Best Neighborhood in Denver, Colorado, USA

About Denver

- Known as 'Mile High City'

- Considered as one of the major cities in United States

- Also considered as one of top cities for job prospects and business owners

- City with 4 major professional sports teams

Aim of the project

To give analysis about the best Denver neighborhoods for families, workers, and students based on crimes and venues data

Data Collection

- Denver Crime Data

    Taken from Denver Open Data Catalog (https://www.denvergov.org/media/gis/DataCatalog/crime/csv/crime.csv)

- Denver neighborhoods

    Taken from Wikipedia (https://en.wikipedia.org/wiki/List_of_neighborhoods_in_Denver)

- Denver venues

    With the help of Foursquare API

Data Preprocessing

Denver Neighborhoods

- Web scrapped from Wikipedia using Beautiful Soup API
- Added 2 columns, Latitude and Longitude of each neighborhoods
- Fetched latitude and longitude data of each neighborhood using Geopy. Because there were some inaccurate locations, some of the neighborhood were filled manually

Data Preprocessing (cont.)

Denver Crime Data

- Taken from the website, then saved into csv file

- Because the amount of data was way too many (> 470000 rows), the data that used in this project only limited to the crimes that happened between 1st January 2018 until 29th February 2020. The traffic collision data was also removed beforehand.

- Dropped some irrelevant columns to simplify further analysis

- Changed some categories in 'All Other Crimes' category based on the type of crime to generalized more crime types and reduced the number of major crimes in 'All Other Crimes' category.

Data Preprocessing (cont.)

Denver Venues

- Limited to 50 venues per neighborhood with radius of 650 meters
- Because there were more than 250 venue categories, some of the categories were simplified into one category, for example Beach Bar, Piano Bar, and Cocktail Bar into Bar category.

Methodology

- Geopy

    In order to get the latitude and longitude of a neighborhood, Geopy is used in this project. However, there were several incorrect / inaccurate location data. Manual search in Google map also used in order to compensate for the inaccurate location data

- Folium

    Folium is used for map visualization of Denver neighborhoods

- One Hot Encoding

    One Hot Encoding is used for k-Means clustering. The dataframe is transformed into categorical value of 0 and 1
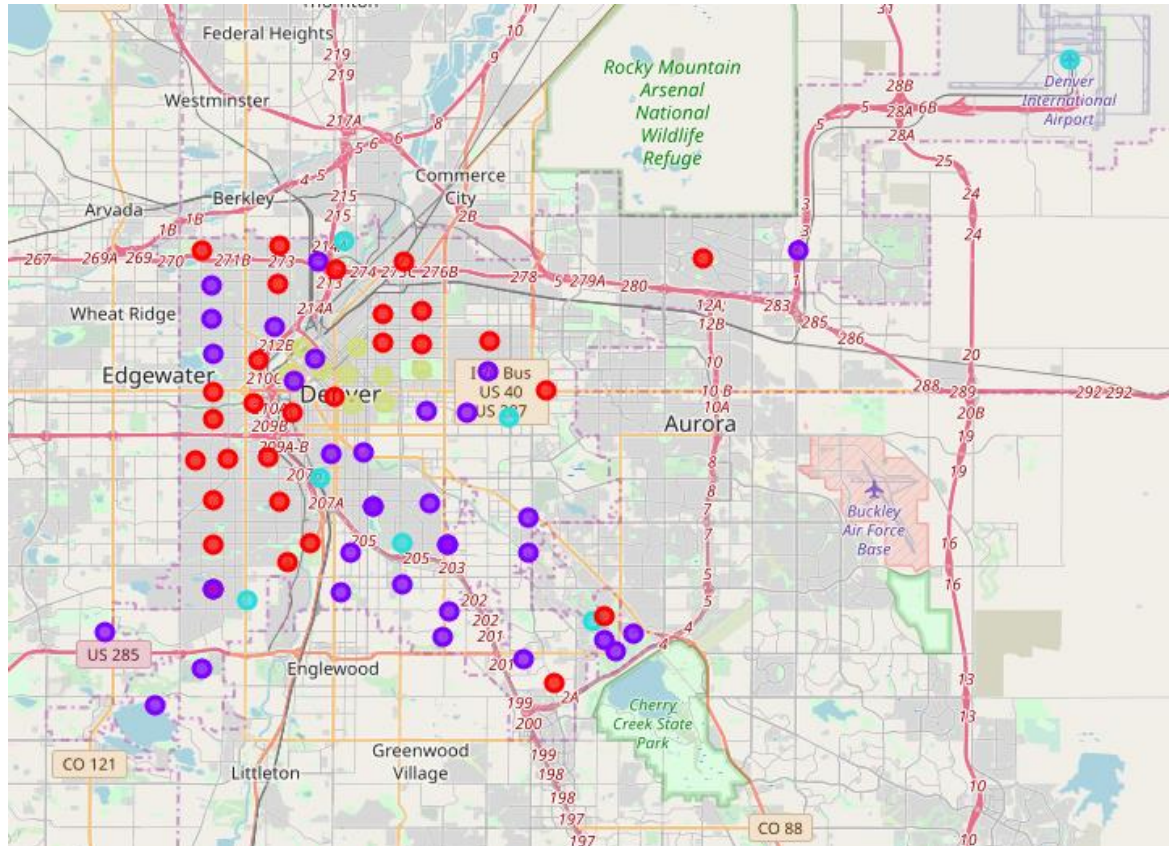
Methodology (cont.)

- Top 5 most occurred crimes / most common venues in Denver

    To help with further analysis, only top 5 of most occurred crimes and most common venues in Denver were chosen.
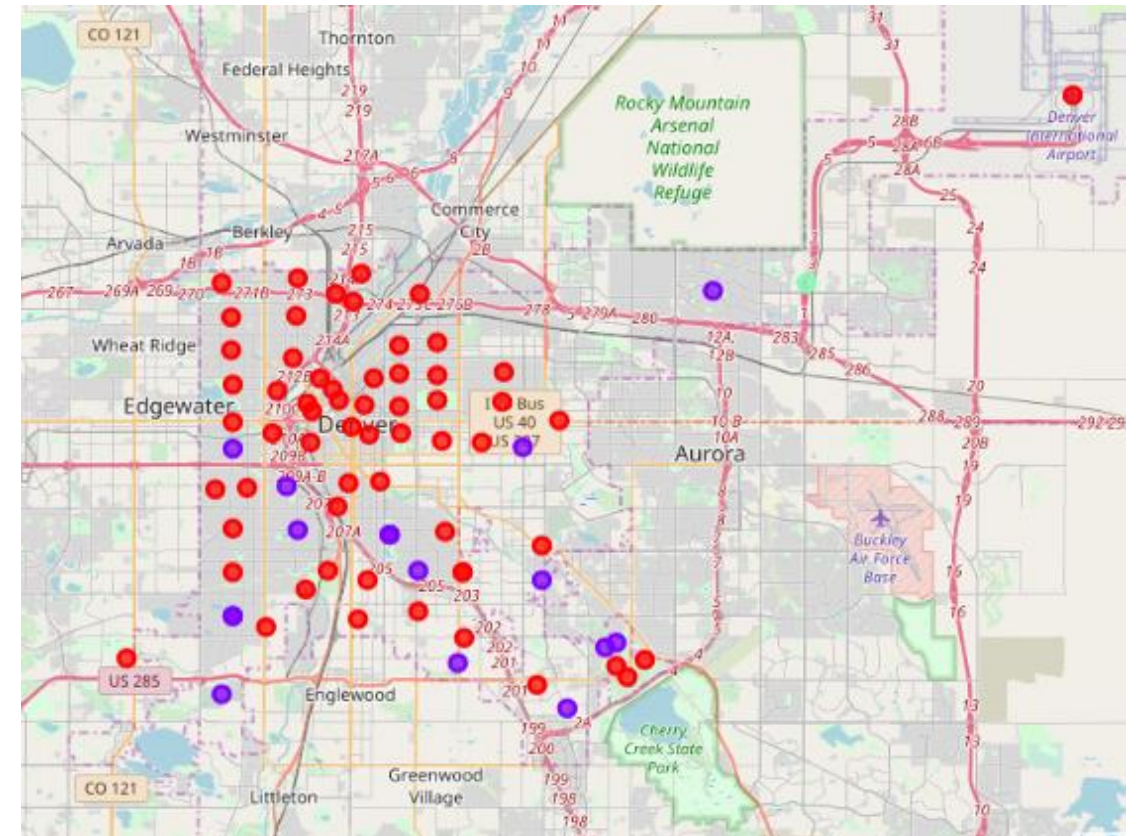
- K-Means Clustering

    The machine learning algorithm in this project is Clustering. K-Means was chosen as the most suitable algorithm for clustering each neighborhoods by crime data / venues data

Results

4 clusters of neighborhood based on Denver crimes data

3 clusters of neighborhood based on Denver venues data

Discussion

Some changes were made in the cluster labels of both results dataframe to simplify the analysis.

Denver Crimes Data
- Cluster 0 (Red)   : Safest
- Cluster 1 (Purple)   : The most unsafe
- Cluster 2 (Turquoise)   : Unsafe
- Cluster 3 (Yellow)   : Neutral

Denver Venues Data
- Cluster 0 (Red)   : Workers / Students
- Cluster 1 (Purple)   : Families
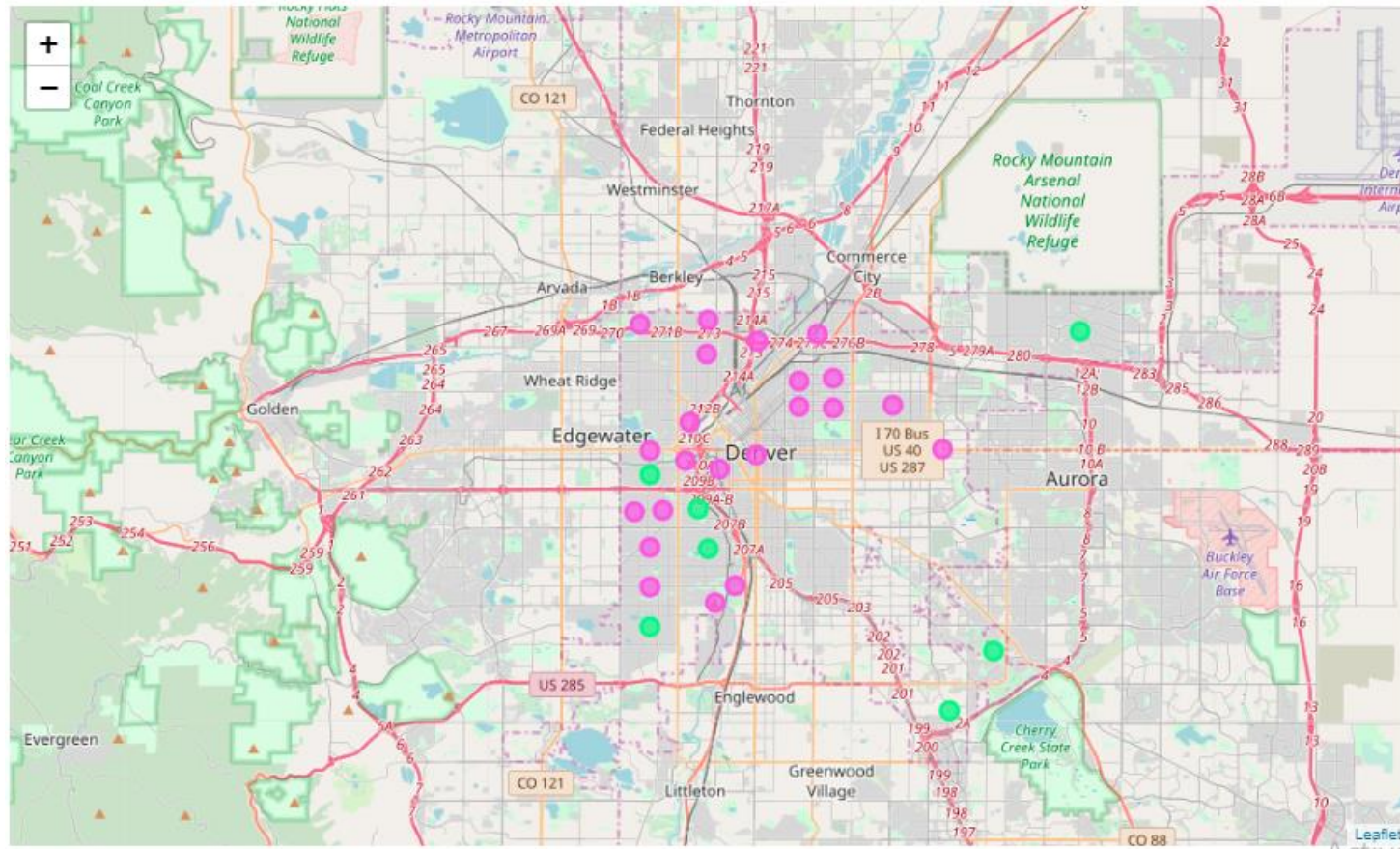- Cluster 2 (Turquoise)   : Everyone

Conclusion

The safest neighborhood in Denver for each targeted groups (Families / Workers / Students) are :

	NEIGHBORHOOD	LATITUDE_x	LONGITUDE_x	Targeted Groups	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	LATITUDE_y	LONGITUDE_y	Safety Level
8	Civic Center	39.738181	-104.987744	Students / Workers	Nightclub / Pub	Museum	Marijuana Dispensary	Yoga Studio	Breakfast Spot	39.738181	-104.987744	Safest
10	Lincoln Park	39.733149	-105.005190	Students / Workers	Café	Bar	Coffee Shop	Art Gallery	Steakhouse	39.733149	-105.005190	Safest
16	East Colfax	39.740629	-104.897748	Students / Workers	Bar	South American Restaurant	Tattoo Parlor	Latin American Restaurant	Fast Food Restaurant	39.740629	-104.897748	Safest
25	Clayton	39.766760	-104.950199	Students / Workers	Mexican Restaurant	Coffee Shop	Market	Marijuana Dispensary	Liquor Store	39.766760	-104.950199	Safest
26	Cole	39.765630	-104.966557	Students / Workers	Park	European Restaurant	Perfume Shop	Nightclub / Pub	Convenience Store	39.765630	-104.966557	Safest
27	Elyria-Swansea	39.782958	-104.958113	Students / Workers	Farm	Intersection	Sports Venue	Boxing Gym	Mexican Restaurant	39.782958	-104.958113	Safest
29	Globeville	39.780732	-104.986972	Students / Workers	Bar	Park	Metro Station	Sporting Goods Shop	Hotel	39.780732	-104.986972	Safest
30	North Park Hill	39.756826	-104.921732	Students / Workers	Clothing Store	Arts & Crafts Store	Snack / Dessert	Food	Brewery	39.756826	-104.921732	Safest
32	Skyland	39.755713	-104.950224	Students / Workers	Zoo Exhibit	Gift Shop	Snack / Dessert	American Restaurant	Exhibit	39.755713	-104.950224	Safest
33	Whittier	39.756363	-104.966558	Students / Workers	Sports Venue	Park	Grocery Store	Café	Bar	39.756363	-104.966558	Safest
36	Montbello	39.784223	-104.831154	Families	Park	Sports Venue	Business Service	Food	Spa	39.784223	-104.831154	Safest
37	Northeast Park Hill	39.665239	-104.872474	Families	Steakhouse	Gym	Park	Deli / Bodega	Auto Dealership	39.665239	-104.872474	Safest
41	Chaffee Park	39.788442	-105.010995	Students / Workers	Grocery Store	Clothing Store	Thrift / Vintage Store	Liquor Store	Mexican Restaurant	39.788442	-105.010995	Safest
43	Jefferson Park	39.750621	-105.019779	Students / Workers	Mexican Restaurant	Theme Park Ride / Attraction	Bar	Brewery	Asian Restaurant	39.750621	-105.019779	Safest
44	Regis	39.786779	-105.043968	Students / Workers	Convenience Store	Golf Course	Burrito Place	Liquor Store	Zoo	39.786779	-105.043968	Safest
46	Sunnyside	39.775680	-105.011696	Students / Workers	Coffee Shop	Mexican Restaurant	Bar	Park	Japanese Restaurant	39.775680	-105.011696	Safest
49	Overland	39.689988	-104.997874	Students / Workers	Coffee Shop	Furniture / Home Store	Miscellaneous Shop	Mexican Restaurant	Pharmacy	39.689988	-104.997874	Safest
58	Goldsmith	39.643414	-104.894206	Families	Asian Restaurant	Mexican Restaurant	Park	Liquor Store	Distillery	39.643414	-104.894206	Safest
65	Harvey Park	39.674664	-105.039167	Families	Mexican Restaurant	Lake	Construction & Landscaping	Recreation Center	Park	39.674664	-105.039167	Safest
67	Athmar Park	39.703682	-105.010741	Families	Warehouse Store	Home Service	Park	Bakery	Discount Store	39.703682	-105.010741	Safest
68	Barnum	39.717683	-105.032455	Students / Workers	Home Service	Convenience Store	Marijuana Dispensary	Market	Gym	39.717683	-105.032455	Safest
69	Barnum West	39.717155	-105.046497	Students / Workers	Mexican Restaurant	Discount Store	Snack / Dessert	Convenience Store	American Restaurant	39.717155	-105.046497	Safest
70	Mar Lee	39.689192	-105.039141	Students / Workers	Fried Chicken Joint	Business Service	Discount Store	Check Cashing Service	Park	39.689192	-105.039141	Safest
71	Ruby Hill	39.683598	-105.007205	Students / Workers	Ski Area	Park	Music Venue	Liquor Store	Marijuana Dispensary	39.683598	-105.007205	Safest
72	Sun Valley	39.736379	-105.021459	Students / Workers	Brewery	Gym / Fitness Center	Bar	Hot Dog Joint	Taco Place	39.736379	-105.021459	Safest
73	Valverde	39.718301	-105.015823	Families	Park	Brewery	Indie Theater	Gym / Fitness Center	Business Service	39.718301	-105.015823	Safest
74	Villa Park	39.730727	-105.039212	Families	Park	Liquor Store	Home Service	Food & Drink Shop	European Restaurant	39.730727	-105.039212	Safest
75	West Colfax	39.740093	-105.039202	Students / Workers	Coffee Shop	Convenience Store	Mexican Restaurant	Snack / Dessert	Bar	39.740093	-105.039202	Safest
76	Westwood	39.704193	-105.039174	Students / Workers	Mexican Restaurant	Museum	Liquor Store	Distillery	Farm	39.704193	-105.039174	Safest

Conclusion (cont.)

The safest neighborhood in Denver for each targeted groups (Families / Workers / Students) mapped in Folium :

Green indicates that the neighborhoods are the safest and more suitable for families
Pink indicates that the neighborhoods are the safest and more suitable for workers or students