Restaurant Recommendation System

Team Uncertainity
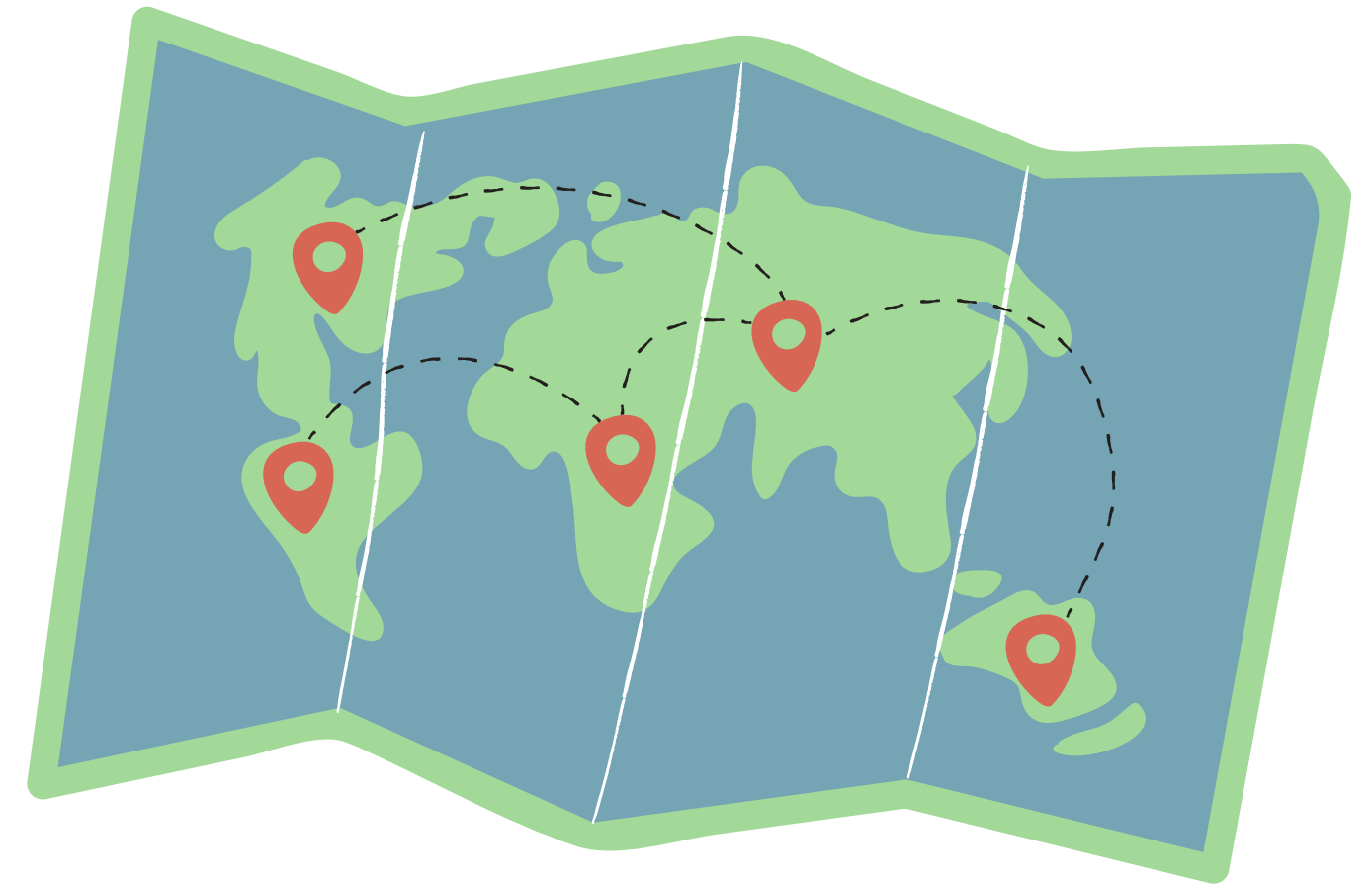
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Travel Agency

**Bob,
The Fox-Traveller**

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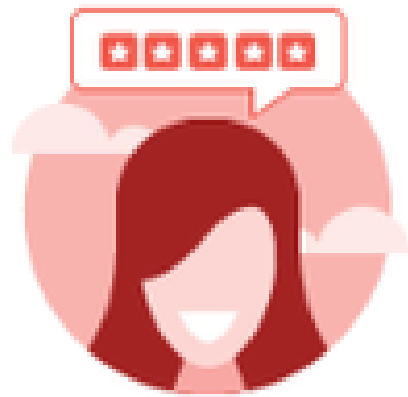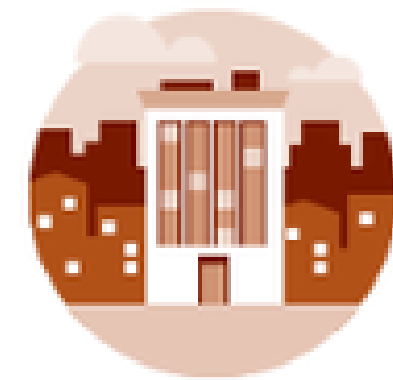
FOOOD!!!

Details of the datasets

8,021,122 reviews

209,393 businesses
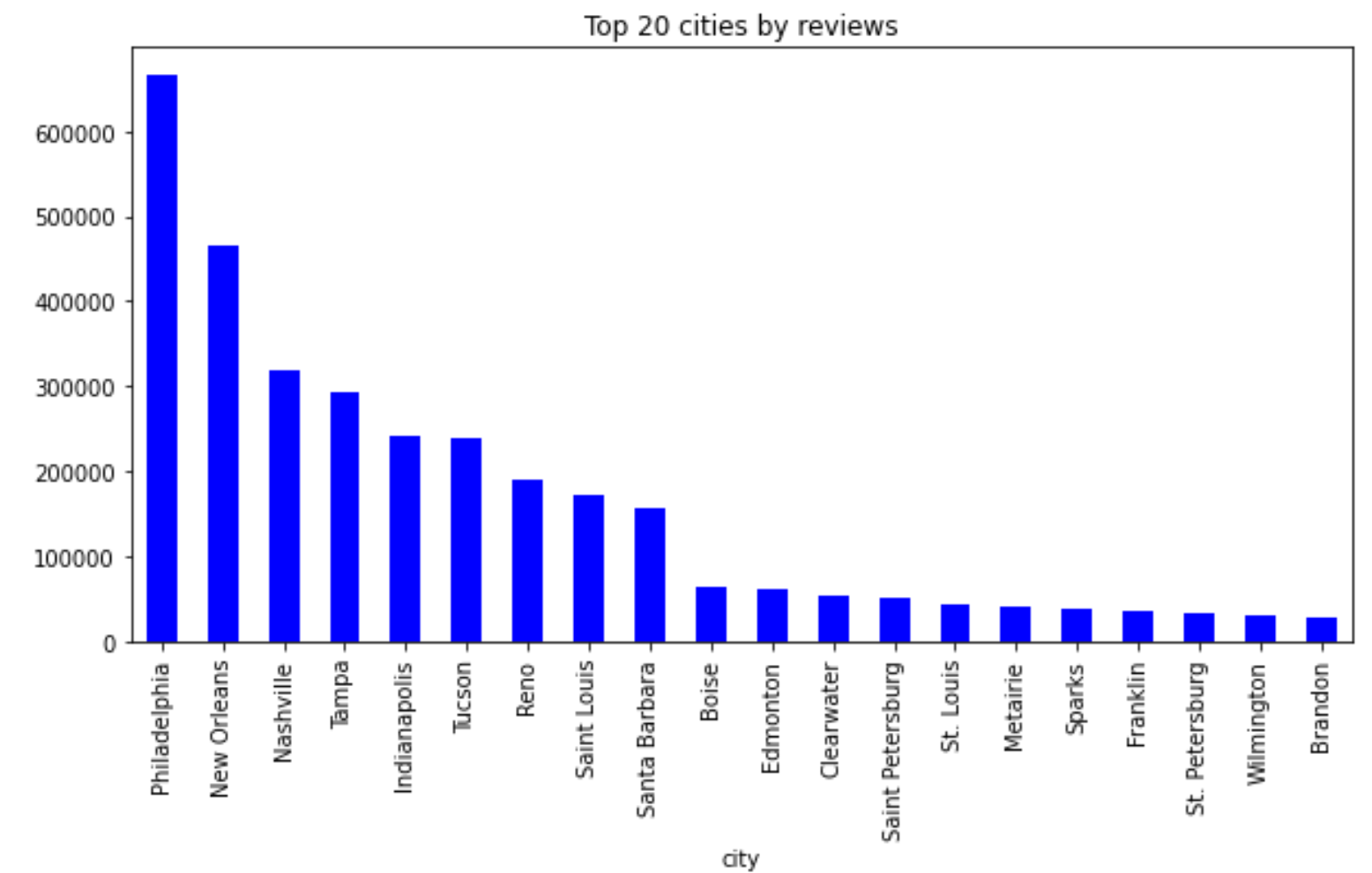
200,000 pictures

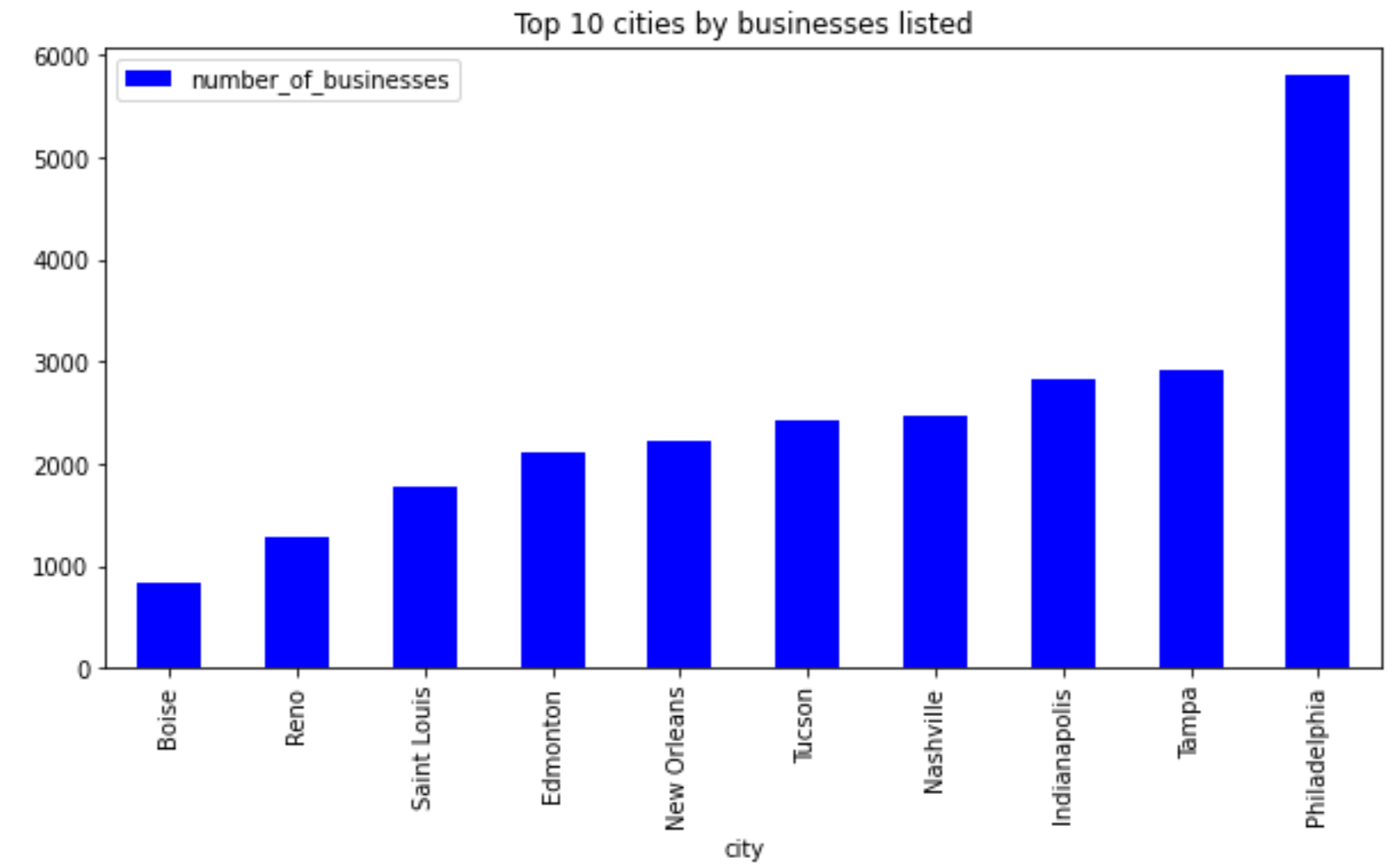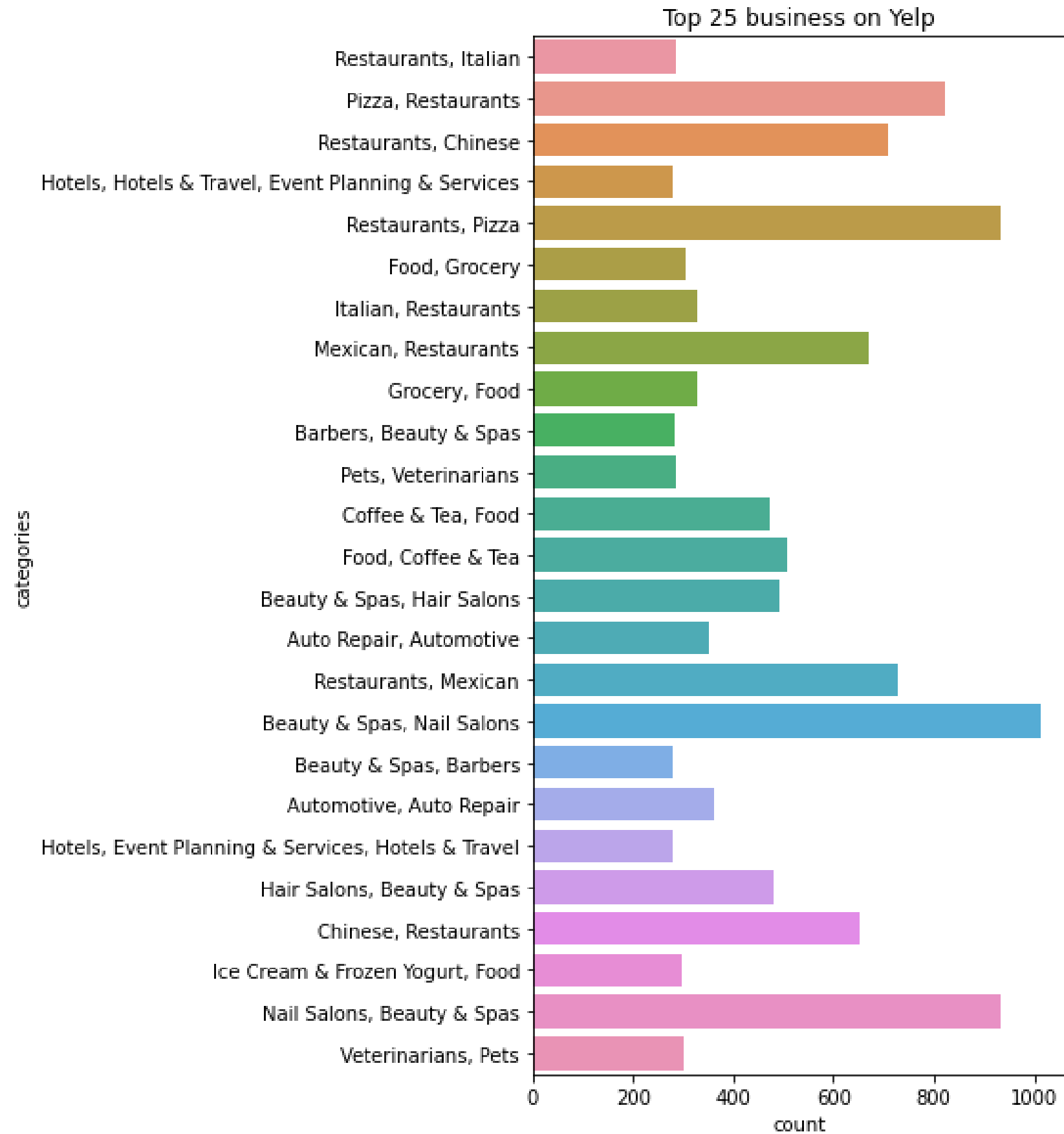10 metropolitan areas

1,320,761 tips by 1,968,703 users
Over 1.4 million business attributes like hours, parking, availability, and ambience
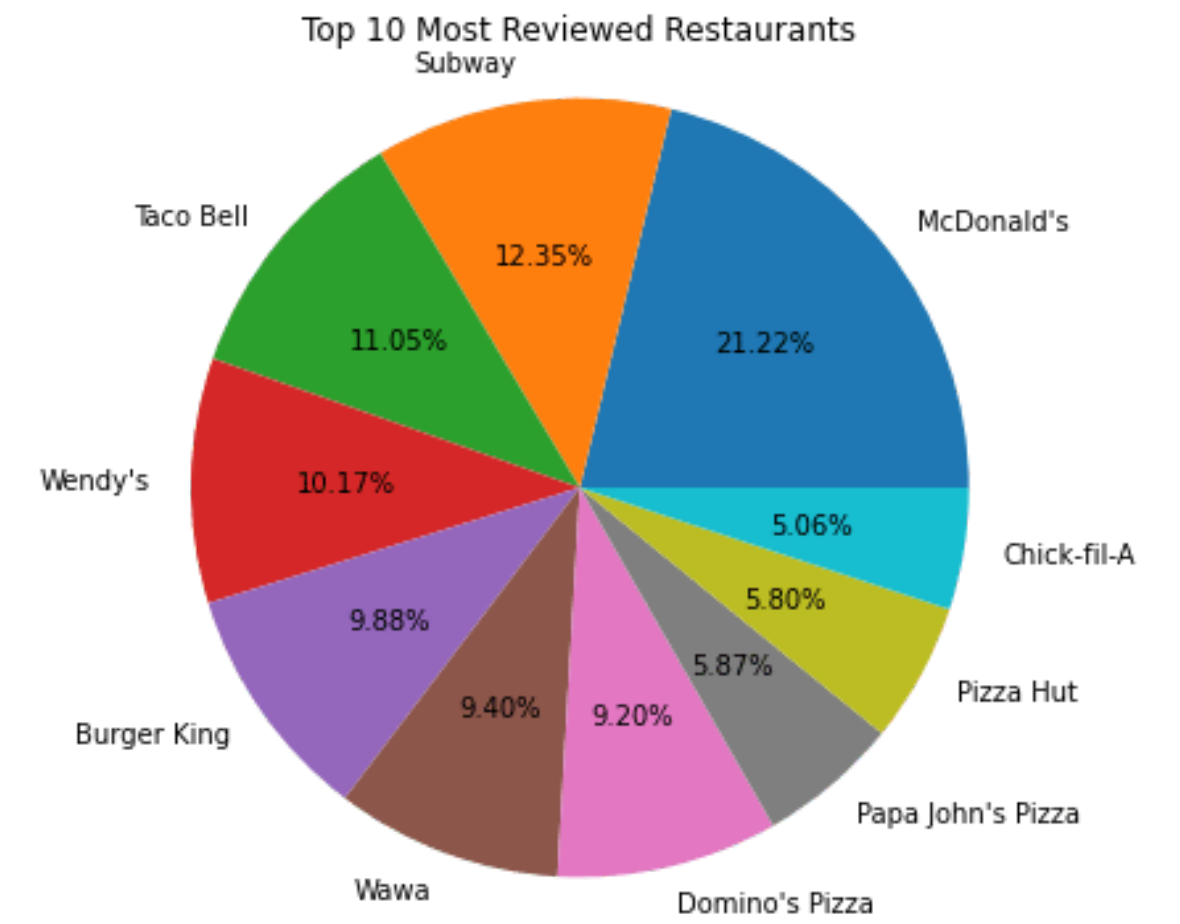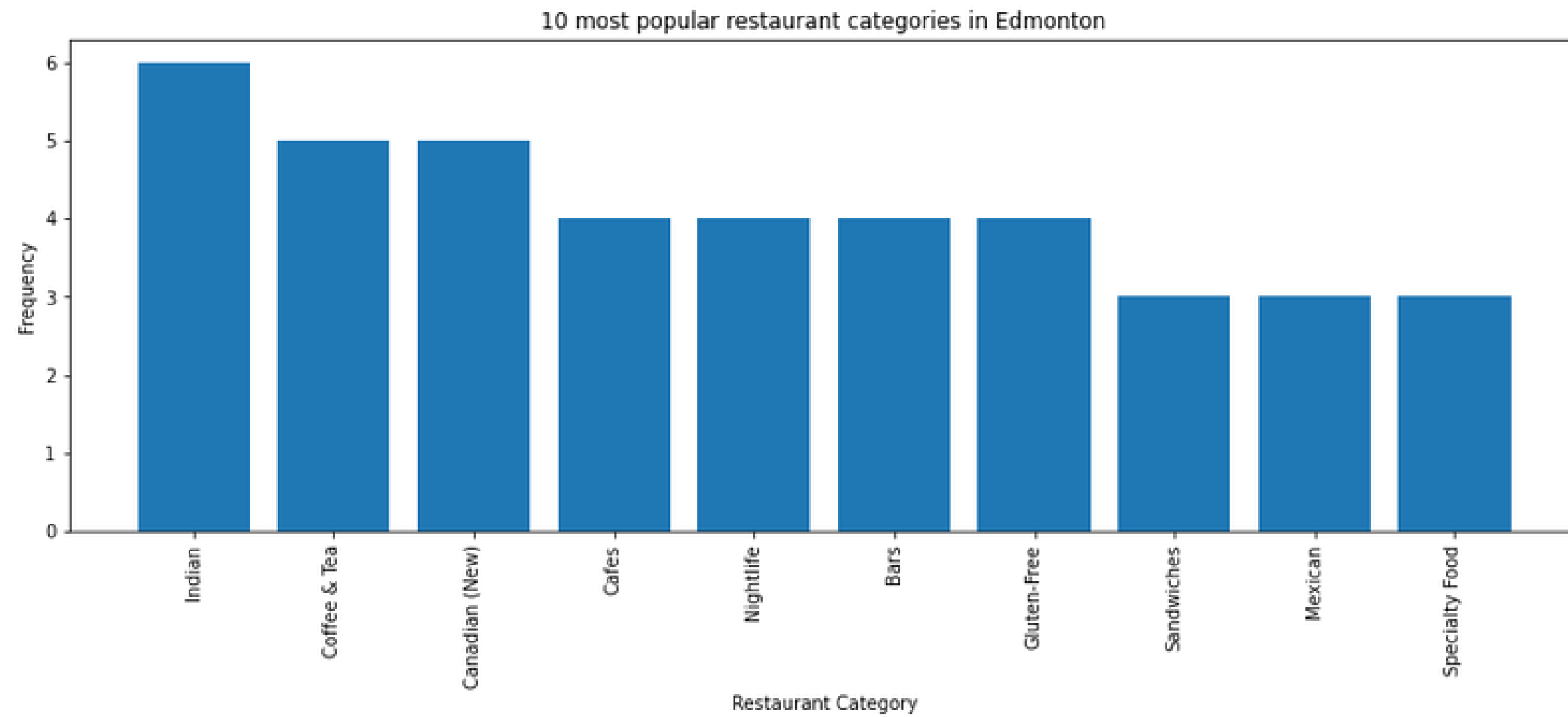Aggregated check-ins over time for each of the 209,393 businesses

yelp

EDA

Top 25 business on Yelp

Top 10 cities by businesses listed

Top 20 cities by reviews

EDA

10 most popular restaurant categories in Edmonton

Top 10 Most Reviewed Restaurants

Similar Restaurants

Get restaurants similar to restaurant_idx

restaurant_idx: 99

Show code

| business_id	name	attributes	categories
2bvABSVn-kChNn0I4BrRJQ	Burger King	{'NoiseLevel': 'u'average'', 'RestaurantsAttir...	Burgers, Fast Food, Restaurants
UrWsPqeJFlf5sGVRZzsuYw	Dunkin'	{'BikeParking': 'False', 'BusinessAcceptsCredi...	Donuts, Coffee & Tea, Restaurants, Food
JBW6XSJQTcCmCFRnUYfJMw	Chicken Now	{'OutdoorSeating': 'False', 'HasTV': 'True', '...	American (New), Food, Chicken Wings, Restaurants
kLMhzIzK1bSohWRMJNmwKw	Nino's Trattoria & Pizzeria	{'RestaurantsTakeOut': 'True', 'OutdoorSeating...	Steakhouses, Burgers, Restaurants, Pizza, Hot ...
PJjkH_VZeQwxEJvIQ-v7wA	Pho 75	{'NoiseLevel': 'u'average'', 'RestaurantsAttir...	Restaurants, Asian Fusion, Vietnamese
E8RHLvnRi_76ryF9IOHoJA	Valentino's	{'RestaurantsTakeOut': 'True', 'OutdoorSeating...	Pizza, Restaurants, Food

The above dataframe shows similar restaurants to idx=99 ie Burger King (first row of the dataframe). We can aproximate this similarity from the columns 'attributes' and 'categories'. We see that the restaurants recommends fast-food places in categories such as pizzas, burgers and donuts and with similar attributes such as noiseLevel:average and RestaurantTakeOut as True

MODEL SELECTION

Recommendation System using randomly initialized latent vectors
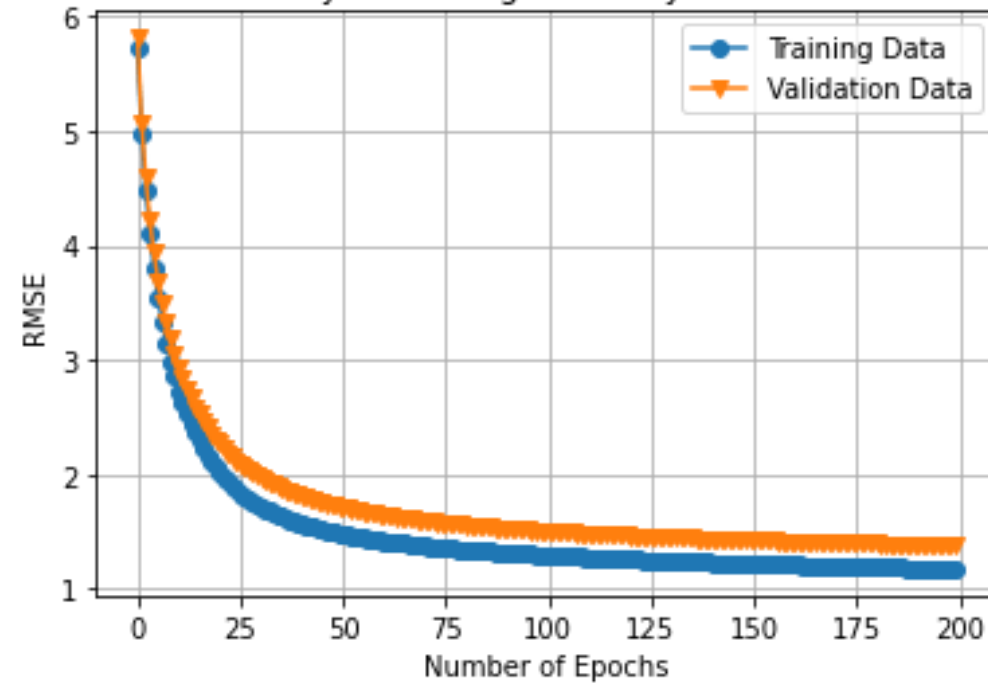
Recommendation System using Restaurant Features
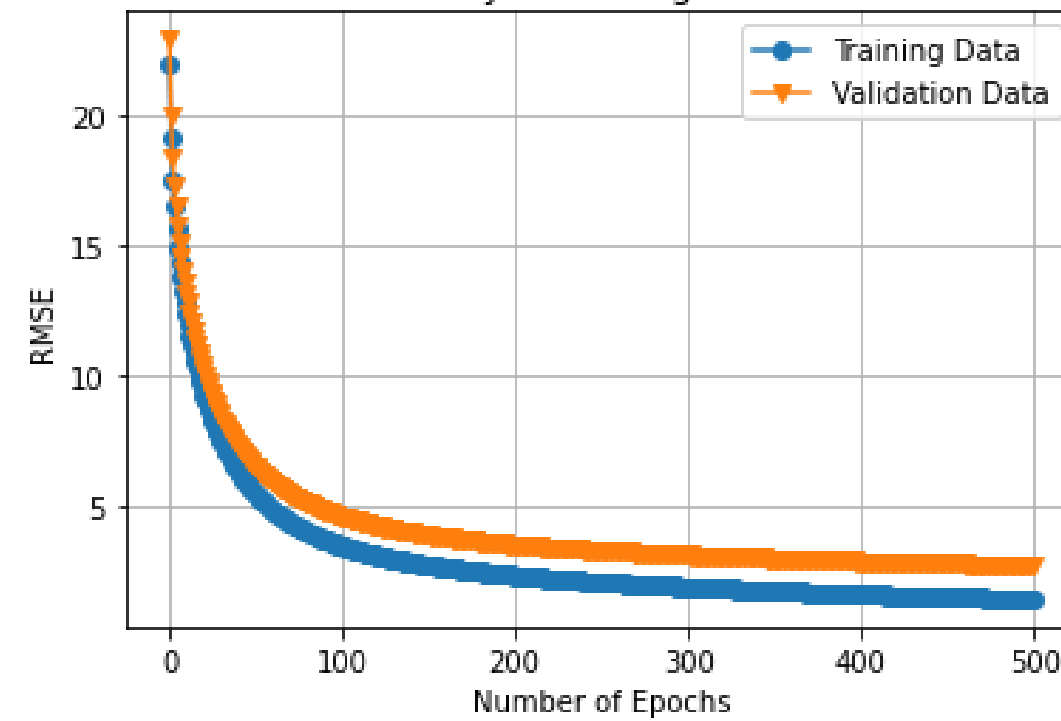
Recommendation System with PCA on restaurant features
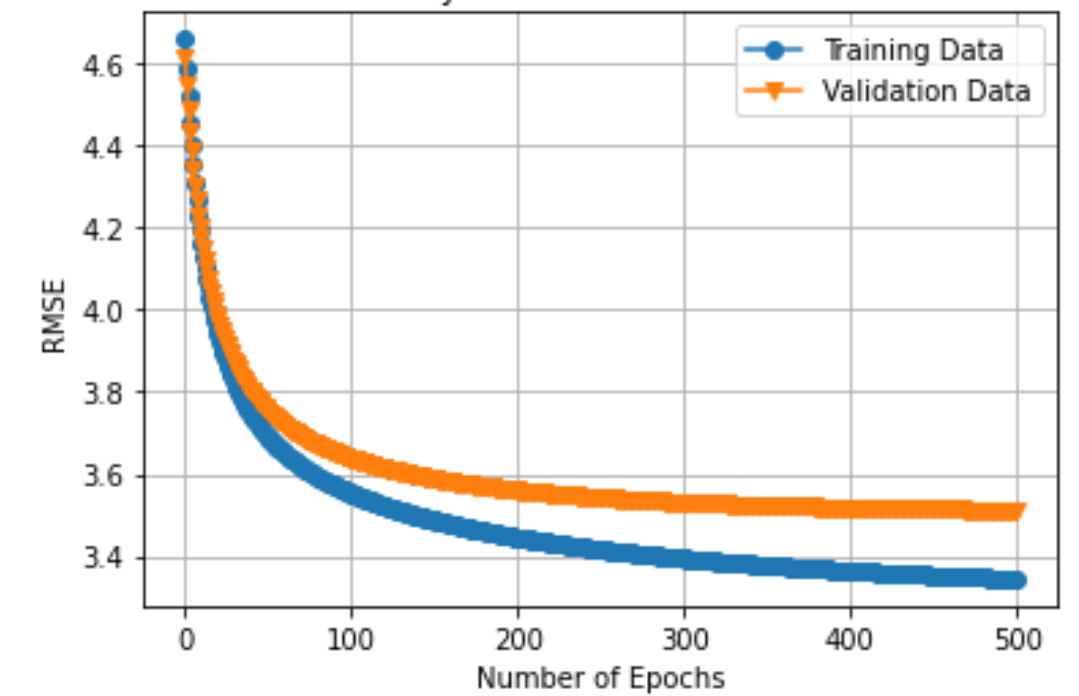
Sr. no.	CF Recommender type	RMSE
1	CF Recommender using randomly initialized latent vectors	1.44
2	CF Recommender using restaurant features	2.81
3	CF Recommender with PCA on restaurant features	3.51

RESULTS

Making recommendations

Enter User index to make recommendations.

user_index: 10

number_of_recommendations: 5

Show code

business_id	name	ratings	attributes	categories
5DJ2sDvM_XRndIB24DnxYw	Adele's	3.817270	{'Alcohol': 'u'full_bar'', 'NoiseLevel': 'u'av...	Cocktail Bars, Restaurants, American (New), Ev...
Hh8jUR0mtVXkAnv8XDZjyA	Sierra St Kitchen & Cocktails	3.880802	{'RestaurantsTakeOut': 'True', 'BestNights': ...	Bars, Nightlife, Restaurants, Wine Bars, Salad...
Z8c0t6xPfM8u1H1ZUcWIOw	Anzie Blue	3.925363	{'OutdoorSeating': 'True', 'DogsAllowed': 'Tru...	Cafes, Cocktail Bars, Cosmetics & Beauty Suppl...
JSjKDbPTsv4mWd3P5nRkfw	Water's Edge Gastropub and Lounge	3.970727	{'WiFi': 'u'free'', 'Alcohol': 'u'full_bar'', ...	Bartenders, Venues & Event Spaces, Lounges, Am...
tavK8PX3ysc8DRFEB8AITA	Quality Foods Market	4.026233	{'WiFi': 'u'free'', 'HasTV': 'True', 'DogsAllo...	Salad, Grocery, Specialty Food, Delis, Food, B...

Future Works

We can make a Semantically Aware Explainable Recommender System using Asymmetric Matrix Factorization: The semantic data can be a source of knowledge for the system about both users and items, which can then be used to create meaningful explanations from the relations between both. If a semantic feature belongs to an item; in our case, a restaurant category such as serving vegetarian food or so like young, male are semantic features of the word boy which can be converted to binary. So, this way we can generate more features, or recommend specific restaurants to users.

Conclusion

According to our RMSE score, Recommendation System using randomly initialized latent vectors looks performing better with RMSE equal to 1.38 followed by Recommendation System using Restaurant features and Using PCA on restaurant features with RMSE 2.74 and 3.51 respectively.