Exploring Commercial Permits Applications with Venues Nearby in Prince George's County, Maryland, US

Peiyu Xu
Feb24, 2019

Project Purpose

To understand the county’s business operation condition by

- Analyzing business and personal permit issuance data
- Discovering permit applicants’ business interest and location preference

Introduction

Prince George’s County

Prince George's County (PGC) is the second-most populous county in Maryland state, United States with 912,756 residences (2017), bordering the eastern portion of Washington D.C.

Foursquare City Guide

a location provider and provides personalized recommendations on places (or venues) to visit.

Data

The list of data and source:

1. Residential and Commercial Permits (Jan 2012 through June 2013),updated on Sept 2015.
   link:
   https://data.princegeorgescountymd.gov/Urban-Planning/Residential-and-Commercial-Permits-Jan-2012-throug/dqvr-xqvv
2. Data from Foursquare obtained from search queries.

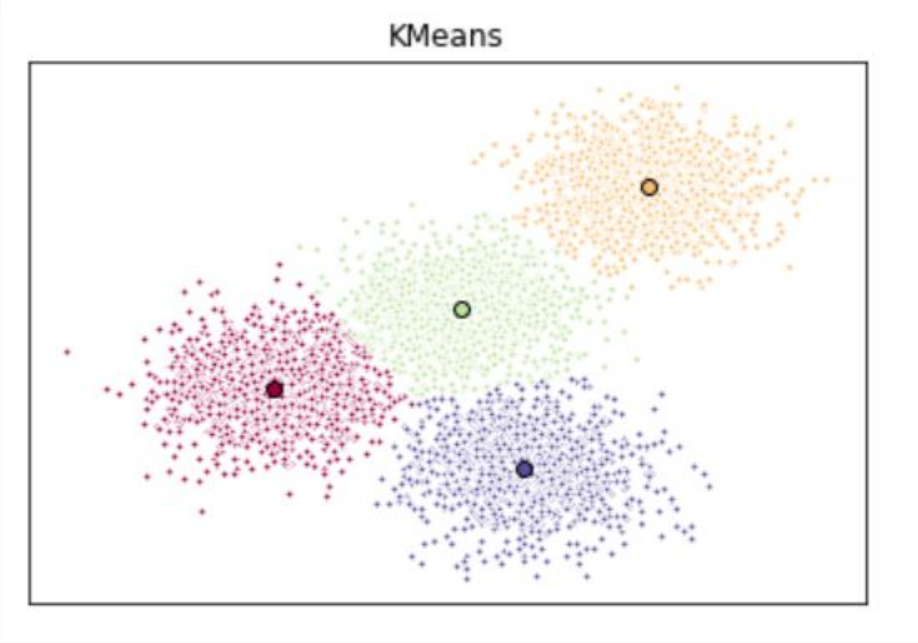
Data: Residential and Commercial Permits

18K observations, 12 columns

- **Permit Category** : The category of the permit
- **County Agency** : Name of the agency
- **Permit Case ID** : Unique identifier of each case
- **Permit Case Year** :The year of when the permit issued -
- **Permit Case Type** : Type of the permit
- **Permit Case Name** : Name of the permit
- **Street Address** : street address only
- **City** : city name
- **Zip Code** : zip code of the location where the permit would be used
- **Permit Issuance Date** : The date when the permit was issued.
- **Expected Construction Cost** : Expected Construction Cost
- **Location** : Full address with latitude and longitude

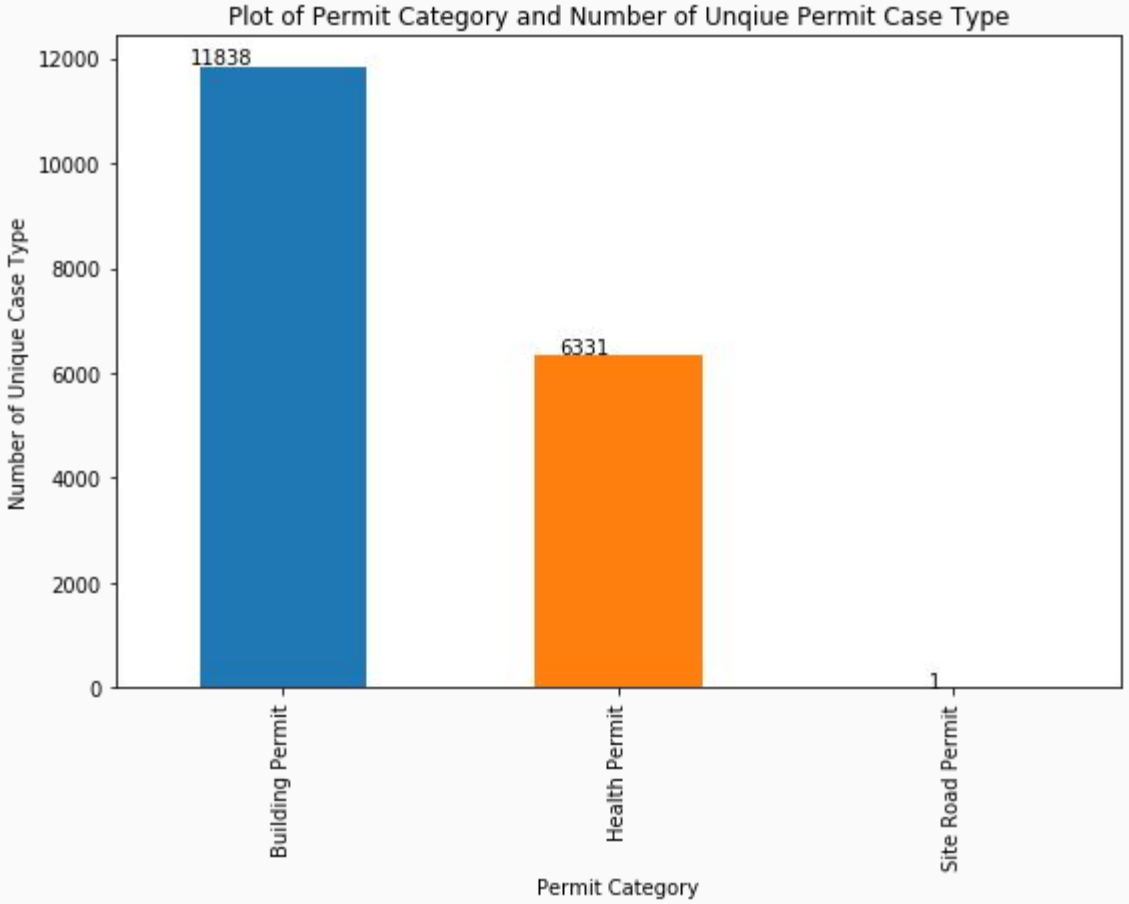
Methodology: K-Means Clustering

- An unsupervised machine learning algorithm
- Useful for customer segmentation, crime-prone areas, and loan collection
- Divides data into K non-overlapping groups



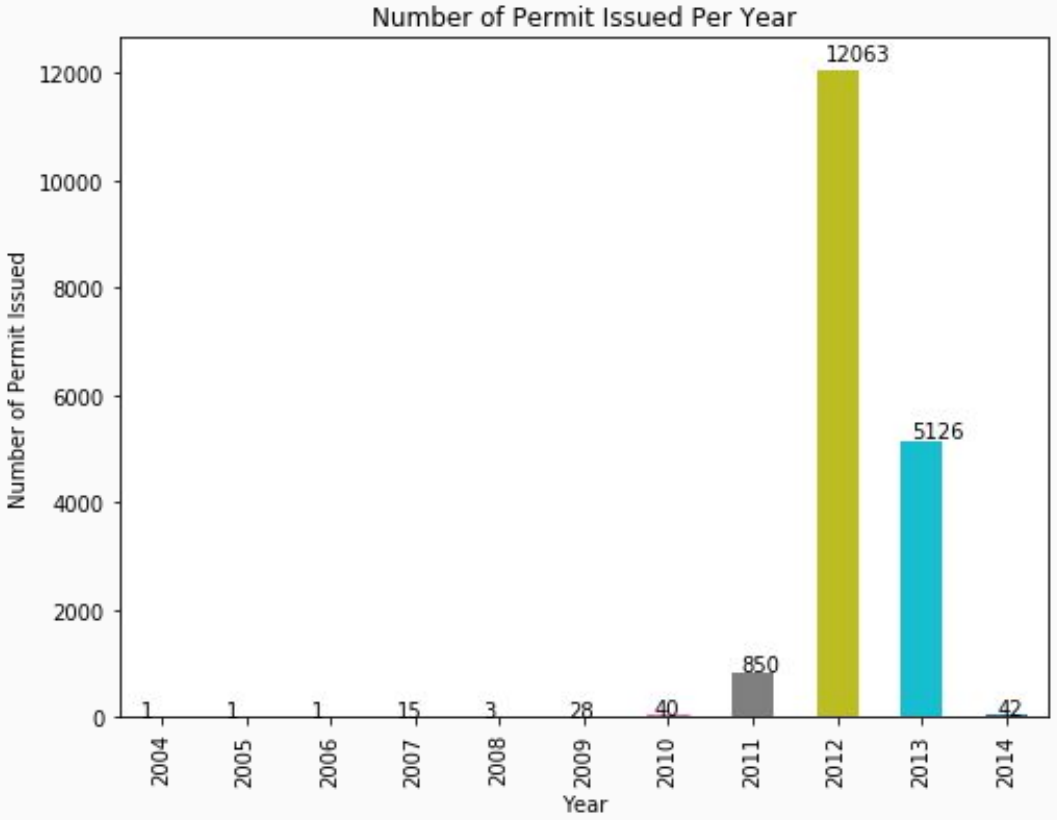
Exploratory Analysis

Among the three permit types. Building Permit is the most popular one.



Exploratory Analysis

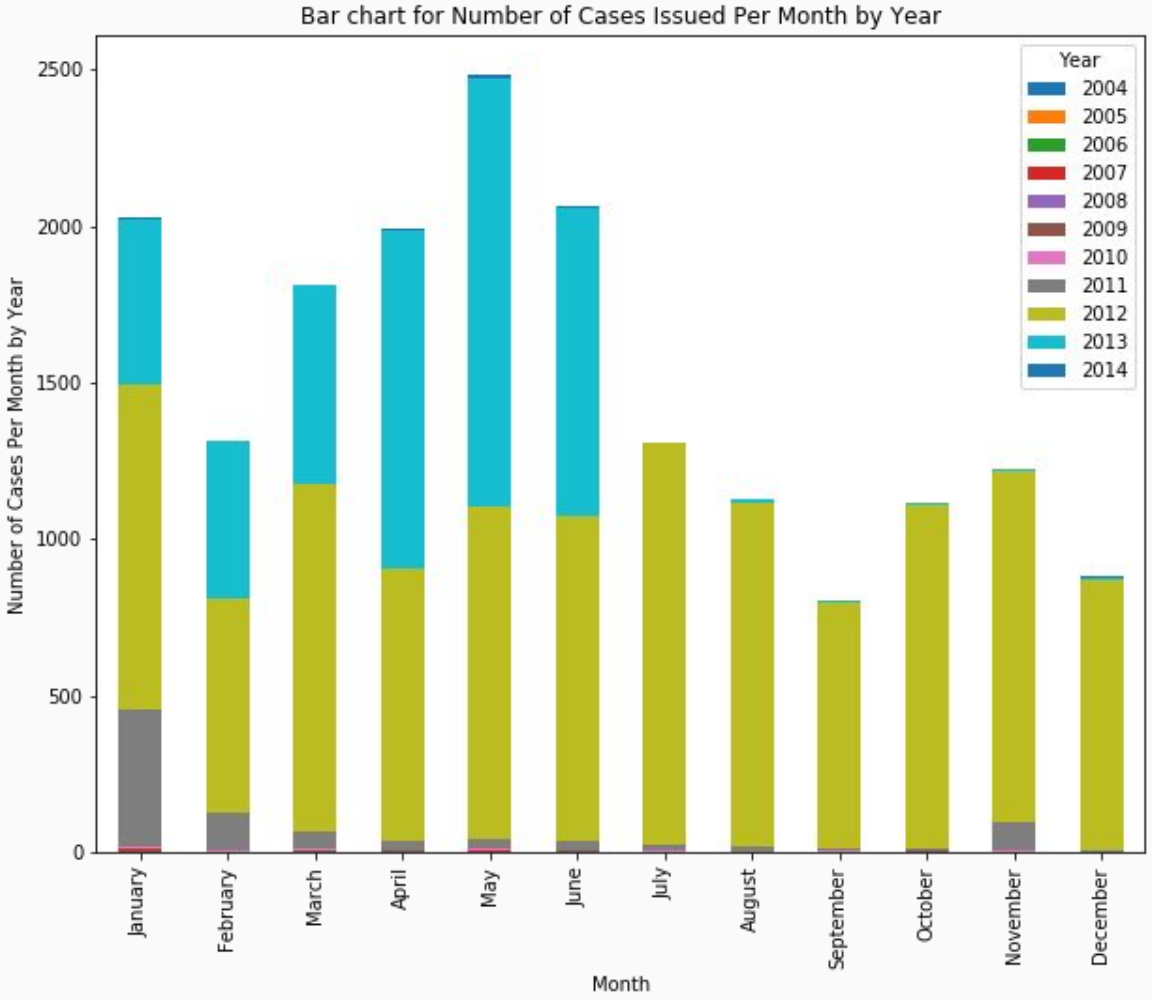
In 2012, the county issued the greatest number of permits.



Exploratory Analysis

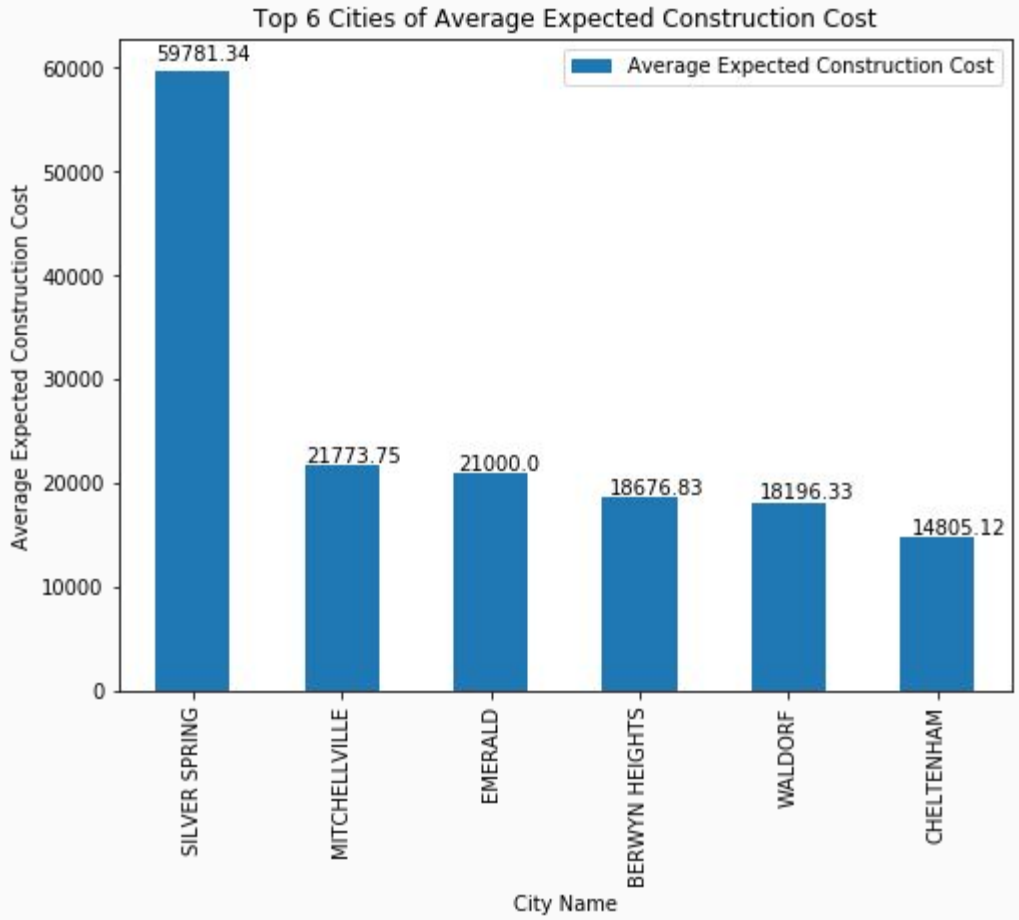
No special pattern like seasonality observed.

The number of permits issued each month is nearly even.



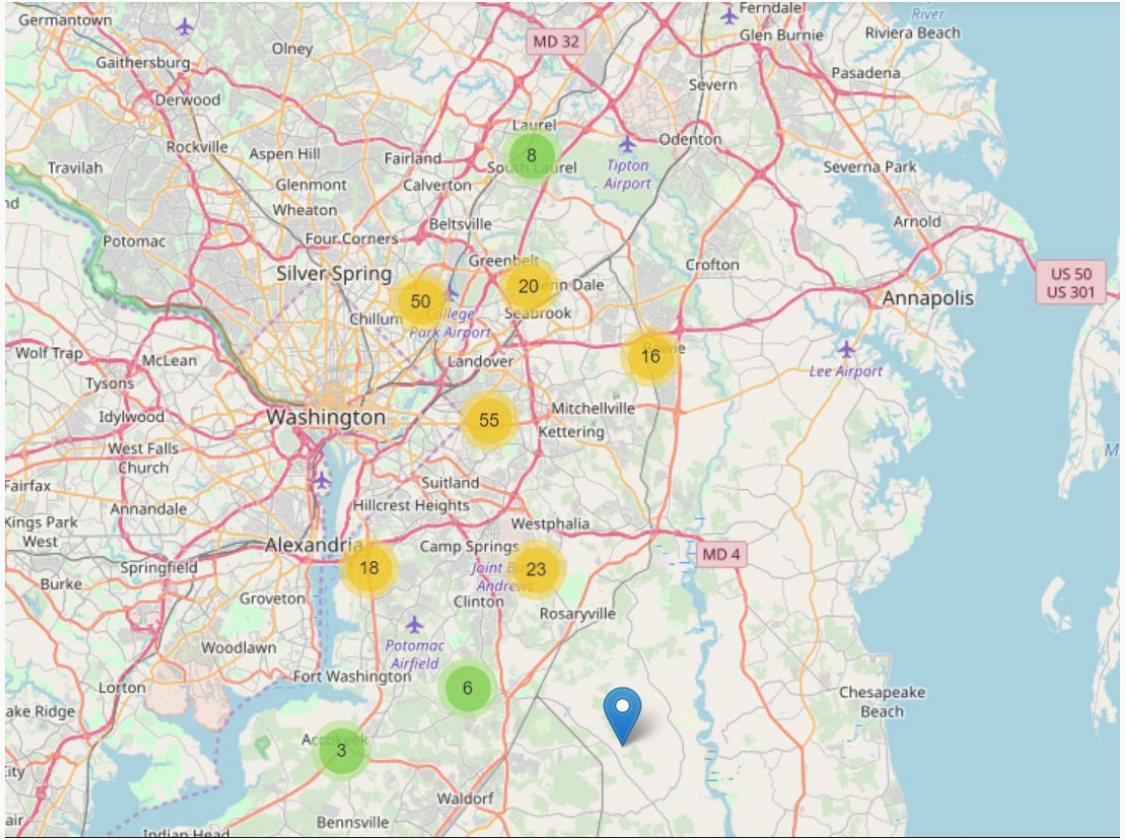
Exploratory Analysis

The city Silver Spring ranks the first. Its average expected construction cost was twice as much as the cost of Mitchellville.



Exploratory Analysis

Mapping with 200 sample, some areas are more popular than other areas as the number indicates the number of cases.



Foursquare Search Result

473

Different Venues

140

Different Venue Categories

200

Sample Coordination Pairs

200

Search Radius

K-Means Clustering

3 Clusters

Business might be operated around different-style local shopping centers equipped with restaurants, pharmacy and grocery store.

Cluster 1

Cluster 1 permits are to be used primarily around restaurants and grocery store. The applicants would be restaurant owners or related stakeholders.

Venue Type	Cluster 1
Seafood Restaurant	0.054945
Sandwich Place	0.043956
Pizza Place	0.043956
Fast Food Restaurant	0.038462
Grocery Store	0.038462

Cluster 2

Cluster 2 permits are to be used in a medium-sized local shopping center, or around sports training center, with restaurants, grocery store, and pharmacy.

Venue Type	Cluster 2
Fast Food Restaurant	0.075758
Pharmacy	0.037879
Grocery Store	0.037879
American Restaurant	0.030303
Football Stadium	0.030303

Cluster 3

Cluster 3 permits are to be used in a small local shopping center. The applicants might own Chinese restaurants, however cluster 2 permit applicants might be more interested in American restaurants.

Venue Type	Cluster 3
Fast Food Restaurant	0.062893
Pharmacy	0.031447
Chinese Restaurant	0.031447
Grocery Store	0.031447
Wings Joint	0.025157

Recommendation

- permit applicants wanted to operate, maintain, or renew business around local shopping center with restaurants, pharmacy, and grocery store nearby.
- Permit applicants showed different interest towards
- Local shopping centers are in different styles
- The county’s government may need to document the applicant’s business category and business operation situation in the future

Thanks!

Author: Peiyu Xu
Date: Feb24, 2019