

# **Analysis of Manhattan Neighborhoods – Finding Optimal Locations for opening a new Gym/Yoga Studio**



# Problem Definition & Stakeholders

- **Problem** - To find an optimal location for opening a new fitness center, particularly Gym/Yoga Studio, in Manhattan, New York, USA.
- Targets the stakeholders that are interested in opening either new gym or yoga studio.
- Investors would be interested in knowing the locations for fitness centers in Manhattan with less competition to make their business profitable.
- Also helpful to determine which Manhattan population is more aware of the importance of fitness (more the fitness centers in area implies more customers available).



# Data Acquisition

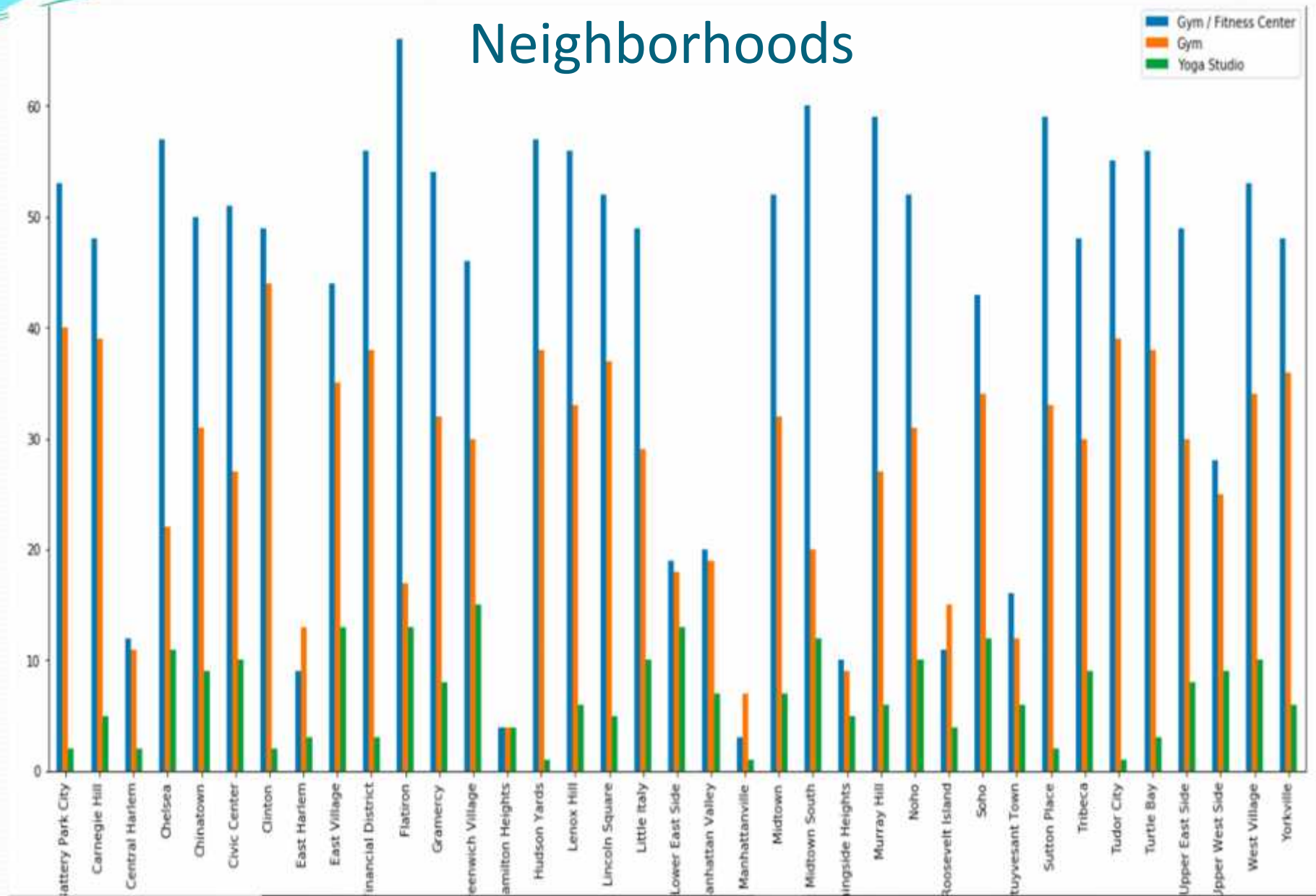
- Neighborhoods of Manhattan are obtained in the form of JSON file from link - [https://cocl.us/new\\_york\\_dataset](https://cocl.us/new_york_dataset)
- Number of fitness centers, their type and location in every neighborhood are obtained using **Foursquare** API
- Coordinates of Manhattan center (Times Square – well known location) and distance from neighborhoods are obtained using Geocoders (of **GeoPy** library)



# Data Cleaning

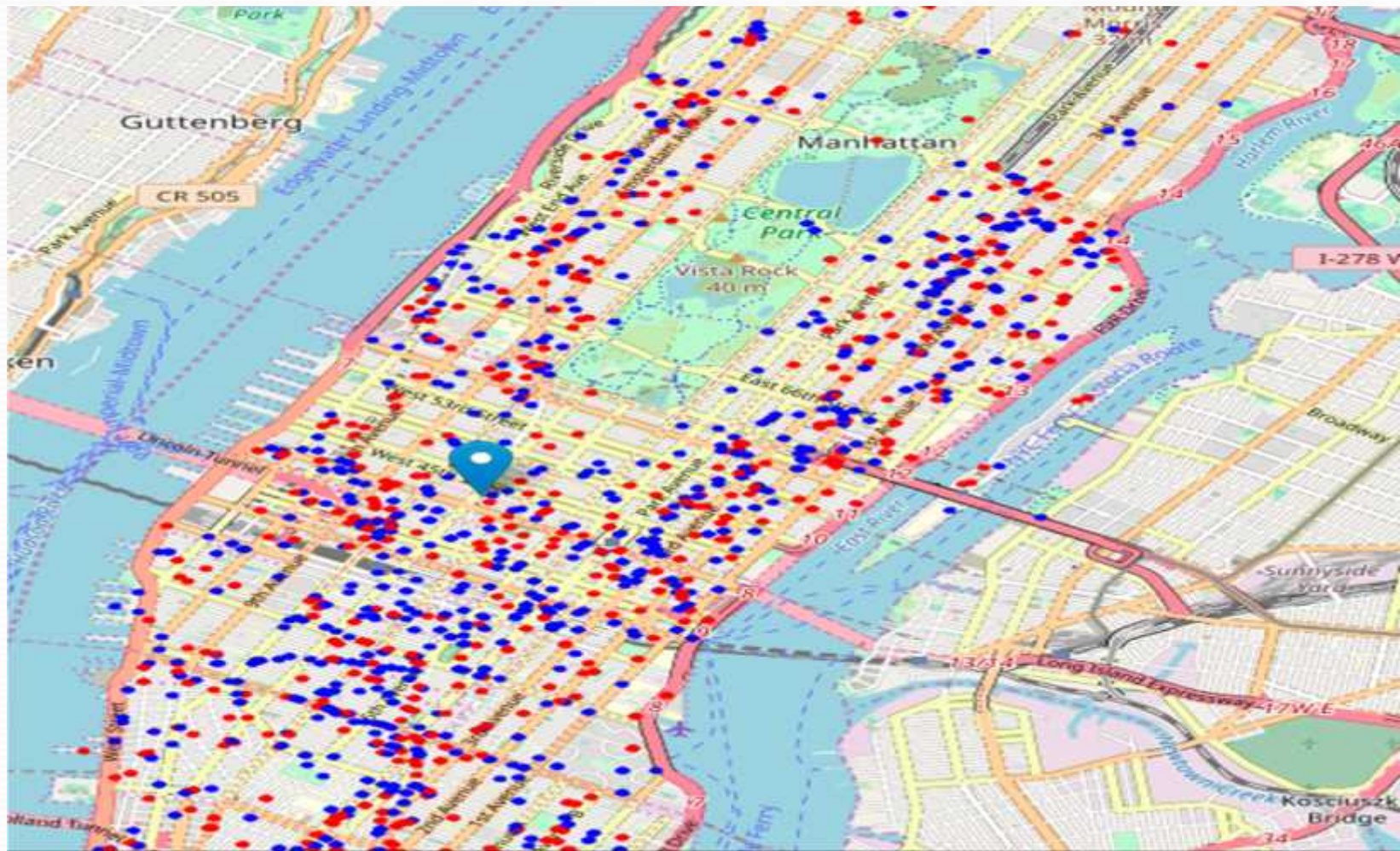
- Only Neighborhoods belonging to Manhattan, within radius of 9 km from Times Square, along with their geographical coordinates.
- Only Venues belonging to 'Gym/Fitness center' category and located within 1 km of each neighborhood center.
- In total, 3113 venues for 37 neighborhoods of Manhattan.
- Ignored venues that are not proper fitness centers such as Weight Loss Center, Playground, Basketball court etc. as they are not direct competitors.

# Number of Gym/Fitness Centers for Manhattan Neighborhoods





# Manhattan Map with Fitness centers (in Blue) and Gym/Yoga Studio (in Red)





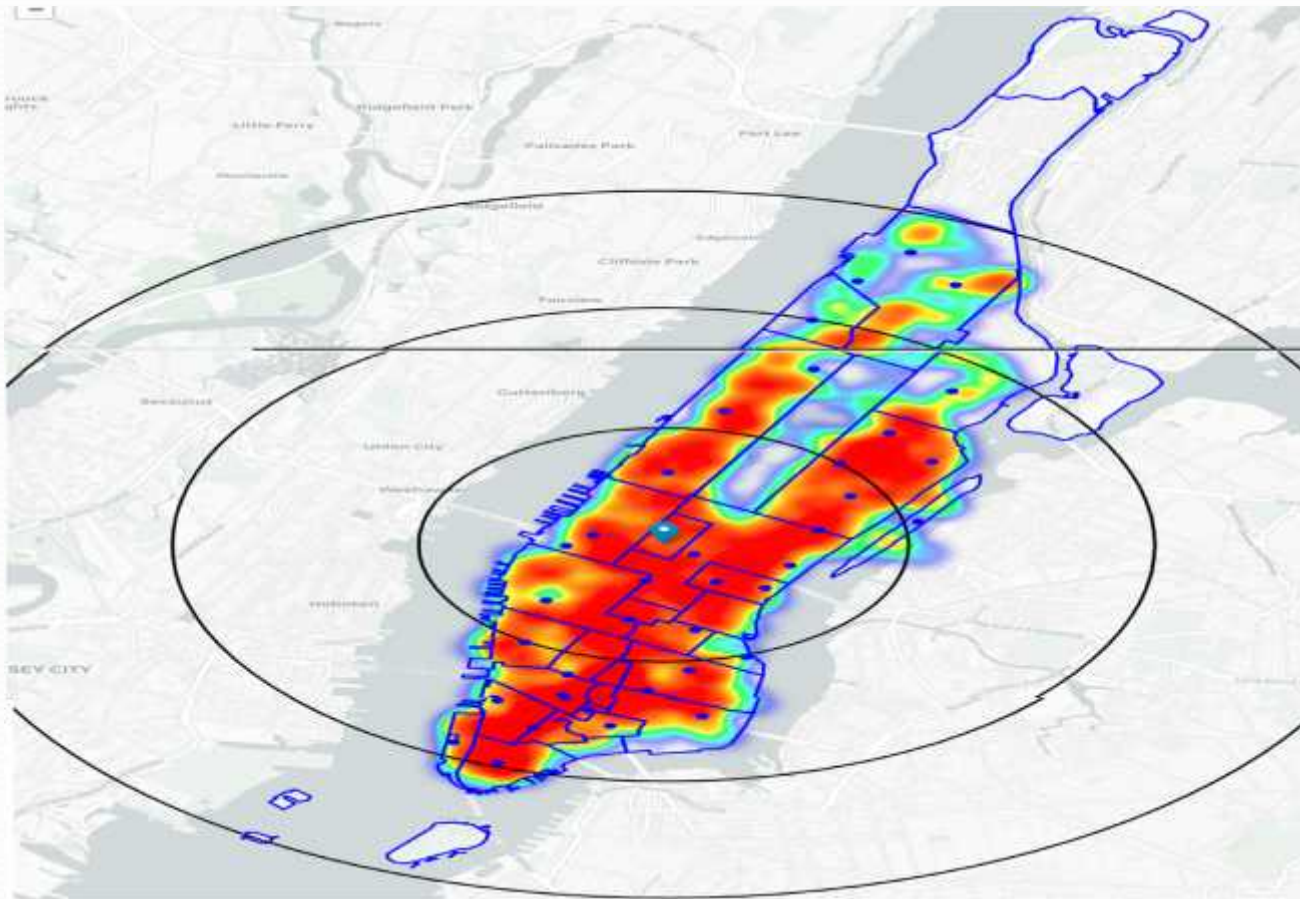
# Methodology

1. To calculate and explore density of fitness centers across Manhattan neighborhoods using heat maps in order to identify a few promising areas with less number of fitness centers.
2. To find most promising areas that meet some basic requirements –
  - No more than 95 fitness centers within radius of 1 km
  - Locations without Gym/Yoga Studios in radius of 150 m.
3. To plot these locations on map and create their clusters using k-means to identify neighborhoods/addresses for optimal venue location.



# Exploratory Data Analysis

## 1. Heat Map showing density distribution of fitness centers across Manhattan

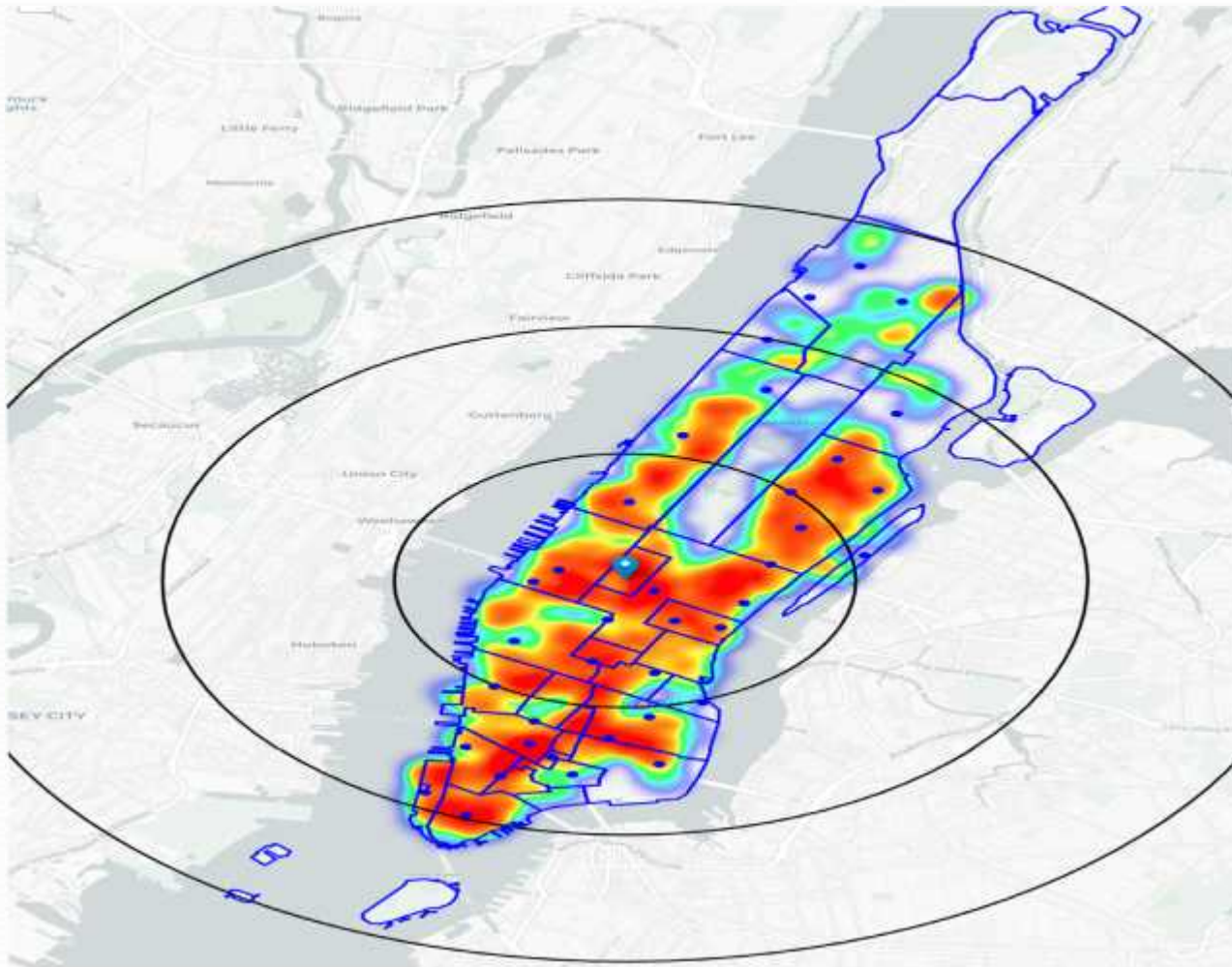


- Low density fitness centers in north-east, east and south-east from Times Square (within 9 km)



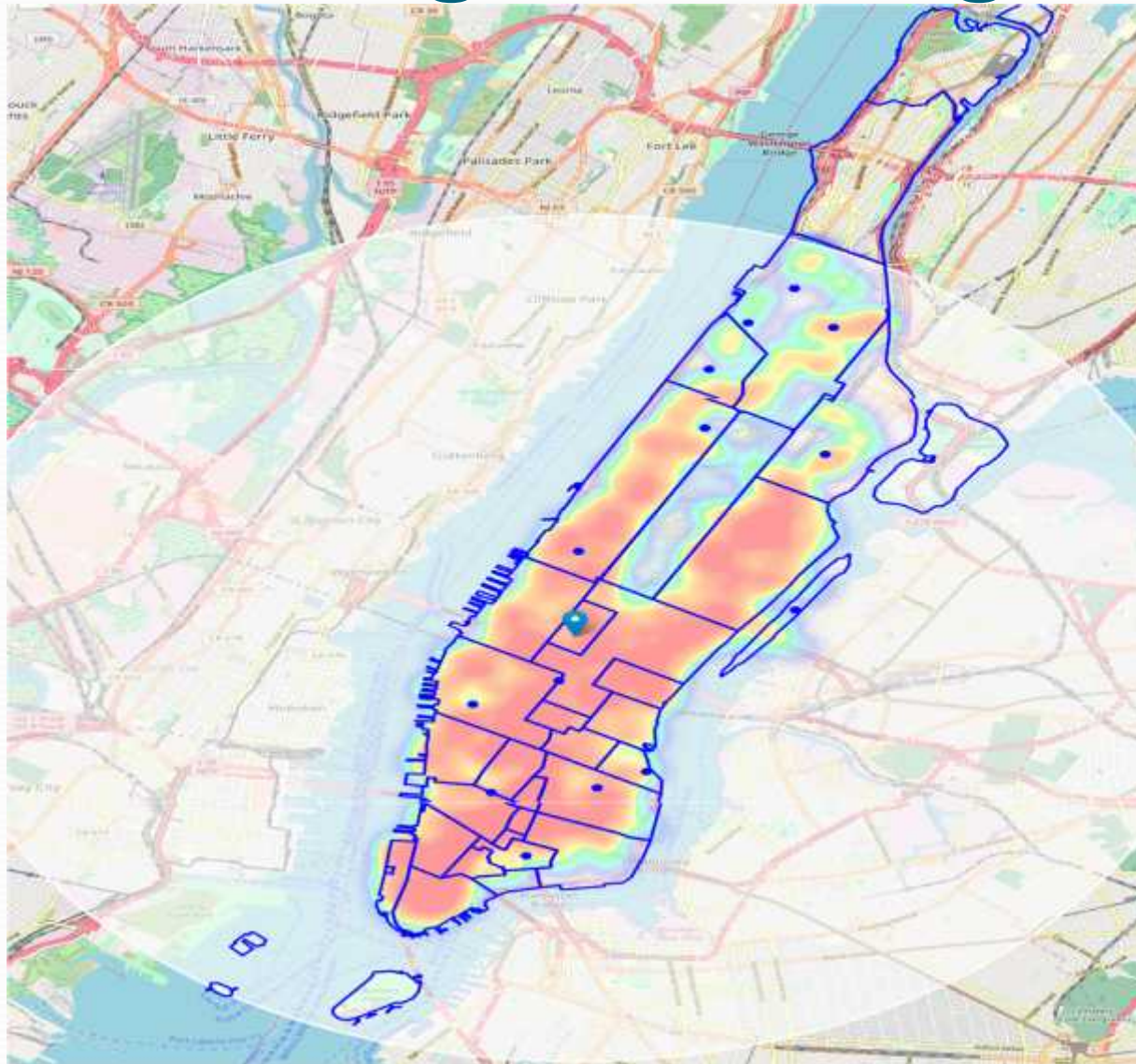
# Exploratory Data Analysis

## 2. Heat Map showing density distribution of Gym/Yoga Studios



- Less 'hotter' than previous one (43% of fitness centers are Gym/Yoga Studio)
- Low density Gym/Yoga Studios in north-east, east and south-east from Times Square (within 9 km)

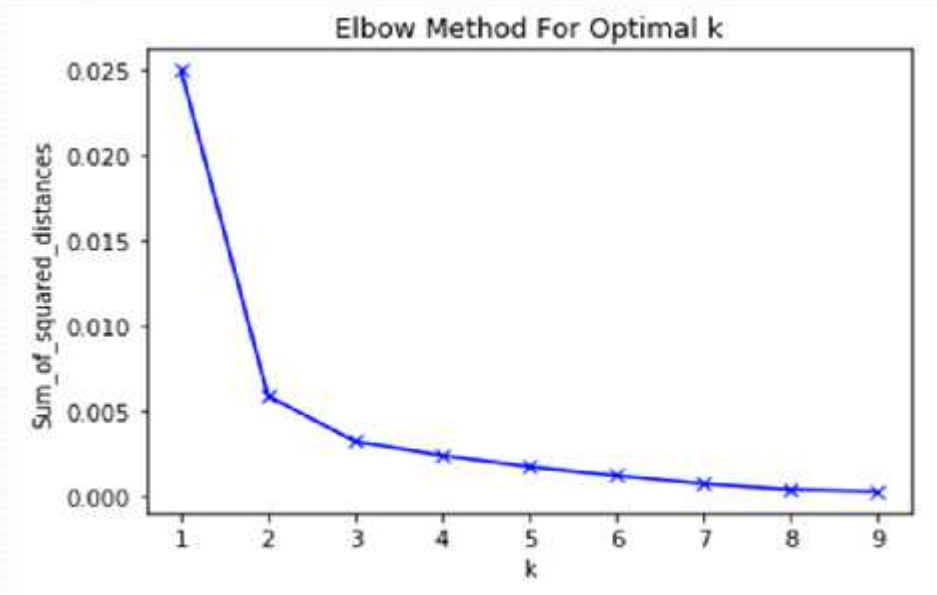
# Finding Promising Locations



- Optimal neighborhoods with total number of fitness centers present  $\leq 95$  and distance to the closest Gym/Yoga Studio  $> 150$  m.
- Blue circles indicating optimal neighborhoods on heat map of fitness centers

# Clustering

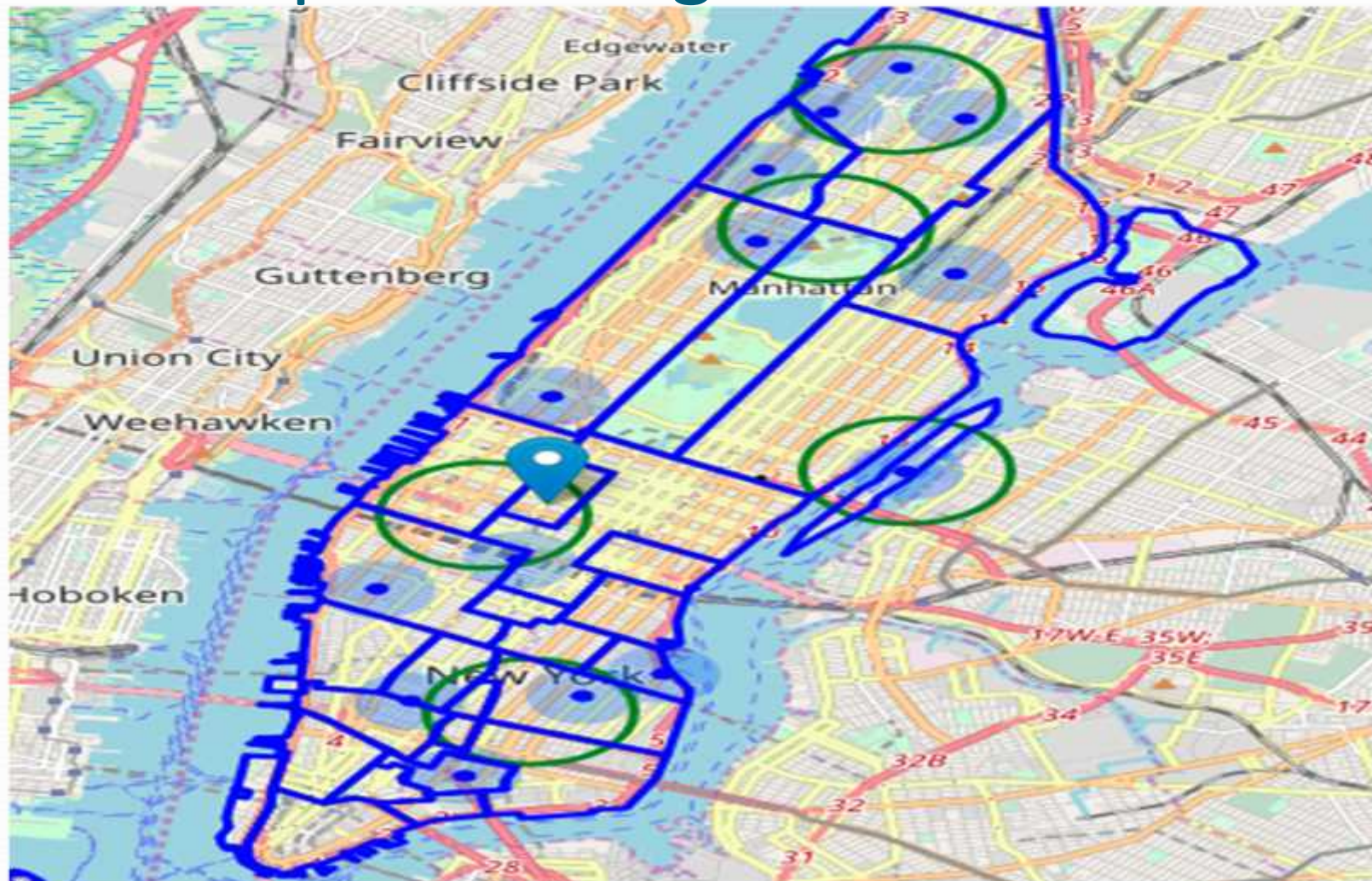
- K-means Clustering tries to group promising locations based on Euclidean distance between them and returns clusters of locations that are close to each other.
- Finding optimal k with Elbow method –



Optimal value for  
 $K = 5$



# Manhattan Map with Clusters and Optimal Neighborhoods







# Conclusion

- Addresses of these five cluster centers help to find the best possible locations/neighborhoods to open new gym/yoga studio.
- These centers/addresses should be considered only as a starting point for exploring area neighborhoods in search for potential gym/yoga studio locations.
- Optimal fitness center location also depends on the other characteristics of locations such as residential population, real estate availability, prices, etc.