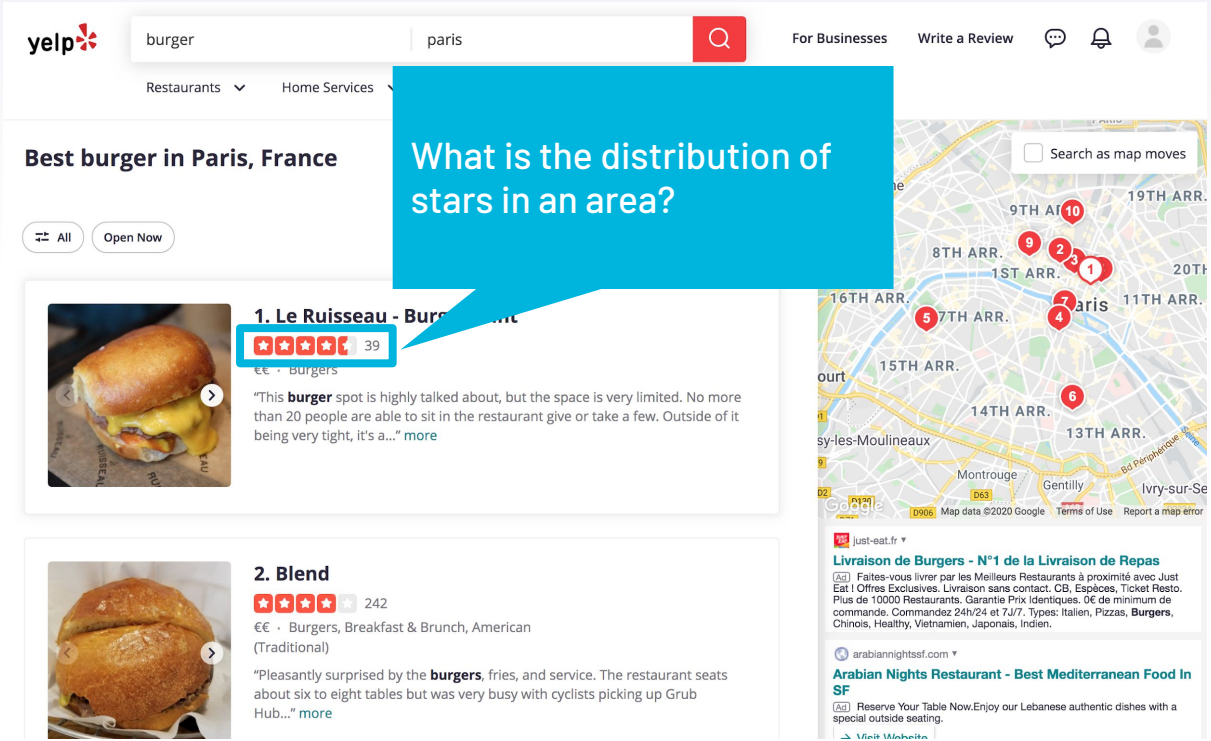

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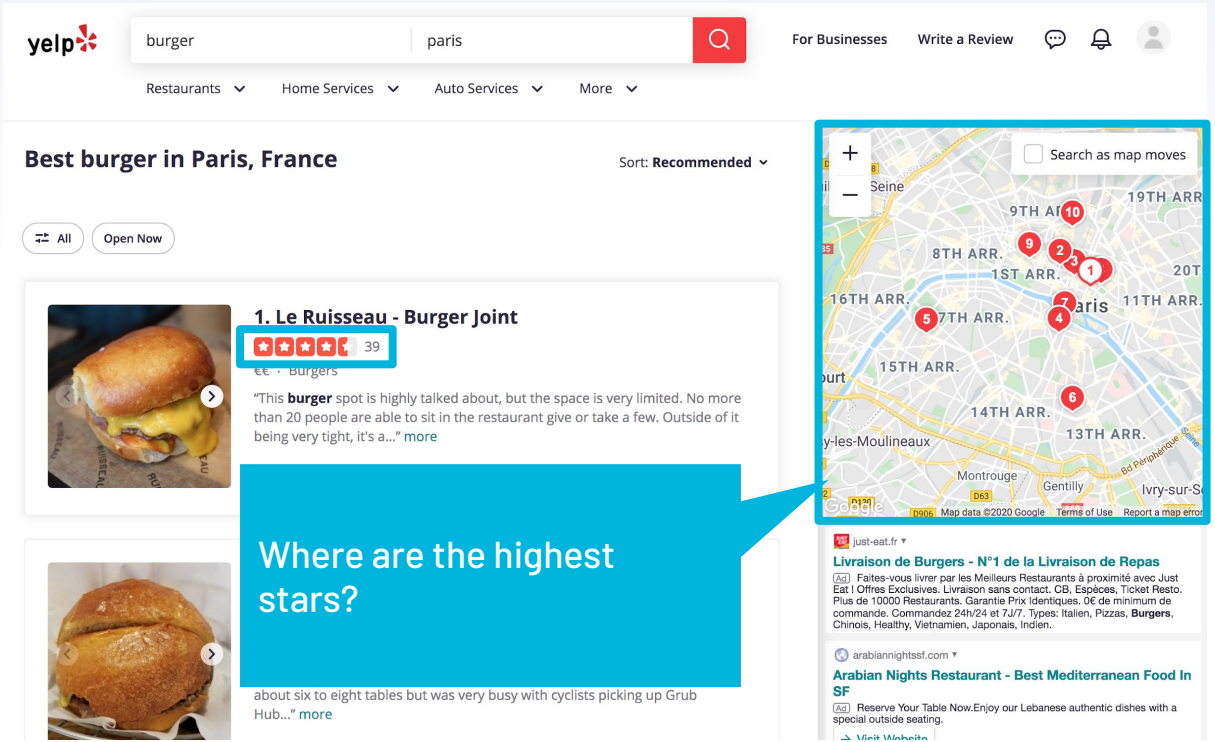

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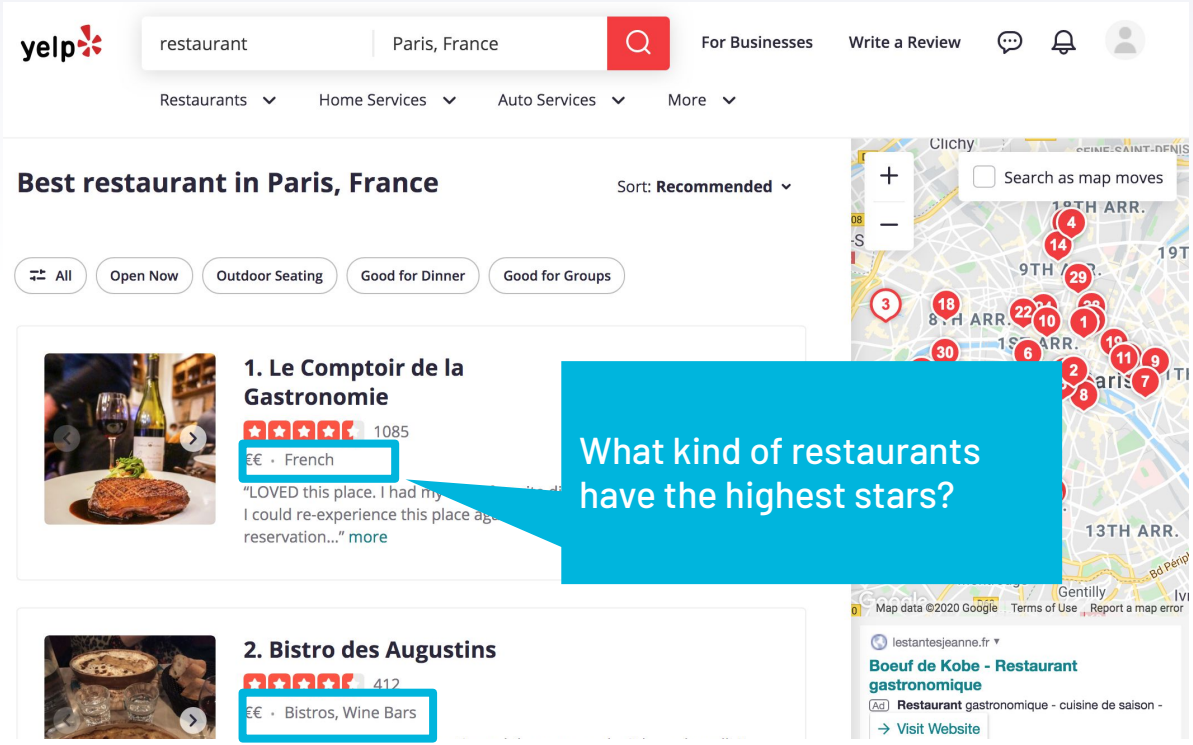
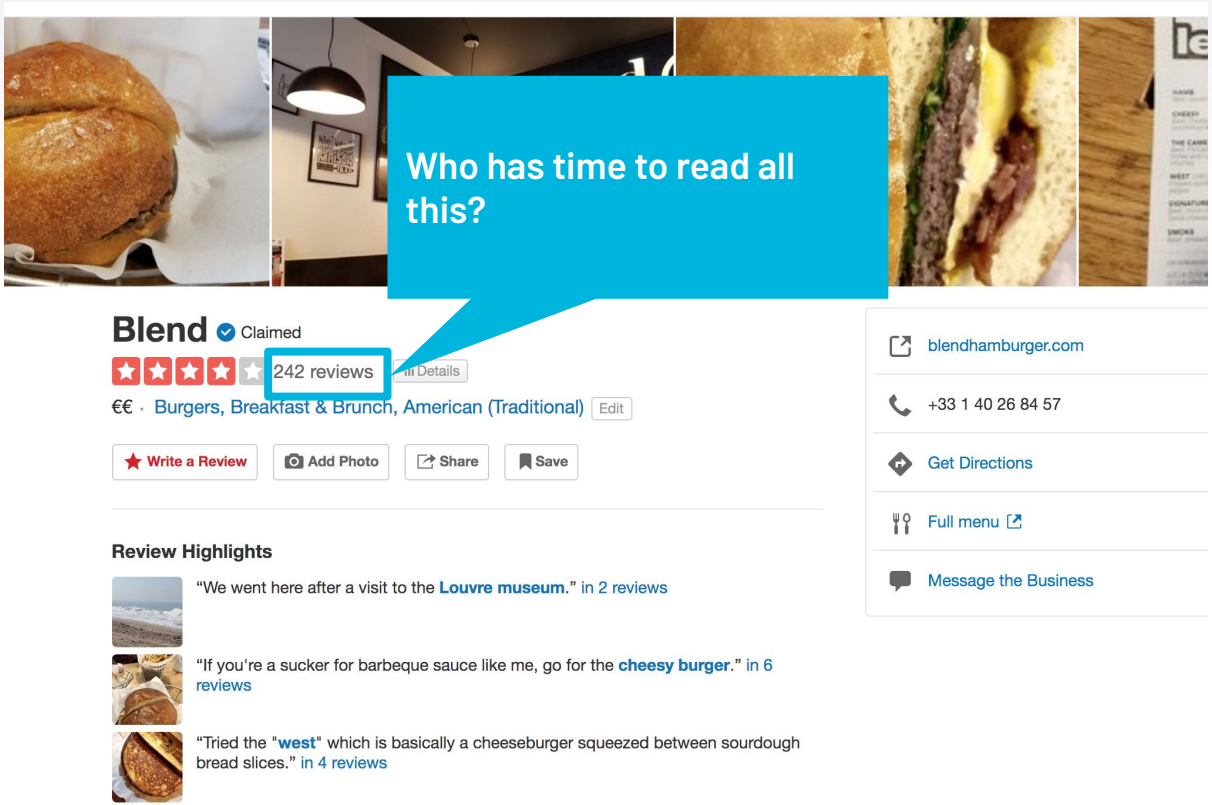


No holistic view of Restaurant Reviews



Project Objectives

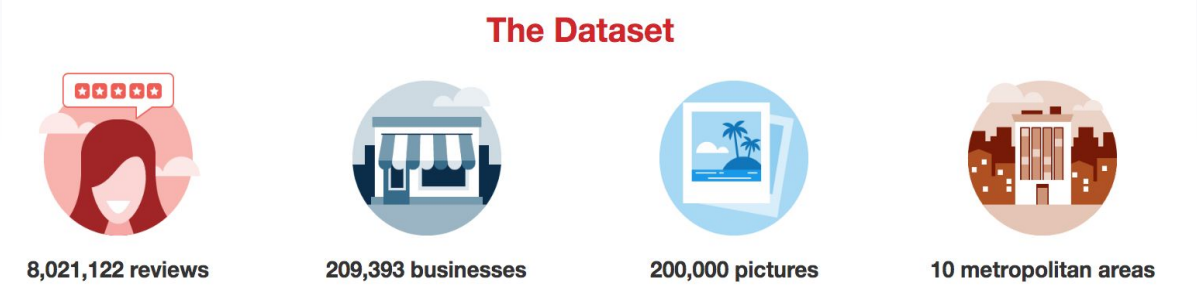
- Create a view for **potential** Restaurant Owners
  - Optimize Location
  - Optimize Category
  - Optimize Characteristics
- Create a view for **current** Restaurant Owners
  - Understand Reviews
  - Optimize Characteristics

Personal Objectives

- Familiarize with **Natural Language Processing** (NLP)
- Learn how to develop an **interface** from scratch
  - Data Storage and Serving
  - Model Storage and Serving
  - User Interface Creation

Data Sources

- **Yelp Reviews Dataset:** Downloadable Dataset with large corpus of text



- **Yelp Fusion API**: Extra information about restaurants

Yelp Reviews Dataset: https://www.yelp.com/dataset

Yelp Fusion API: https://www.yelp.com/fusion

Use Latent Dirichlet Allocation to summarize the texts by Topics

Goal: Finds latent topics in a corpus of text

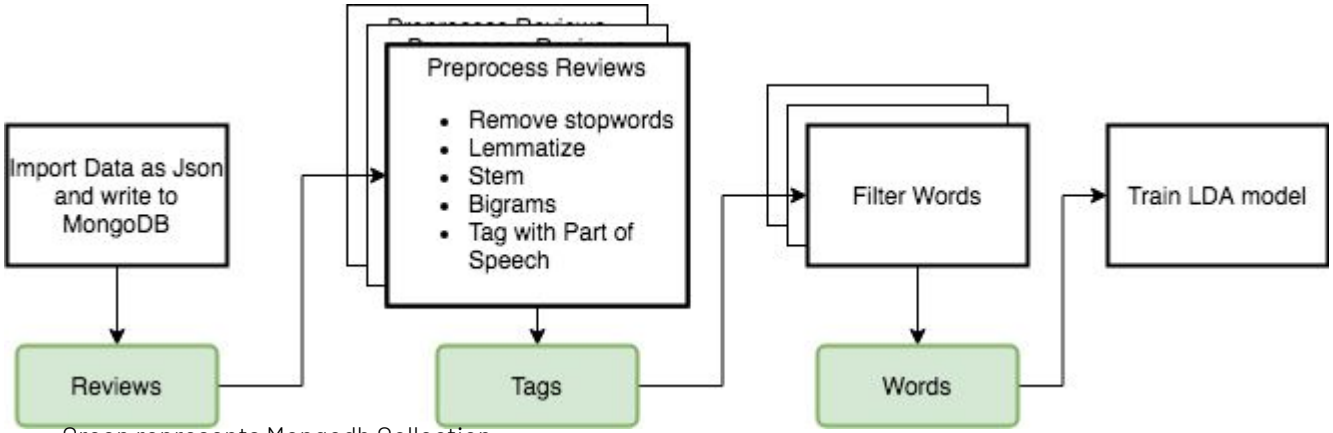
Main assumption: Text documents are a mix of topics and each topic is a mix of words

Technologies:

- Gensim
- NLTK

Data Processing

- Failed to use spark implementation of LDA due to data engineering issues
- Multiprocessing python library used to create threads of concurrent processing
- MongoDB NoSql database used to store intermediary results



Green represents Mongodb Collection

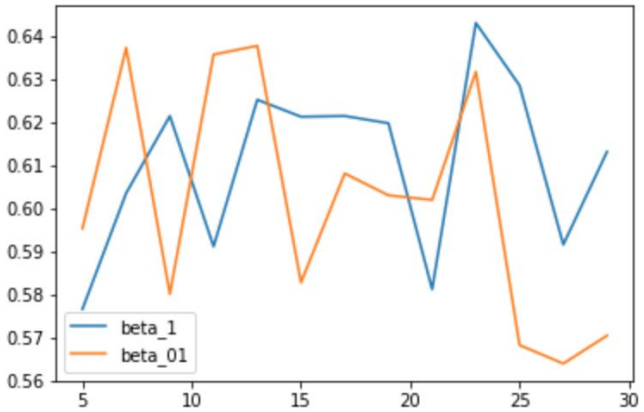
Finetuning and Results

Main Hyperparameters:

- **Alpha:** document-topic density
- **Beta:** topic-word density
- **Number of Topics:** Number of topics LDA should produce

Chosen Hyperparameters:

- **Alpha:** "Asymmetric"
- **Beta:** 0.1
- **Number of Topics:** 13



Evaluation Metric:

- **Coherence:** measures the degree of semantic similarity among the highest scoring words in each topic

Final Coherence Score: 0.6377

Topics produced

```
#0: (0, '0.034*"place" + 0.018*"coffee" + 0.018*"breakfast" + 0.016*"food" + 0.015*"time" +
0.012*"staff" + 0.012*"service" + 0.010*"day" + 0.008*"love" + 0.008*"spot"')

#1: (1, '0.061*"food" + 0.049*"service" + 0.032*"place" + 0.022*"restaurant" + 0.022*"time" +
0.014*"experience" + 0.013*"dinner" + 0.012*"staff" + 0.010*"menu" + 0.010*"quality"')

#2: (2, '0.017*"salad" + 0.013*"sauce" + 0.011*"meal" + 0.011*"bread" + 0.010*"chicken" +
0.010*"menu" + 0.010*"dinner" + 0.009*"restaurant" + 0.009*"side" + 0.008*"steak"')

#3: (3, '0.045*"bar" + 0.037*"place" + 0.032*"beer" + 0.027*"drinks" + 0.024*"night" +
0.023*"food" + 0.021*"music" + 0.017*"selection" + 0.015*"drink" + 0.014*"patio"')

#4: (4, '0.063*"food" + 0.046*"place" + 0.028*"service" + 0.022*"chicken" + 0.017*"staff" +
0.016*"tacos" + 0.015*"chips" + 0.014*"lunch" + 0.014*"time" + 0.011*"love"')

#5: (5, '0.062*"cream" + 0.049*"ice" + 0.039*"chocolate" + 0.018*"cake" + 0.015*"dessert" +
0.014*"flavors" + 0.013*"la" + 0.011*"vanilla" + 0.010*"cookies" + 0.010*"desserts"')

#6: (6, '0.030*"selection" + 0.030*"quality" + 0.025*"price" + 0.022*"prices" + 0.013*"variety" +
0.013*"foods" + 0.012*"place" + 0.010*"options" + 0.010*"wall" + 0.010*"items"')

#7: (7, '0.068*"fries" + 0.057*"burger" + 0.031*"burgers" + 0.021*"sandwich" + 0.019*"bbq" +
0.017*"meat" + 0.015*"ribs" + 0.013*"bun" + 0.012*"cheese" + 0.011*"beef"')

#8: (8, '0.025*"order" + 0.024*"time" + 0.019*"minutes" + 0.016*"service" + 0.015*"people" +
0.014*"food" + 0.013*"customer" + 0.011*"place" + 0.010*"manager" + 0.009*"location"')

#9: (9, '0.049*"vegas" + 0.027*"strip" + 0.023*"buffet" + 0.023*"hotel" + 0.017*"las" +
0.015*"room" + 0.011*"casino" + 0.011*"club" + 0.011*"night" + 0.010*"floor"')

#10: (10, '0.108*"pizza" + 0.029*"toppings" + 0.028*"store" + 0.027*"crust" + 0.020*"slice" +
0.015*"wings" + 0.014*"pizzas" + 0.013*"place" + 0.012*"delivery" + 0.012*"shopping"')

#11: (11, '0.033*"rice" + 0.025*"chicken" + 0.023*"soup" + 0.021*"spicy" + 0.018*"beef" +
0.017*"pork" + 0.017*"noodles" + 0.016*"sauce" + 0.015*"food" + 0.014*"thai"')

#12: (12, '0.020*"watch" + 0.018*"tables" + 0.017*"room" + 0.015*"tv" + 0.015*"game" +
0.015*"area" + 0.015*"bar" + 0.014*"games" + 0.013*"chairs" + 0.012*"sports"')
```

Topics produced

Topic0  **Breakfast**

Topic1  **Dinner**

Topic2  **Main Dish**

Topic3  **Bar**

Topic4  **Mexican**

Topic5  **Dessert**

Topic6  **Value**

Topic7  **Burgers**

Topic8  **Service/Wait Time**

Topic9  **Vegas**

Topic10  **Pizza**

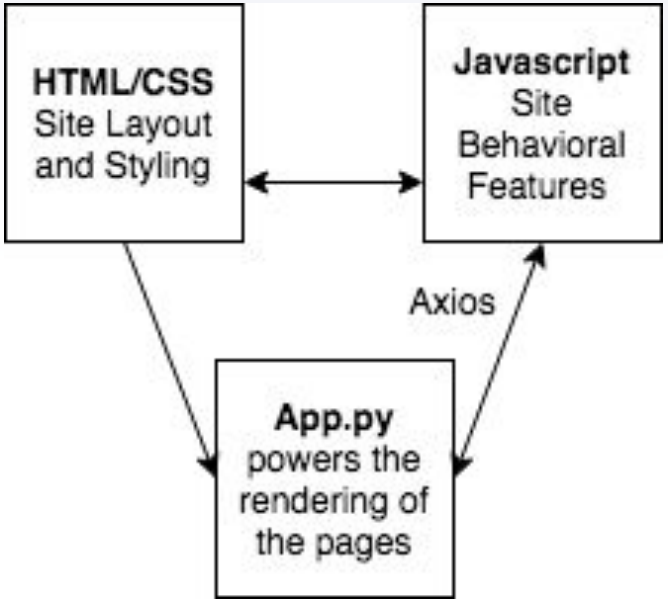
Topic11  **Asian**

Topic12  **Sports Bar**

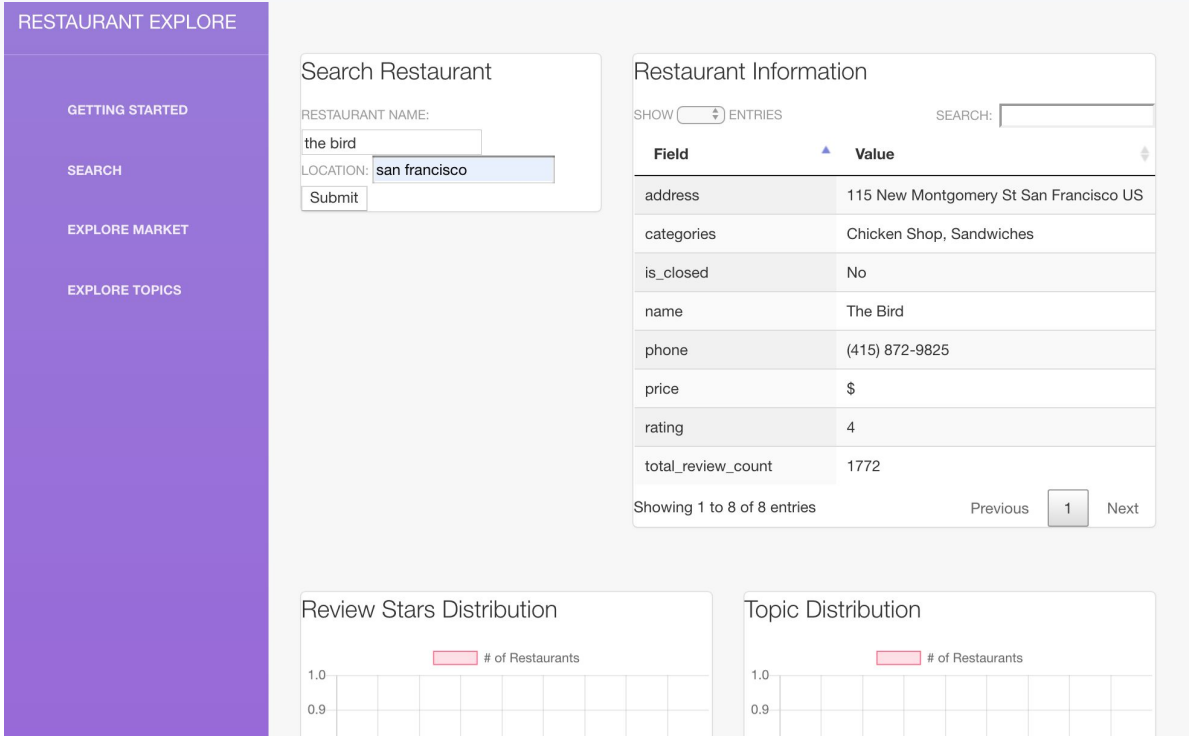
Create a User Interface to showcase results

Technology:

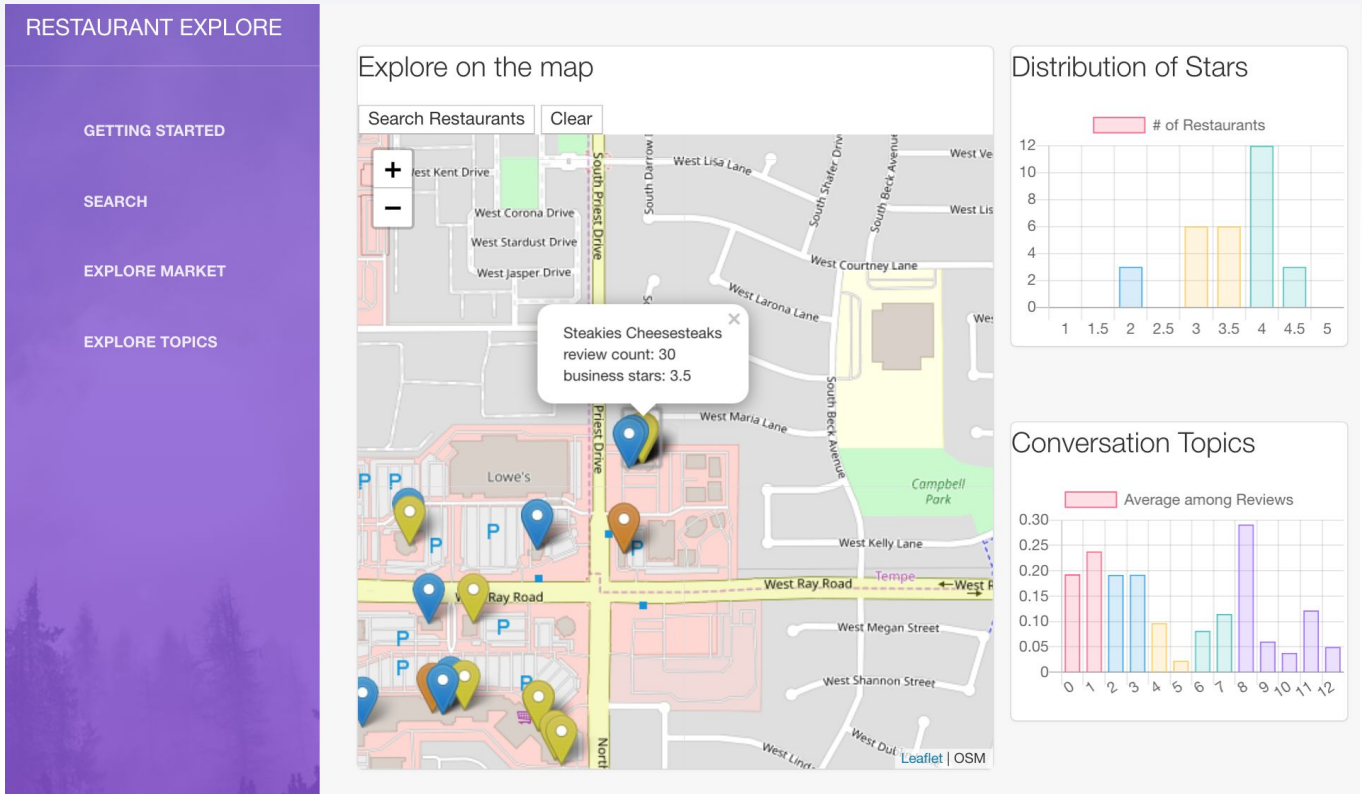
- Flask: Framework for developing web applications
- Leaflet: Map API
- Bootstrap: HTML/CSS framework
- MongoDB: Database



Search restaurant for in depth analysis on your review content



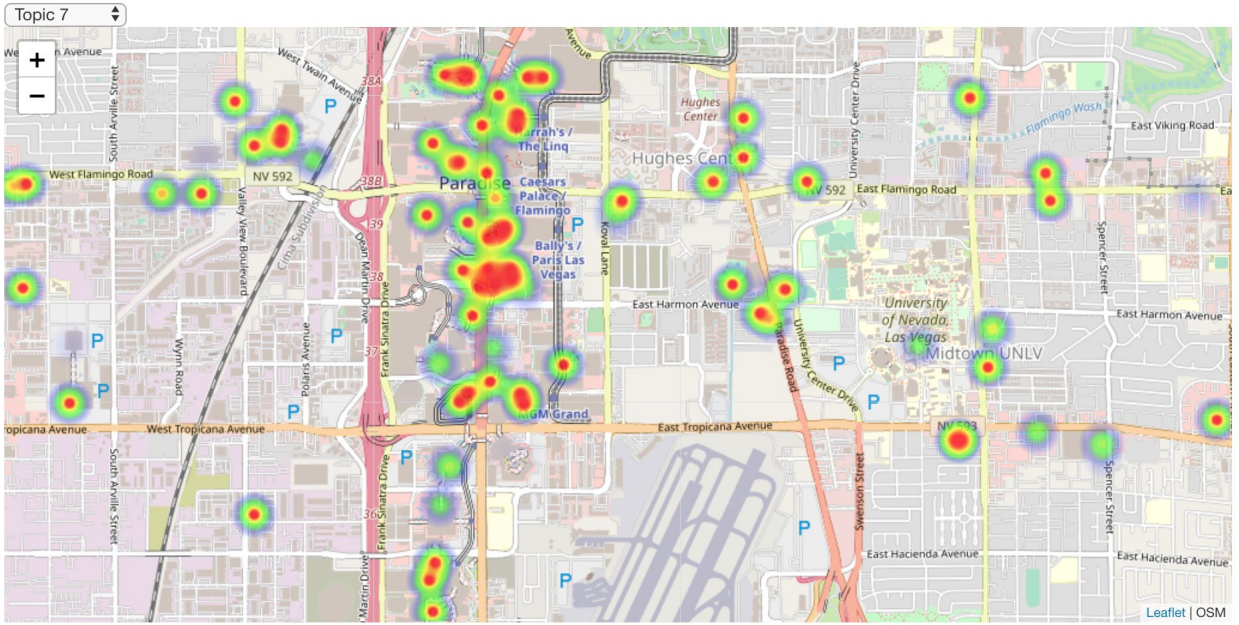
Explore the review stars on a map



Explore Topics on a map

RESTAURANT EXPLORE

- GETTING STARTED
- SEARCH
- EXPLORE MARKET
- EXPLORE TOPICS



Next steps

Data

- Make a model for each city or for each category to have more precise topics

Application

- Database Optimization
  - Slow Record Retrievals
- UX/UI Design
  - More intuitive UX
- Page that analyzes per category and topic