(Photo: Paul Finnerty)

Battle of the Neighborhoods
in
San Francisco, CA

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This project is part of the ‘Applied Data Science Capstone’ Coursera Course and of IBM’s Professional Certificate ‘Data Scientist’.

What to expect?

- Client, goal and business question
- Data acquisition and preparation
- Methodology
- Analysis
- Results and discussion
- Conclusion

CBD, a fast-growing market

- Market: $4.67 million in 2017 to *$25 billion* in 2025
- California is market leader
- Products: oil/tinctures, lotion, gummies, bath bombs, bedsheets
- Use: mainly to reduce stress, anxiety, joint pain, insomnia (71%)
- CBD-only user: 33% is 20-34 years old

CBD, a fast-growing market

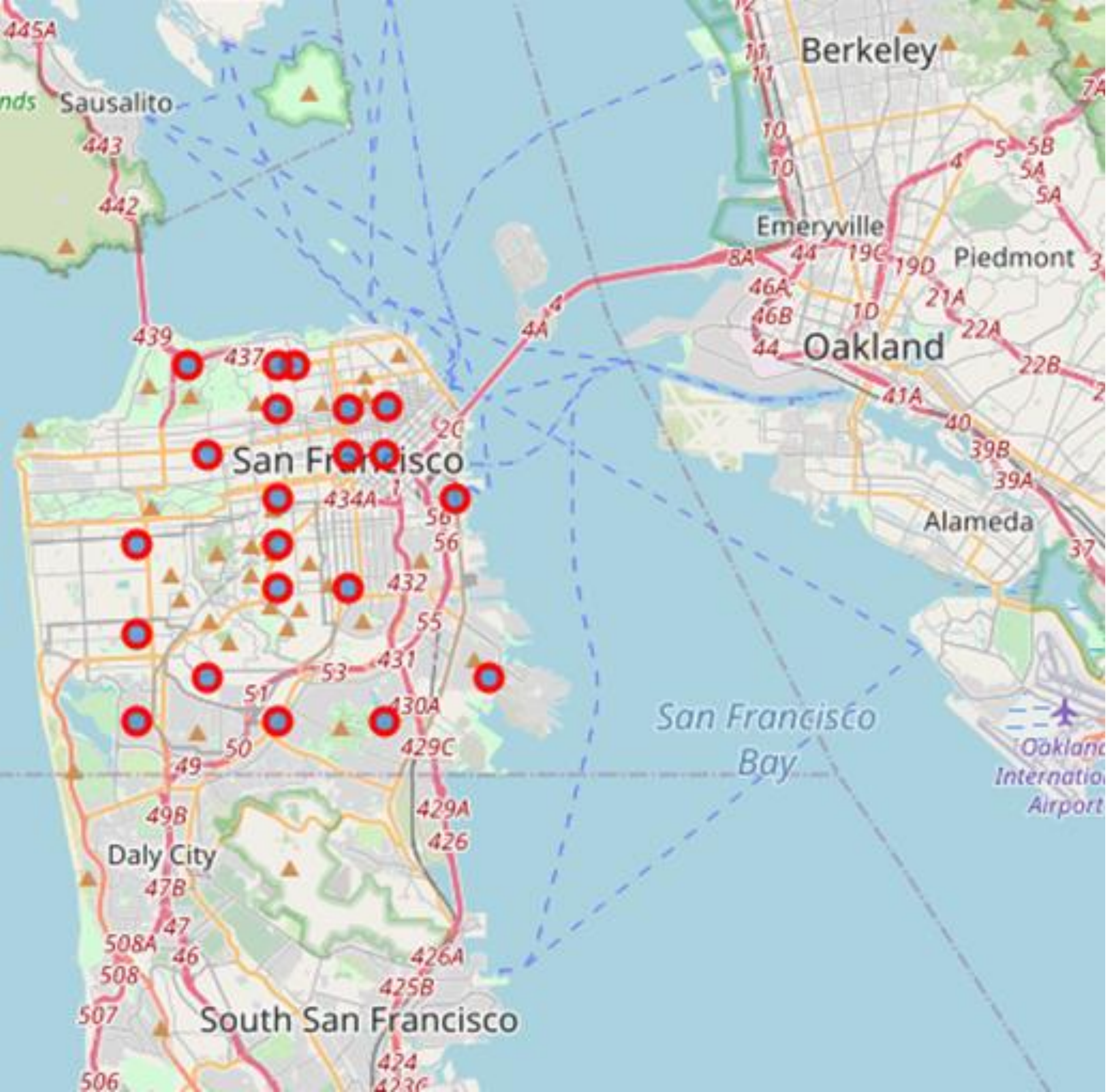
- Our client, CBD seller, wants to open a business in San Francisco, target age is 20–34 year
- Asks for data driven advice on location
- Location parameters (in order of importance):
    1. Cluster of neighborhoods
    2. Dominant age in neighborhood: 20-34 years
    3. Venues attract costumers, like pharmacies with CBD on shelves, coffeeshops, restaurants, nightlife

Data acquisition

- Zip codes and neighborhoods scraped from San Francisco Department of Public Health (2004)
- Latitudes and Longitudes from uszipcode and Geopy (both Python libraries)
- Age distribution per neighborhood from US Census Bureau (2019)
- Venues per neighborhood from Foursquare API

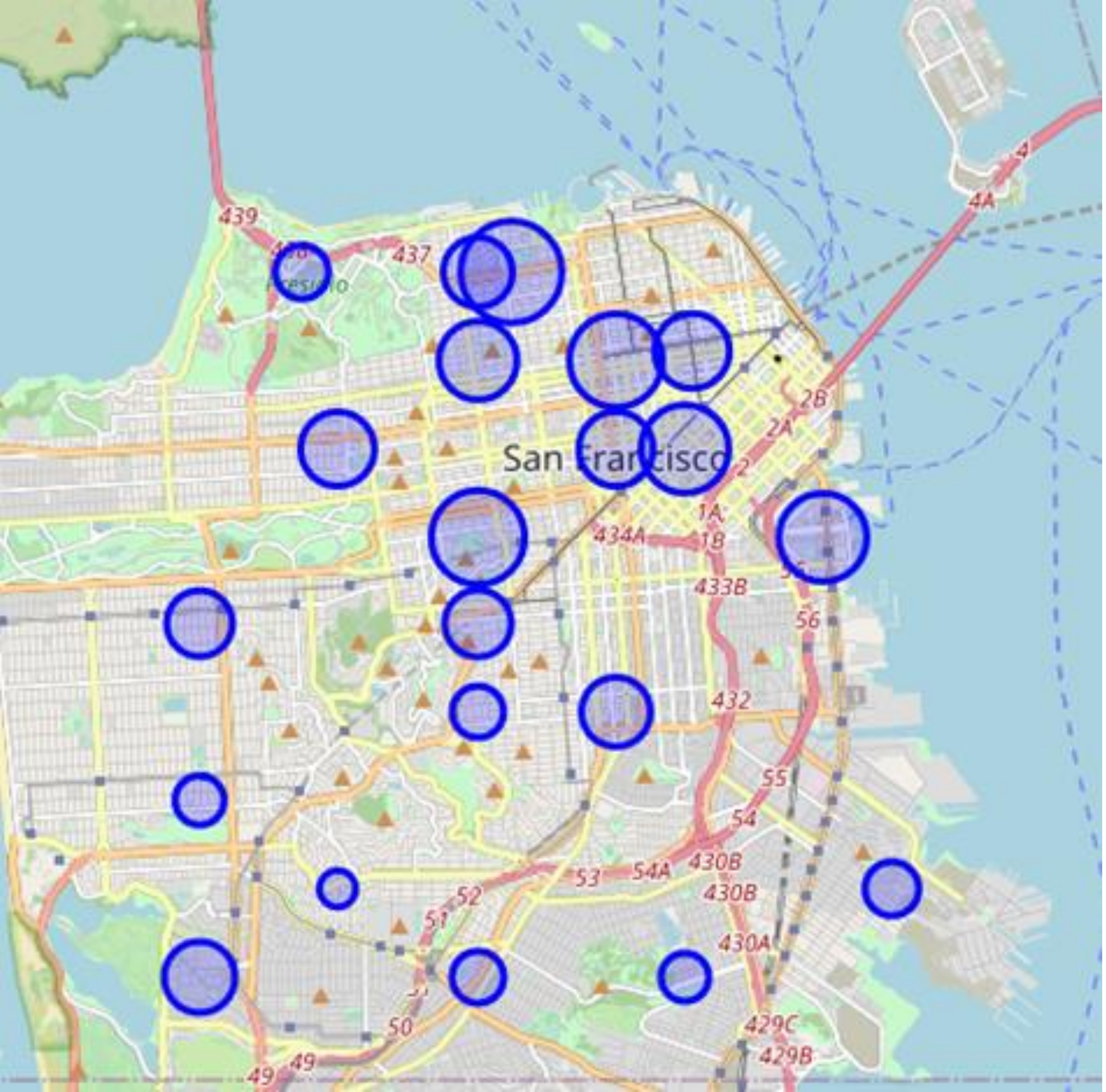
Data preparation

- Two longitudes needed to be corrected
- Absolute age distribution columns were dropped
- ‘Age-Zip Code’ table was transposed
- Column name ‘Zip Code’ was added
- Venues per neighborhood (223 unique categories) were normalized and grouped per neighborhood
- Result: dataframe with 21 rows and 15 features



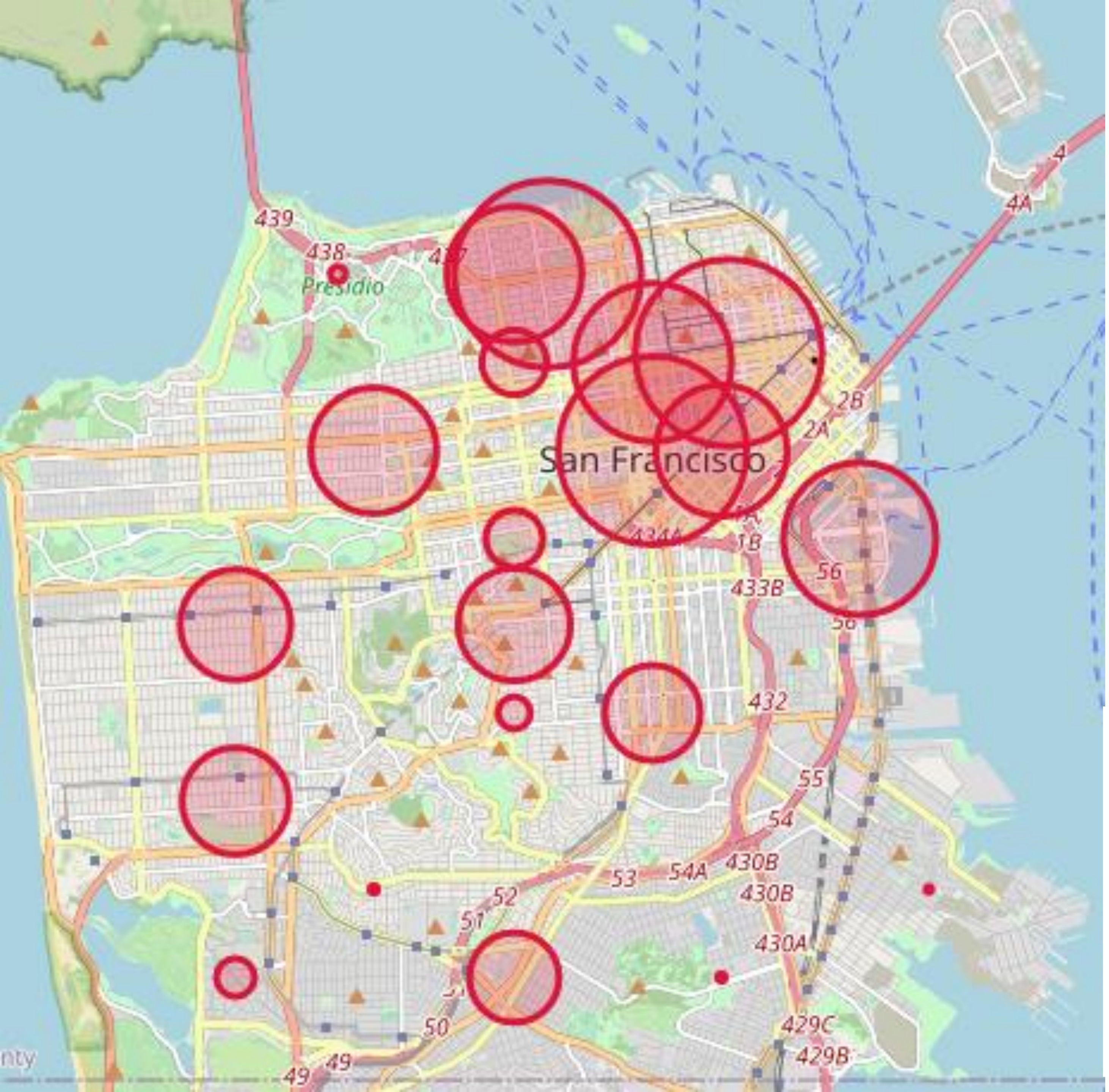
San Francisco neighborhoods

- Map shows 21 neighborhoods on Peninsula



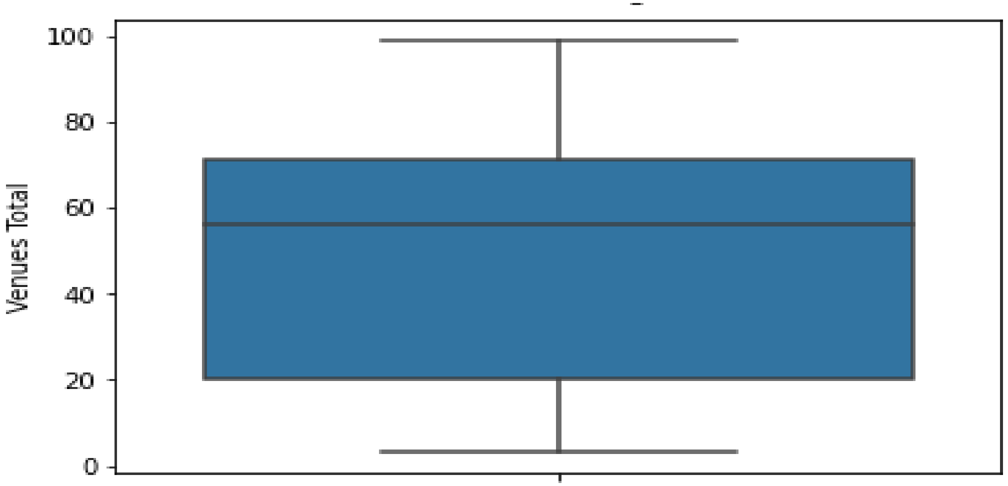
Age distribution 20-34 years

- Bubble map shows higher concentration of 20-34 age group in northeast
- Six neighborhoods where 20-34 age group >=33% :
  - Marina (0.43)
  - Haight-Ashbury (0.39)
  - Polk/Russian Hill (0.39)
  - Portrero Hill (0.37)
  - South of Market (0.37)
  - Western Addition/Japantown (0.33)

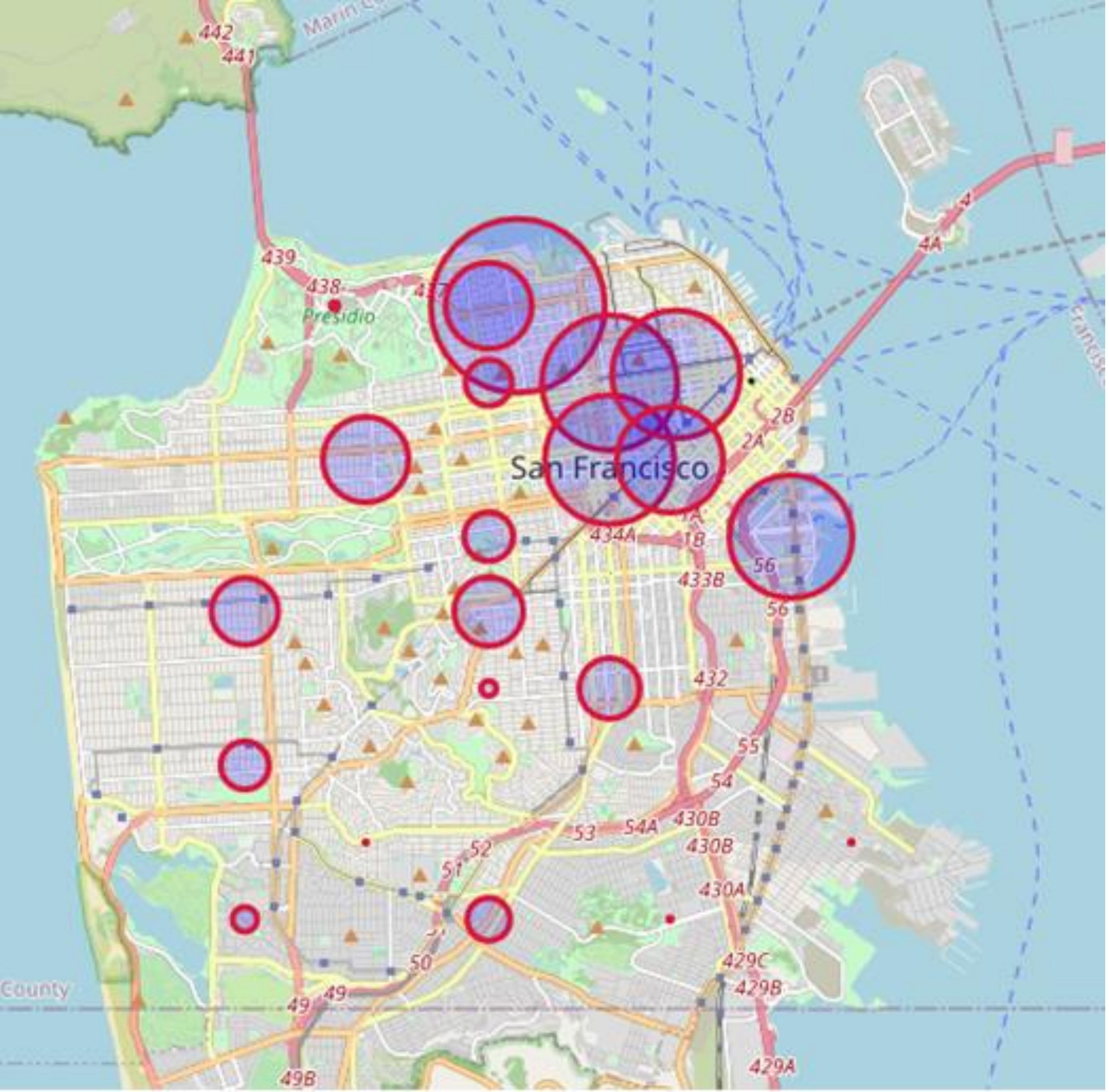


Spread of venues

- Bubble map shows higher concentration of venues in northeast
- Boxplot shows wide range: 3-99, median=56
- Neighborhoods in upper quartile:
  - Hayes Valley/Tenderloin/North of Market (99)
  - Chinatown (98)
  - Marina (98)
  - Polk/Russian Hill (Nob Hill) (83)
  - Portrero Hill (80)

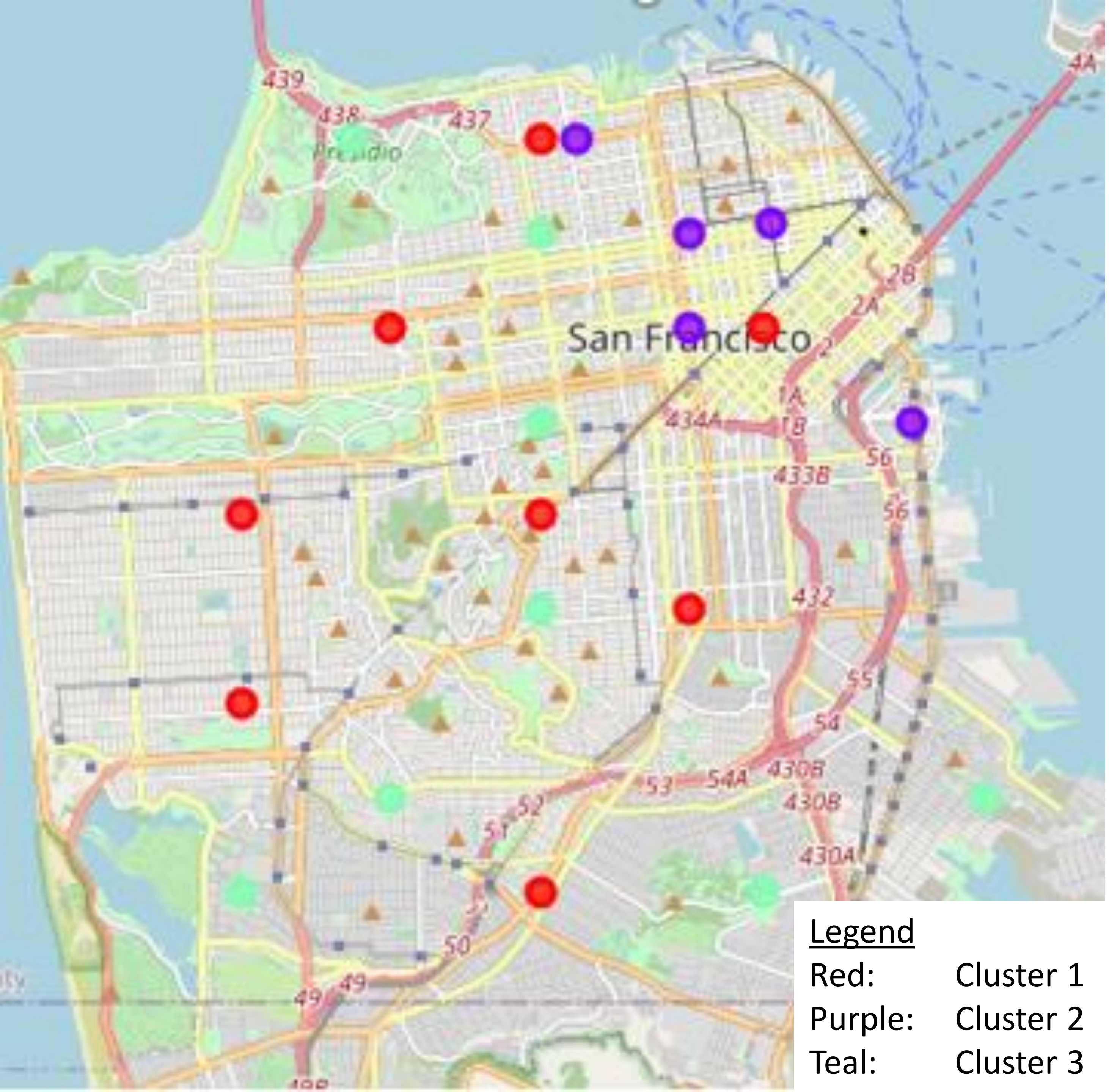


AVE scores



- Age is more important than venues
- AVE: expresses weighted venues. Total venues are multiplied with proportion of 20-34 years age group
- AVE = ('20-34 years' * 'Venues Total')/100
- Bubble map shows concentration of higher AVE scores in northeast

K-Means Clustering



- Optimal K, k=3, has:
  - northeast cluster,
  - homogeneity in age distribution, in the number and in types of venues
- Map shows concentration of Cluster 2 neighborhoods in northeast
- Cluster 1: Mixed-Use Cluster (8 neighborhoods)
- Cluster 2: Hospitality, Health and Luxury Cluster (5 neighborhoods)
- Cluster 3: Residential Cluster (8 neighborhoods)

Results and discussion

- Cluster 3 best starting point to look for location:
  - Cluster of 5 adjacent neighborhoods
  - Age group 20-34 years is dominant in all 5 neighborhoods
  - Highest numbers of venues and top 25% AVE scores of San Francisco, types of venues fit with profile
- Follow-up research:
  - Keep South of Market, North Beach, and Western Addition in mind: location within/next to cluster 3, high 20-34 population, many businesses
  - Research on street level: Real estate availability & prices, existing selling points vs market size, movements of (potential) customers
- Discussion points:
  - Future research should use multiple data sources
  - Difficulty in data replication

Conclusion

- Location search best starting point in:
  - Cluster 3: Marina, Polk/Russian Hill, Hayes Valley/Tenderloin/north of Market, Chinatown, and Portrero Hill
  - Possible additions: South of Market, North Beach, and Western Addition
- Current research might be interesting for businesses who target 20-34 years old, health oriented, customers.

(Photo: Paul Finnerty)

Thank you for your attention!