



# Predicting Fires & Volunteers

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# Solution Overview

- ▶ Wanted to address two main problems facing the Red Cross, recruitment and proactive prevention:
  - ▶ Proactive Prevention
    - ▶ Identify areas that are high risk for house fires
    - ▶ Target these areas for preventative programs to increase local awareness
  - ▶ Recruitment
    - ▶ Find areas likely to have highly active volunteers
    - ▶ Target areas near danger areas found in Part I

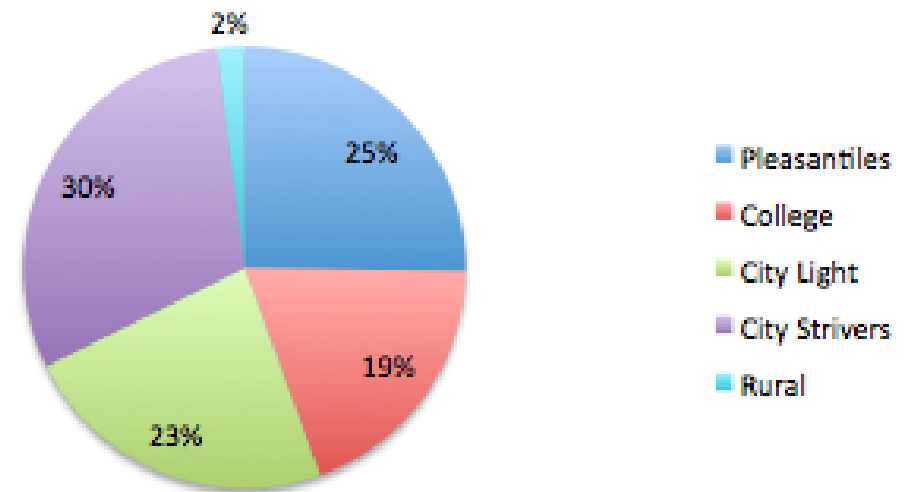
# Data Collection

- ▶ Collected zip code level data on the following demographic information:
  - ▶ Income breakdown
  - ▶ Race
  - ▶ Education
  - ▶ Marriage
  - ▶ Poverty
  - ▶ Unemployment
  - ▶ Gender
  - ▶ Population
- ▶ Calculated a volunteer score for every zip code
  - ▶ Volunteer Score = average response rate per incident
  - ▶ Per zip code: total response rate \* average response rate
- ▶ Calculated total number of fires per zip code

# Characteristics of Clusters

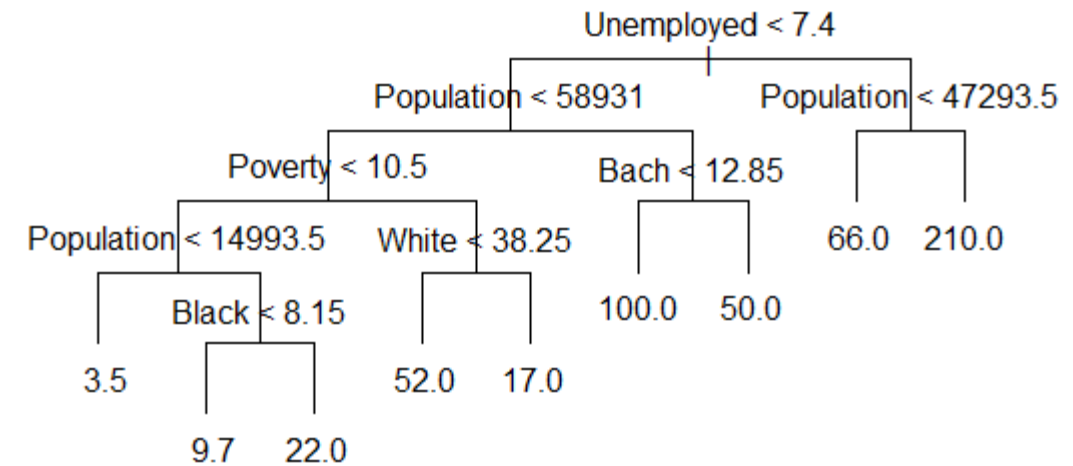
- ▶ Looking at the top two clusters:
  - ▶ 25 % “Pleasantiles” - recently retired people seeking meaningful tasks
  - ▶ 23% “City Light” - middle class families willing to volunteer
  - ▶ 30% “City Strivers” - low SES families in highly populated areas
  - ▶ 19% College Students

**Overall Volunteer Demographics**

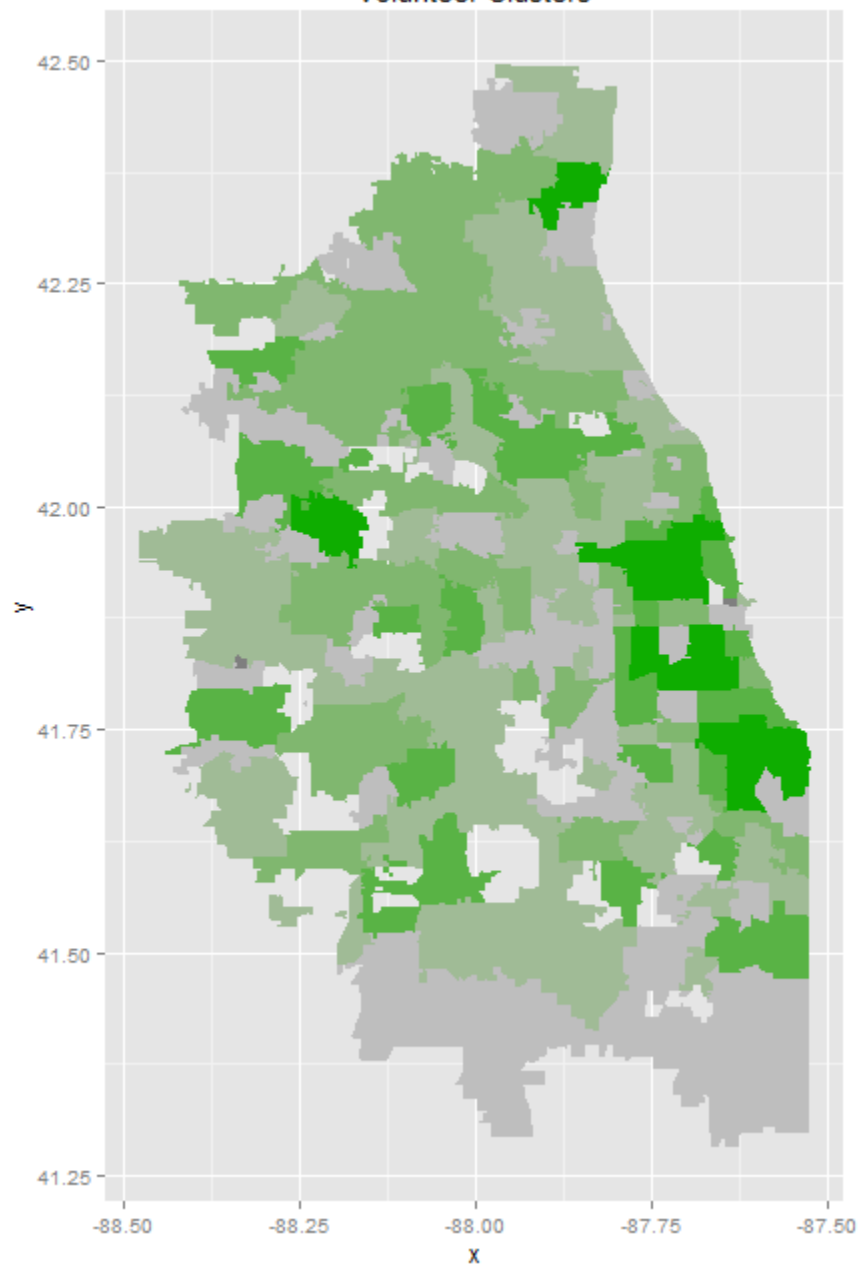


# Predicting Numbers of Fires

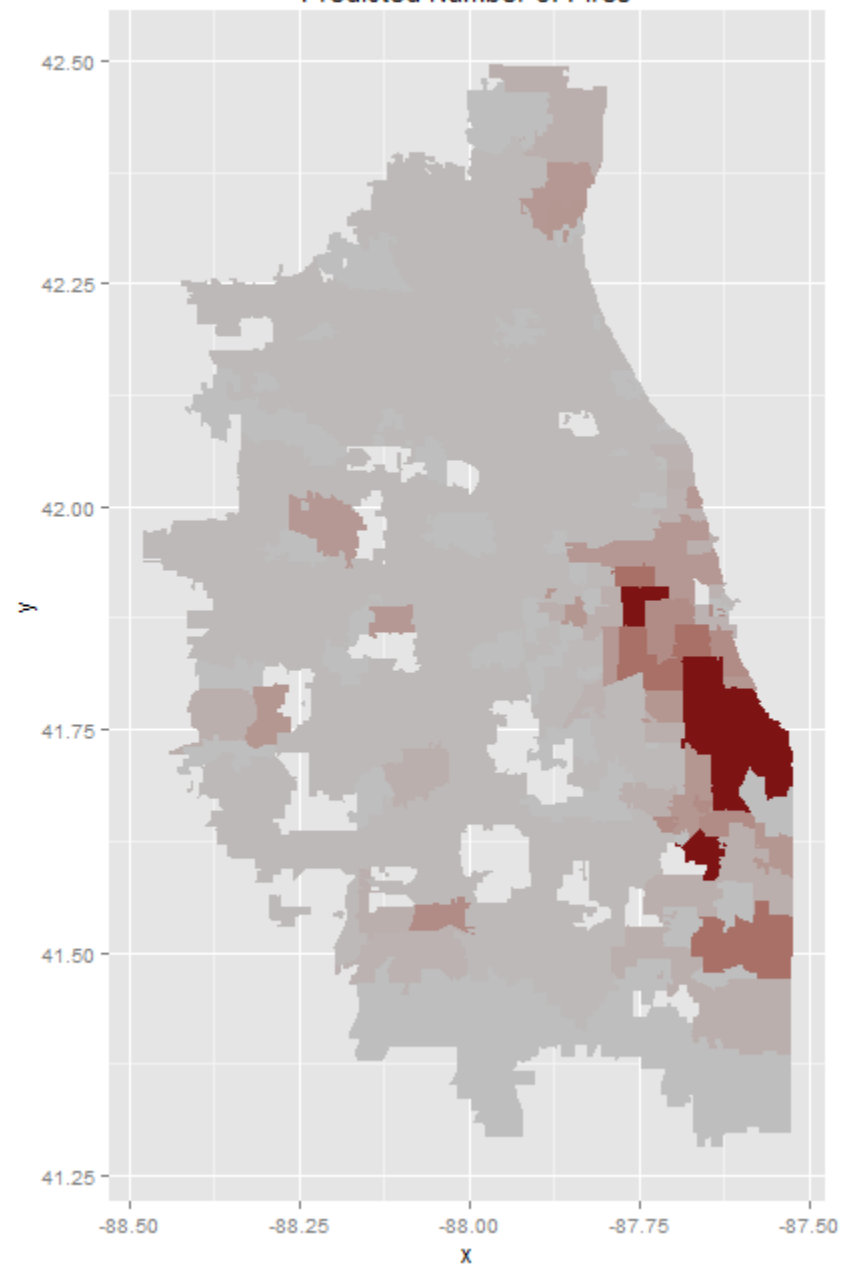
- ▶ Identified two major risk factors for house fires:
  - ▶ Cooking
  - ▶ Heating
- ▶ Lower SES leads to Higher Risk
  - ▶ Older buildings
  - ▶ Dangerous electrical connections
  - ▶ Reliance on wood burning stoves and fireplaces
  - ▶ Lower functioning detectors



"Volunteer Clusters"



"Predicted Number of Fires"





# Further Steps

- ▶ **Case Study:**

- ▶ Identified highest fire risk area (zip code 60426)
- ▶ Found 9 nearby zip codes with high volunteering scores
- ▶ Target these for recruitment to cover ensure high responsiveness

- ▶ **Taking into Consideration Current State:**

- ▶ Incorporate the greatest current need based off of where current volunteers are located and what regions we are currently servicing

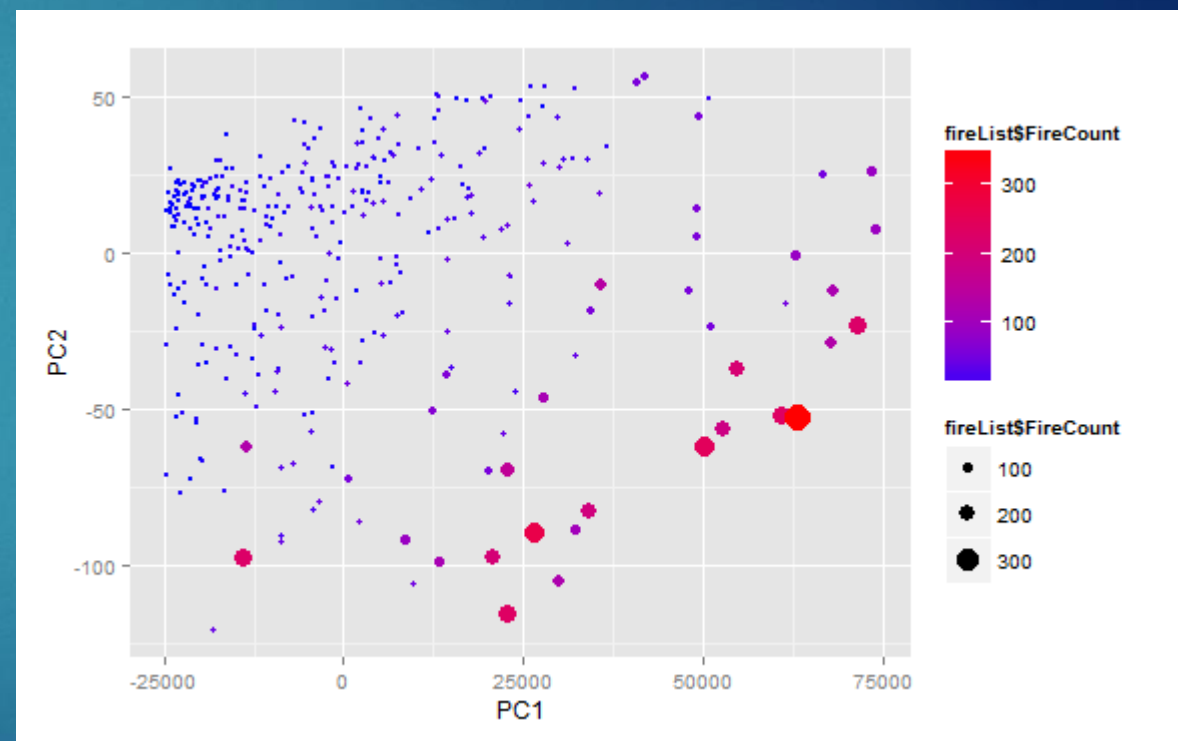
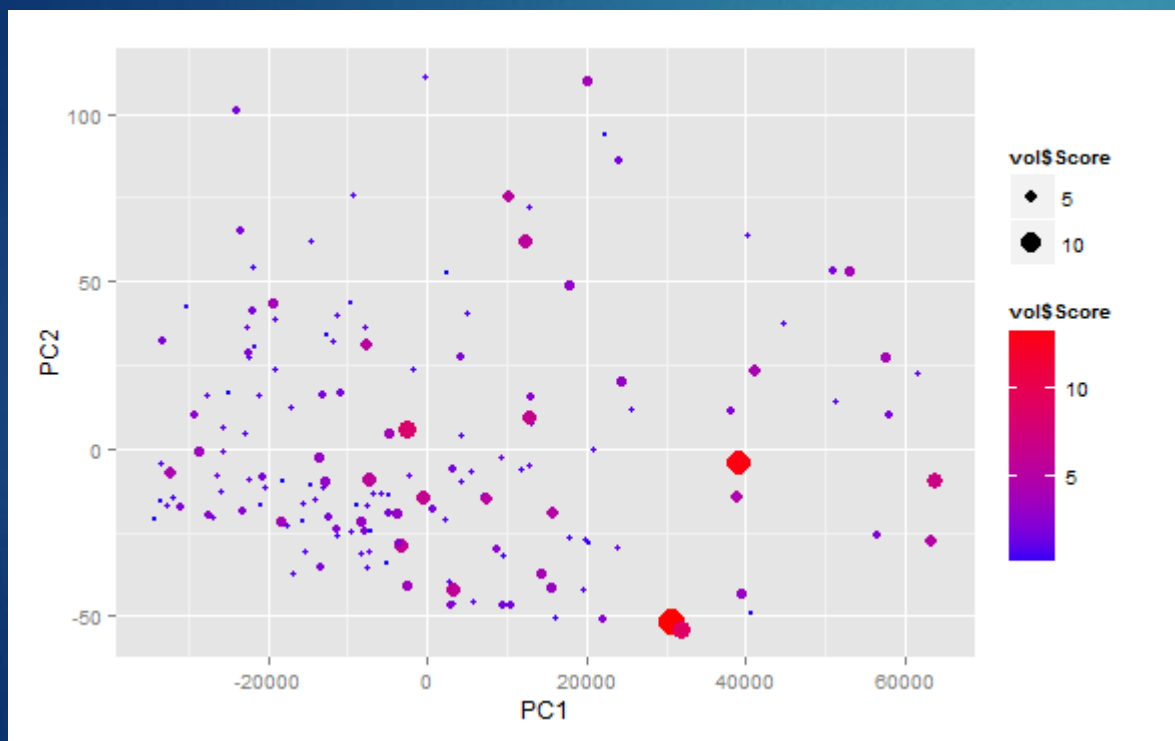
- ▶ **Mission of Red Cross:**

- ▶ Number of clients helped
  - ▶ Allows for targeted preventative programs to inform most at risk individuals.
- ▶ Meaningful experience for the volunteers
  - ▶ Volunteers will be near at incident locations and be able to make a real impact in their community

# Appendix



# Data Exploration



# High Volunteerism Areas

- ▶ Due to the lack of trends during exploration, we conducted k-means clustering
- ▶ Jaccard similarity index - how dispersed is the data?
- ▶ **K - 5**

