

Introduction

Currently, users endure a negative experience to search for different information in separate apps, including *Airbnb*, *Yelp* and *Google Maps*, and manually collect information on their own. Our proposed All-in-one Travel **recommendation** App aims to kill three birds with one stone to enhance recommendation quality in **Las Vegas**.

- Our App combines:
- **user preference**
 - **historic reviews**
 - **map visualizations**



Data

The dataset includes both **Yelp** and **Airbnb** data. The Airbnb data is gathered from InsideAirbnb, a public data project website. It contains the detailed listing and reviews in csv format. For our project, we downloaded the Airbnb data for Clark County, Nevada. The Yelp data is collected from the Yelp Dataset Challenge that is hosted by Yelp. It contains different Yelp business and review data around the US.

The Airbnb data is already formatted and cleaned, but only the key attributes for each listing are stored in our dataset. The key attributes contains summary, room type, neighborhood, etc. The Yelp data are filtered to restaurants only in Las Vegas.

Type	# of Records	# of Reviews
AirBnb	2487	6752
Yelp	7398	1.4 Million

Algorithms

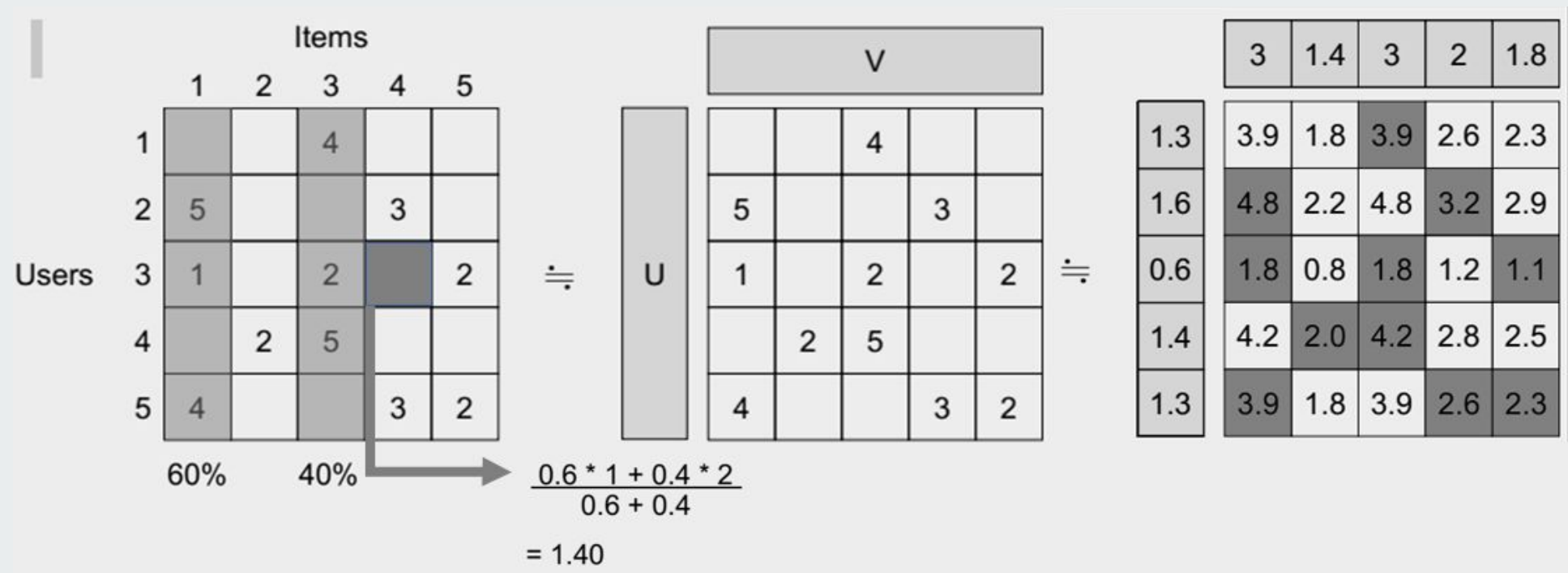
Keywords Searching with NLP

We used natural language processing (NLP) to extract keywords from 1.4 million customer reviews and then **recommend** merchants by user's preferences. We implemented a **rule-based approach** that exploits the grammatical structure of reviews, and extract word tokens from corpus.



Item-based Collaborative Filtering

Implemented item-based collaborative filtering for preference listing. And then made it through **Low-rank matrix factorization** and **one-norm similarity function**.



Interactive Visualization

- Main functions:
- Preference Interface
 - Map Visualization
 - Information Dashboard

mongoDB



The **map visualization** is coded in node.js, which is portable and supports *MongoDB* for **data processing**. The function builds on the foundation of *Leaflet.js* and *Turf.js*.

Why & Innovation

The visualized map combines the information of all the attractions, hotels and restaurants and provides them effectively to the users. The attractions, hotels and restaurants can be **searched and filtered** based on only one visualized map, which can help users effectively find the information they need without **searching** on other websites. It also provides **personalized recommendation** based on **users' interest**.

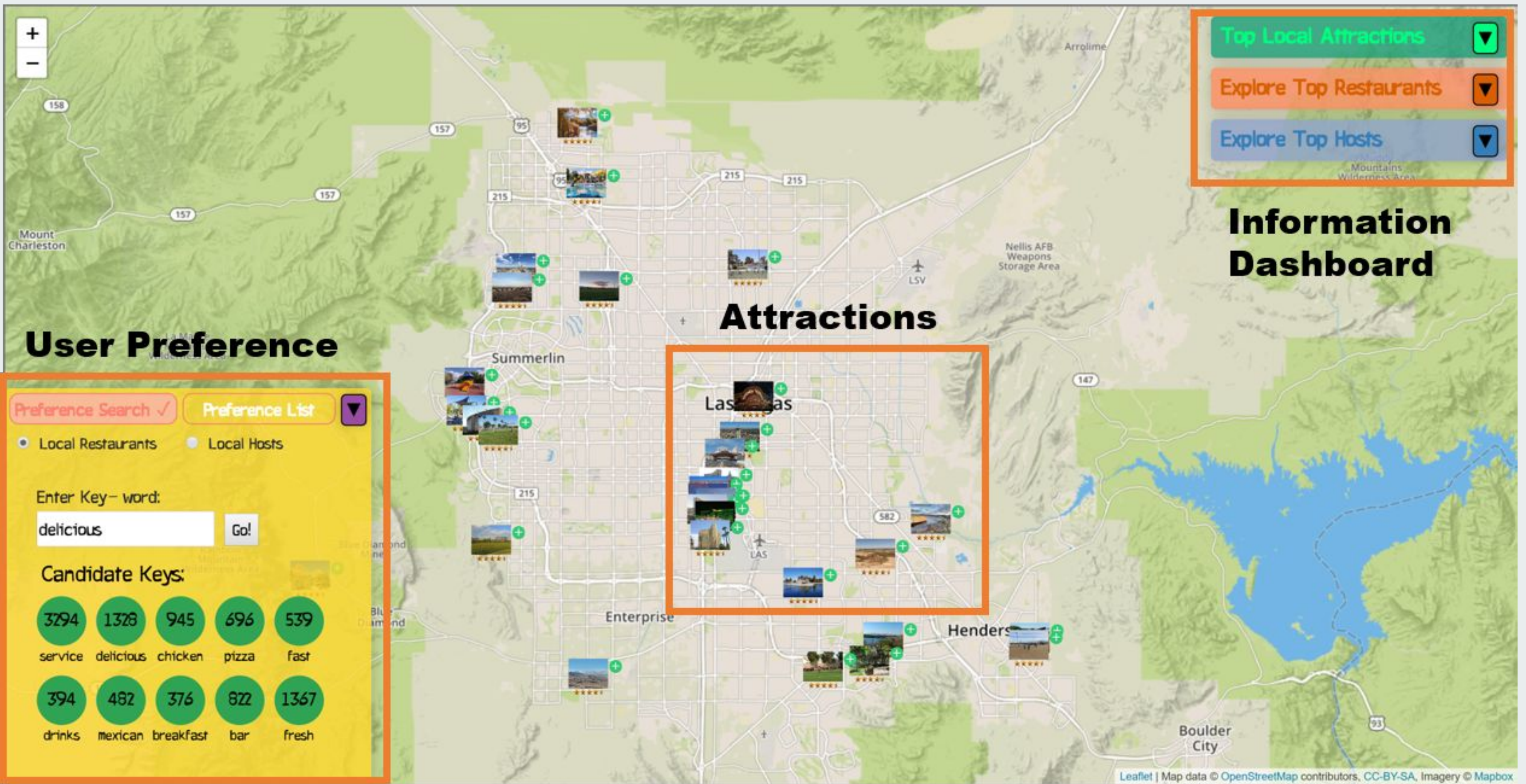
Results: Searches and Recommendations

- Preference listings: Based on the merchants the users selected, we can provide the **10 best matched merchants** according to their characteristics for users, where **average similarity is 0.91**.
- Keywords searching: Based on the preprocessing of 1.4 million of reviews through NLP, we provided fast and accurate **matched merchants** according to **user preferences**.

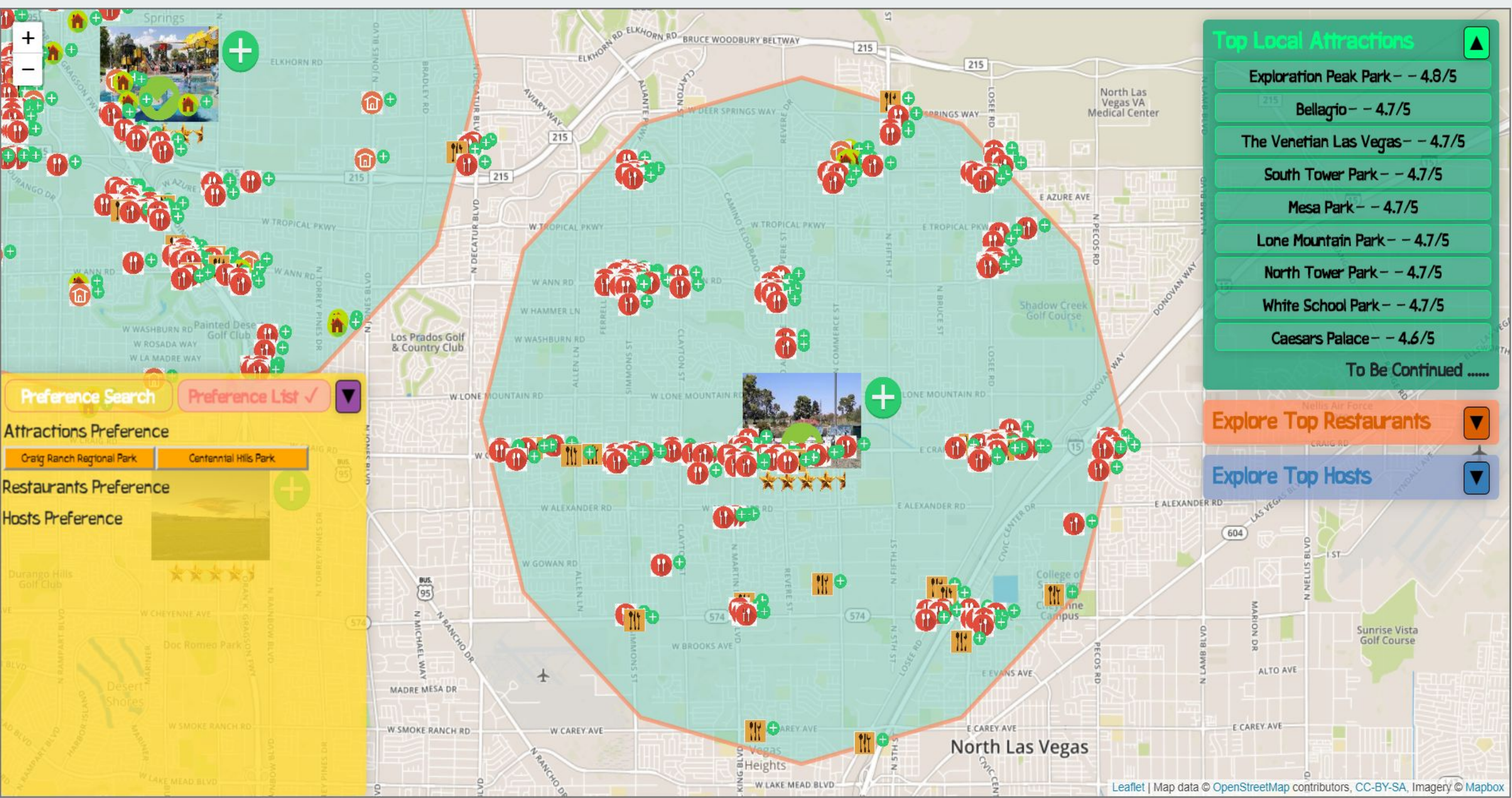
The online algorithms not only take advantages of large existing data, but also provide an efficient and reliable way for **searching and recommendation**.

Results: Map Visualization

Our methods combined all the three information together which improves the efficiency for the **user searching** process. This method can provide visualized map and save labor compared to single searching for travelling in the market at present.



The map gives the attractions in Las Vegas and the user can get information of the **hotels and restaurants** based on the choice of the **attractions**. By clicking the information Dashboard, users can find the **top choices** for each section.



In Preference List, users can add their **interests** into the list and perform information search based on the needs.

Acknowledgement

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