



Deciding The Neighborhood due to Relocation and Finalizing Amenities for Settlement with Family



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Introduction



- Deciding to shift to a new city means analyzing cost and property index
- Relocation to a different city means
 - looking for safe neighborhood and accommodation. Safety in terms of number of crimes in each neighborhood and looking for residential complexes there.
 - provides convenient access to basic amenities like schools etc.
 - Looking for Airbnb complexes. Predicting their prices based on neighborhood , property type and amenities.



Data Acquisitions

- Data about cost of living index and property price index for all the major world cities from <https://www.numbeo.com/>
- Chicago is divided into 77 community areas. Data about neighborhoods in each community area from https://en.wikipedia.org/wiki/Community_areas_in_Chicago
- Open source Chicago 2018 Crime data from <https://data.cityofchicago.org>
- FourSquare website www.foursquare.com to explore the neighborhood of Chicago Using the API to look for Residential Complexes and schools in safe neighborhoods.
- Data about Chicago Airbnb listings data is downloaded from <http://insideairbnb.com/get-the-data.html>



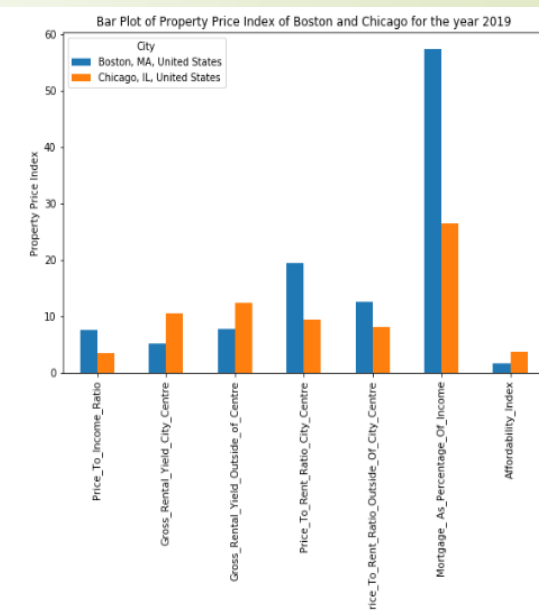
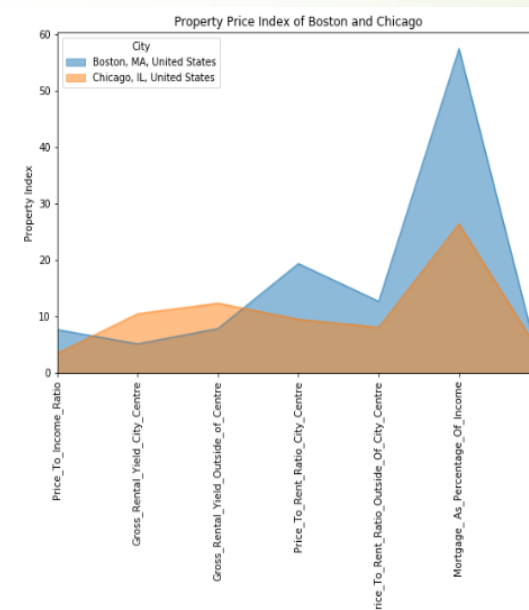
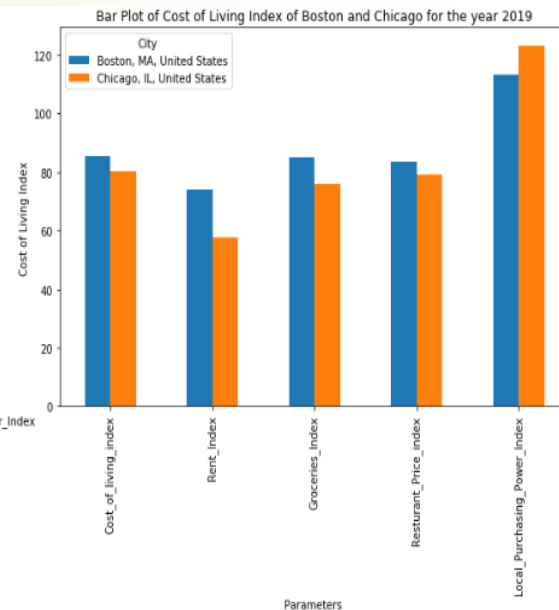
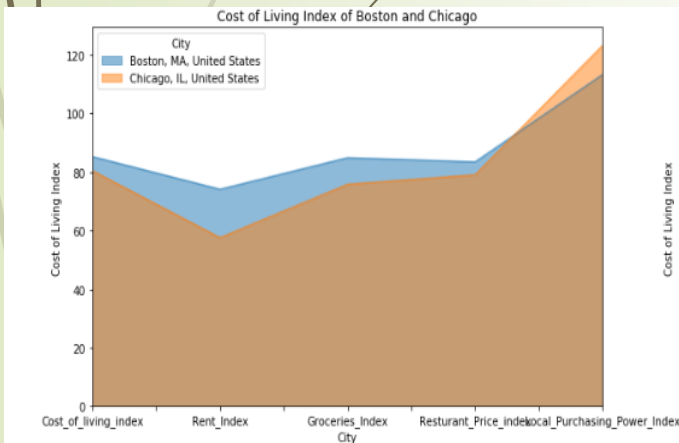
Data Cleaning



- Data scraped from sources like www.numbeo.com and Wikipedia was spread across multiple tables, it had to be scraped and loaded in a dataframe.
- Crime data from <https://data.cityofchicago.org/> had a lot of missing values. No information regarding neighborhoods. So details had to be merged with neighborhood data from Wikipedia.
- Chicago 2018 Crime records had missing values. Values of XCoordinate, YCoordinate, latitudes, longitudes and location were missing for many. Location column was duplicate information as longitude latitude were mentioned separately.
- Airbnb datasets also had missing values in many columns like bathrooms, bedrooms, review_scores_rating, cleaning_fee, security_deposit, host_location, host_about, host_response_time. Price was zero in some row had to be handled.
- Data was analyzed to check if these rows can be ignored or should be filled with zero or mean values. Slightly correlated features were kept, others were dropped from the dataset. Categorical data was converted to numeric using one hot encoding.

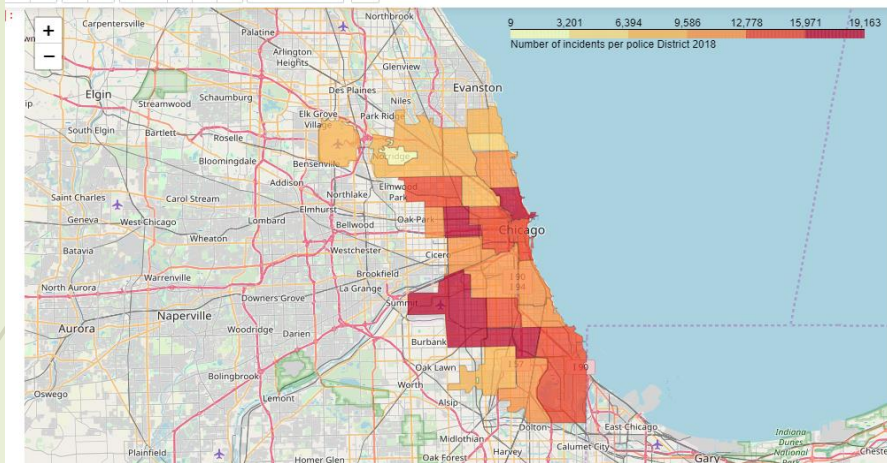
Methodology-Boston Vs Chicago- Choosing the relocation city

City	Boston, MA, United States	Chicago, IL, United States
Price_To_Income_Ratio	7.69	3.51
Gross_Rental_Yield_City_Centre	5.16	10.50
Gross_Rental_Yield_Outside_of_Centre	7.87	12.36
Price_To_Rent_Ratio_City_Centre	19.38	9.52
Price_To_Rent_Ratio_Outside_Of_City_Centre	12.70	8.09
Mortgage_As_Percentage_Of_Income	57.44	26.41
Affordability_Index	1.74	3.79

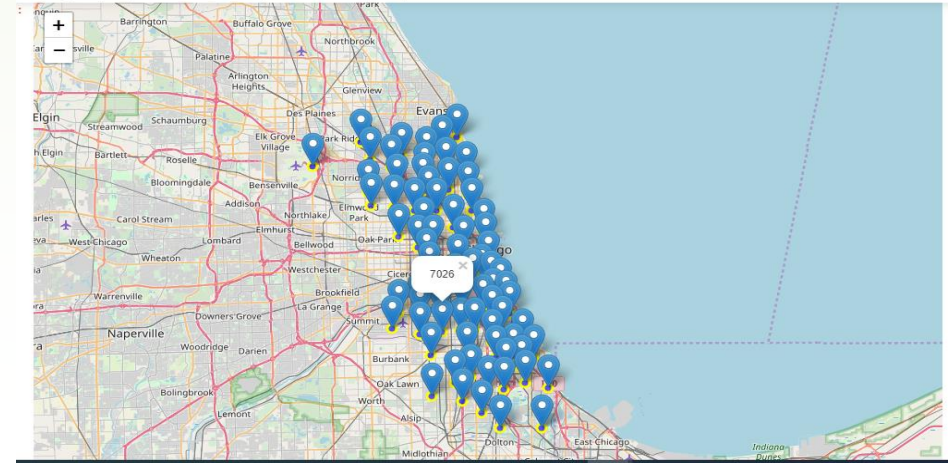


Chicago had lower cost of living index and affordability ratio

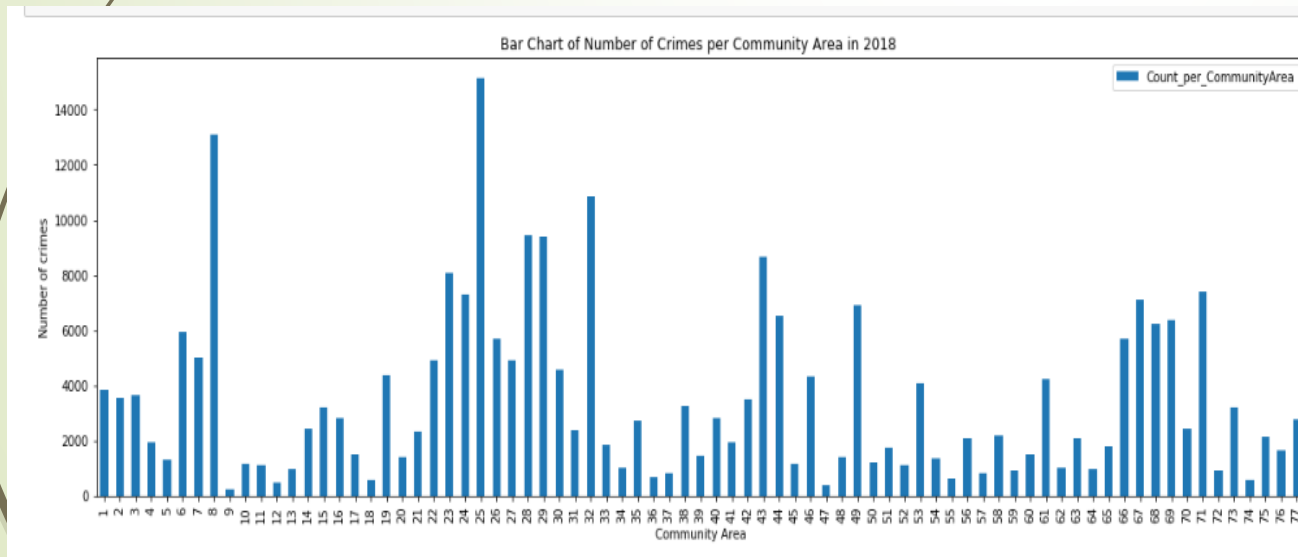
Determining safe Neighborhoods



Map showing crimes per district



Map showing crimes per community Areas



The top 5 safest community Areas were 9, 47, 12, 74 and 18. (Edison Park, Burnside, Forest Glen, Mount Greenwood, Montclare)

Exploring the Neighborhood

```
neighborhoods_venues_sorted.head()
```

	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
0	Archer Heights	Mexican Restaurant	Bakery	Gas Station	Hot Dog Joint	Pharmacy	Nightclub	Cosmetics Shop	Mobile Phone Shop	Rental Car Location	Rental Service
1	Beverly	Park	Souvenir Shop	Wings Joint	Discount Store	Dry Cleaner	Fast Food Restaurant	Financial or Legal Service	French Restaurant	Fried Chicken Joint	Gas Station
2	Brynford Park	Korean Restaurant	Sandwich Place	Bus Station	Coffee Shop	Park	Japanese Restaurant	Radio Station	College Quad	College Bookstore	Soccer Field
3	Burnside	Intersection	Train Station	Convenience Store	Construction & Landscaping	Wings Joint	Gas Station	Fast Food Restaurant	Financial or Legal Service	French Restaurant	Fried Chicken Joint
4	Chrysler Village	Video Store	Pizza Place	American Restaurant	Convenience Store	Gay Bar	Fried Chicken Joint	Mexican Restaurant	Nightclub	Fast Food Restaurant	Donut Shop

Foursquare API used to explore the neighborhoods. Venues were clustered. Cluster 2 had all amenities nearby.

CommunityCode	Longitude	Latitude	Cluster Labels	Neighborhood	1st Most Common Venue	2nd Most Common Venue	3rd Most Common Venue	4th Most Common Venue	5th Most Common Venue	6th Most Common Venue	7th Most Common Venue	8th Most Common Venue	9th Most Common Venue	10th Most Common Venue
9	-87.813081	42.006482	1	Edison Park	Italian Restaurant	Mexican Restaurant	Pizza Place	Spa	Liquor Store	French Restaurant	Deli / Bodega	Hot Dog Joint	Soccer Field	Res
47	-87.597472	41.727392	1	Burnside	Intersection	Train Station	Convenience Store	Construction & Landscaping	Wings Joint	Gas Station	Fast Food Restaurant	Financial or Legal Service	French Restaurant	Res
18	-87.798532	41.928947	1	Montclare	Wings Joint	Pizza Place	Home Service	Financial or Legal Service	Gas Station	Dry Cleaner	Fast Food Restaurant	French Restaurant	College Bookstore	C
55	-87.544482	41.656561	1	Hegewisch	Chinese Restaurant	Lounge	Deli / Bodega	Pet Store	Market	Pizza Place	Golf Course	Grocery Store	College Bookstore	Gi
57	-87.727011	41.806666	1	Archer Heights	Mexican Restaurant	Bakery	Gas Station	Hot Dog Joint	Pharmacy	Nightclub	Cosmetics Shop	Mobile Phone Shop	Rental Car Location	Rer L
37	-87.632231	41.804750	1	Fuller Park	Bus Station	Train Station	Optical Shop	Restaurant	Wings Joint	Gas Station	Dry Cleaner	Fast Food Restaurant	College Bookstore	Fi c
59	-87.674325	41.830451	1	McKinley Park	Diner	Thrift / Vintage Store	Chinese Restaurant	Seafood Restaurant	Discount Store	Mexican Restaurant	Gas Station	Pharmacy	College Bookstore	B
64	-87.767073	41.778296	1	Chrysler Village	Video Store	Pizza Place	American Restaurant	Convenience Store	Gay Bar	Fried Chicken Joint	Mexican Restaurant	Nightclub	College Bookstore	Fa Res
13	-87.716362	41.984665	1	Brynford Park	Korean Restaurant	Sandwich Place	Bus Station	Coffee Shop	Park	Japanese Restaurant	Radio Station	College Quad	College Bookstore	(

Searching for Schools and Residential Complex

	name	categories	address	cc	city	country	crossStreet	distance	formattedAddress	labeledLatLngs	lat	lon
0	Administration Building, Lincolnwood School District	Government Building	6950 N East Prairie Rd	US	Lincolnwood	United States	NaN	836	[6950 N East Prairie Rd, Lincolnwood, IL 60712...	[{"label": "display", "lat": 42.00662783127496...	42.006628	-87.72647
1	Todd Hall, Lincolnwood School District 74	School	3925 W Lunt Ave	US	Lincolnwood	United States	NaN	958	[3925 W Lunt Ave, Lincolnwood, IL 60712, United States]	[{"label": "display", "lat": 42.00733958885679...	42.007340	-87.72788
2	JCB Yeshiva - Rabbi Doug's School	Student Center	3145 W Pratt Blvd	US	Chicago	United States	Kedzie	645	[3145 W Pratt Blvd (Kedzie), Chicago, IL 60645...	[{"label": "display", "lat": 42.00464370325810...	42.004644	-87.70898
3	Roza's School Of Nail Technology	Trade School	NaN	US	Chicago	United States	NaN	1161	[Chicago, IL, United States]	[{"label": "display", "lat": 41.99742115950946...	41.997421	-87.72333
4	Rutledge High School	High School	NaN	US	Lincolnwood	United States	NaN	857	[Lincolnwood, IL, United States]	[{"label": "display", "lat": 42.0057308, "lng": -87.72666...]	42.005731	-87.72666

Foursquare website used to explore for schools and Housing Areas in safe neighborhoods determined

	name	categories	address	cc	city	country	crossStreet	distance	formattedAddress	labeledLatLngs	lat	lon	postalCode
	Apartmentcity 2.0	Residential Building (Apartment / Condo)	NaN	US	Chicago	United States	NaN	857	[Chicago, IL, United States]	[{"label": "display", "lat": 41.93393348969538...	41.933933	-87.708475	NaN
	Hispanic Housing	Residential Building (Apartment / Condo)	2806 N Sawyer Ave	US	Chicago	United States	NaN	716	[2806 N Sawyer Ave, Chicago, IL 60618, United States]	[{"label": "display", "lat": 41.932285, "lng": -87.708958...}]	41.932285	-87.708958	60618
	Midpointe Apartments	Residential Building (Apartment / Condo)	4050 West 115th Street	US	Chicago	United States	NaN	1263	[4050 West 115th Street, Chicago, IL 60655, United States]	[{"label": "display", "lat": 41.6843237, "lng": -87.721198...}]	41.684324	-87.721198	60655
	South Gate Apartments	Residential Building (Apartment / Condo)	4050-4064 W 115th St	US	Chicago	United States	Pulaski	1033	[4050-4064 W 115th St (Pulaski), Chicago, IL 60655, United States]	[{"label": "display", "lat": 41.68661804923405...	41.686618	-87.721463	60655
	milwaukee apartments	Residential Building (Apartment / Condo)	3060 N Milwaukee	US	Chicago	United States	NaN	954	[3060 N Milwaukee, Chicago, IL, United States]	[{"label": "display", "lat": 41.93691940543633...	41.936919	-87.720593	NaN

Predicting Prices of Airbnb

- Extracting listings from 'http://data.insideairbnb.com/united-states/il/chicago/2019-09-22/data/listings.csv.gz' into a data frame

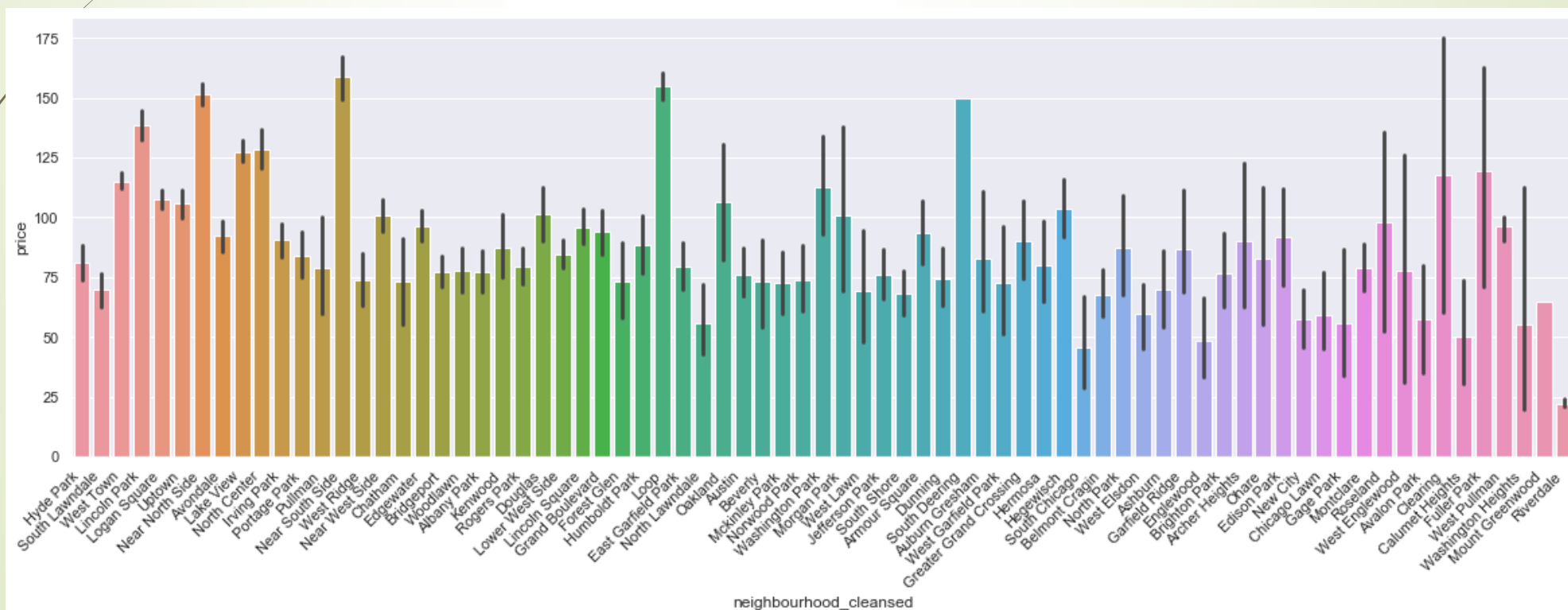
```
listings.head(3)
```

	id	listing_url	scrape_id	last_scraped	name	summary	space	description	experiences_offered	neighborhood_
0	2384	https://www.airbnb.com/rooms/2384	20190922191701	2019-09-22	Hyde Park Private Room - Pleasant Walk to UChi...	You are invited to be the sole Airbnb guest in...	The private bedroom has a queen size bed, beds...	You are invited to be the sole Airbnb guest in...	none	My apartm block from
1	4505	https://www.airbnb.com/rooms/4505	20190922191701	2019-09-22	One Great Apartment. 377 Great Reviews. 1 Bad ...	We took the winter off, made things nicer arou...	We travel a lot, we know what people need. We...	We took the winter off, made things nicer arou...	none	
2	7126	https://www.airbnb.com/rooms/7126	20190922191701	2019-09-22	Tiny Studio Apartment 94 Walk Score	A very small studio in a wonderful neighborhood.	This is a very small studio apartment with a ...	A very small studio in a wonderful neighborhood...	none	Ukrainian Villag named "Hott

Prices vs Neighborhood

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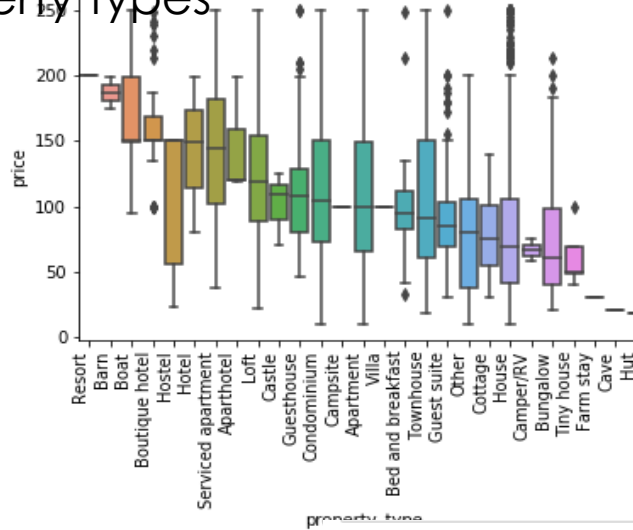
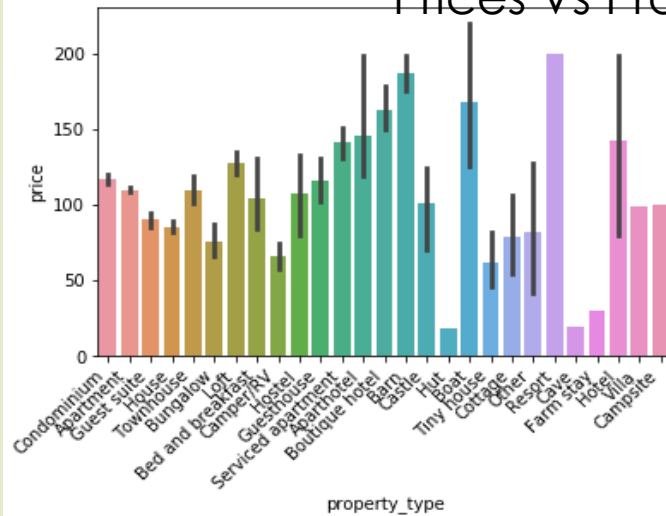
	id
neighbourhood_cleansed	
West Town	1127
Near North Side	852
Lake View	780
Logan Square	600
Loop	527
Near West Side	449
Lincoln Park	437
Uptown	303
Lower West Side	287
Edgewater	230



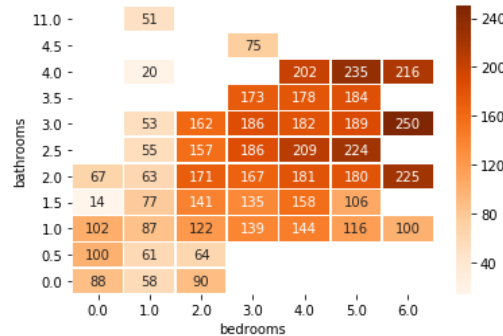
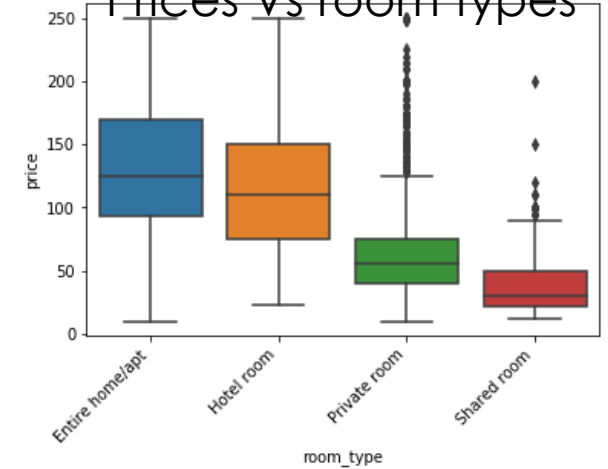
Predicting Prices of Airbnb

-Based on property type, neighborhood, room type etc.

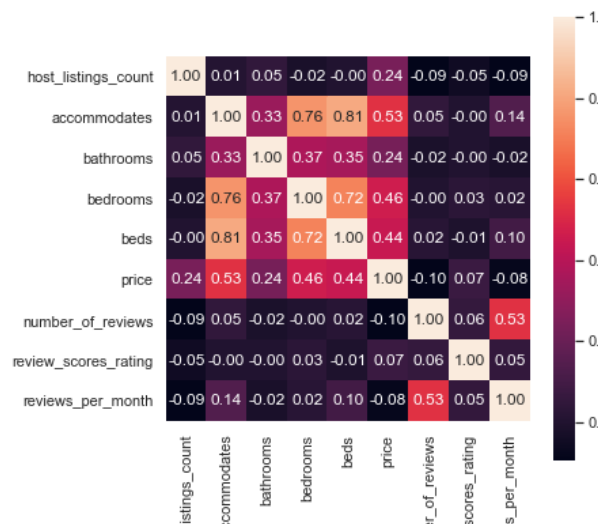
Prices Vs Property types



Prices Vs room types



Major listings have bedrooms > 2 and bedrooms >=1





Final Dataset has shape (6586 ,319)

Splitting the data set in to training and testing set

➤ Training set(5268, 319) Test Set (1318,319)

➤ Prediction Model

Model	Score	RMSE
Linear Regression	0.58369	39.527
Random Forrest Regressor	0.627	37.44
Ridge Model	0.5627	



Conclusion and Future Direction

- Compared cost of living index and property index for Boston and Chicago
- Searched for safer neighborhoods for accommodation and schools.
- Built useful models to predict to predict Airbnb pricing
- Accuracy of the models has room for improvement
- The model can be streamlined for safer neighborhoods. With missing community codes the data can be merged with community area dataframes.
- We can further analyse crime data on types of crime committed, month wise breakup. We can load crime data from previous years and see the trends.