CapstoneProject-FinalReport

May 8, 2020

1 Applied Data Science Capstone: A Survey Of Crime, In Chicago, Via Foursquare

1.1 Introduction:

An unfortunate blemish on any neighborhood is its rate of crime. As a business investor or owner, it would be profitable to understand how proximity to criminal events affects the sustainability of a venue location. Is there any correlation between criminal activity and the types of venues found in an area? If so, What types of crime have the greatest effect, based on the type of venue? Furthermore, are some business ventures more or less susceptible to proximal criminal activity? These are the questions I set out to answer, with this exploratory investigation.

1.2 Data:

To answer these questions, there were two sets of data that needed to be leveraged: criminal records and venue information. Criminal records were gathered from the city of Chicago's webspace. The last complete year of data (2019) was used in this analysis. From these records, the following information was extracted: Type of crime, a brief description of the crime, whether an arrest took place; latitude and longitude. Any rows of information lacking geospatial coordinates were dropped, as that information would become pertinent when gathering venue information. Any rows lacking other types of information were filled with "UNKNOWN," to preserve as much of the data as possible. Any rows involving geospatial coordinates outside of Chicago's boundaries were ignored, as this investigation only pertained to the city of Chicago. This resulted in a set with 257,862 rows of crime data. As using the Foursqare API was one of the criteria for this investigation, and given the size of this data set, I took a creative approach for making calls to the Foursquare API. The geospatial coordinates for the crime data were rounded down to one and two decimal places; this resulted in 16 and 717 unique coordinates, respectively. The 16 unique one-decimal coordinates (separated by slightly more than 10,000 meters from nearest neighbors) were used to make calls to the Foursquare API, limited to 100 calls per point with a radius of 5000 meters to cover the area. From those calls, venue names, geospatial coordinates, and type were returned. In order to assign to a finer area, venue coordinates were rounded to two decimal places (roughly a 500 meter radius) and then merged with the crime data, accordingly. This resulted in a final data set with 514,201 rows of information, stored as a .csv for later use. The head and tail are provided below, as a sample; some columns were dropped, for the sake of formatting.

```
[22]: DF=pd.read_csv('CourseraCapstoneDF.csv')
```

```
[23]: keep=DF.drop(['Description', 'Arrest', 'Venue'], axis=1)
      DF=keep
```

```
[24]: DF.head(100)
```

```
[24]:                       Crime  Latitude  Longitude              Venue_Type
      0                   BATTERY     41.89     -87.63      Seafood Restaurant
      1                   BATTERY     41.89     -87.63            Gourmet Shop
      2                   BATTERY     41.89     -87.63           Grocery Store
      3                   BATTERY     41.89     -87.63                   Hotel
      4                   BATTERY     41.89     -87.63           Women's Store
      5                   BATTERY     41.89     -87.63              Waterfront
      6                   BATTERY     41.89     -87.63     Gym / Fitness Center
      7                   BATTERY     41.89     -87.63                   Hotel
      8                   BATTERY     41.89     -87.63                 Theater
      9                   BATTERY     41.89     -87.63       Frozen Yogurt Shop
      10                  BATTERY     41.89     -87.63       Italian Restaurant
      11                  BATTERY     41.89     -87.63       Italian Restaurant
      12                  BATTERY     41.89     -87.63              Steakhouse
      13                  BATTERY     41.89     -87.63             Music Venue
      14                  BATTERY     41.89     -87.63  New American Restaurant
      15                  BATTERY     41.89     -87.63           Hot Dog Joint
      16                  BATTERY     41.89     -87.63              Donut Shop
      17                  BATTERY     41.89     -87.63      Indie Movie Theater
      18                  BATTERY     41.89     -87.63                   Hotel
      19                  BATTERY     41.89     -87.63       Mexican Restaurant
      20                  BATTERY     41.89     -87.63                   Hotel
      21                  BATTERY     41.89     -87.63              Steakhouse
      22  CRIMINAL SEXUAL ASSAULT     41.89     -87.63      Seafood Restaurant
      23  CRIMINAL SEXUAL ASSAULT     41.89     -87.63            Gourmet Shop
      24  CRIMINAL SEXUAL ASSAULT     41.89     -87.63           Grocery Store
      25  CRIMINAL SEXUAL ASSAULT     41.89     -87.63                   Hotel
      26  CRIMINAL SEXUAL ASSAULT     41.89     -87.63           Women's Store
      27  CRIMINAL SEXUAL ASSAULT     41.89     -87.63              Waterfront
      28  CRIMINAL SEXUAL ASSAULT     41.89     -87.63     Gym / Fitness Center
      29  CRIMINAL SEXUAL ASSAULT     41.89     -87.63                   Hotel
      ..                      ...       ...       ...                      ...
      70  CRIMINAL SEXUAL ASSAULT     41.89     -87.63           Women's Store
      71  CRIMINAL SEXUAL ASSAULT     41.89     -87.63              Waterfront
      72  CRIMINAL SEXUAL ASSAULT     41.89     -87.63     Gym / Fitness Center
      73  CRIMINAL SEXUAL ASSAULT     41.89     -87.63                   Hotel
      74  CRIMINAL SEXUAL ASSAULT     41.89     -87.63                 Theater
      75  CRIMINAL SEXUAL ASSAULT     41.89     -87.63       Frozen Yogurt Shop
      76  CRIMINAL SEXUAL ASSAULT     41.89     -87.63       Italian Restaurant
      77  CRIMINAL SEXUAL ASSAULT     41.89     -87.63       Italian Restaurant
      78  CRIMINAL SEXUAL ASSAULT     41.89     -87.63              Steakhouse
      79  CRIMINAL SEXUAL ASSAULT     41.89     -87.63             Music Venue
      80  CRIMINAL SEXUAL ASSAULT     41.89     -87.63  New American Restaurant
```

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81  CRIMINAL SEXUAL ASSAULT    41.89   -87.63            Hot Dog Joint
82  CRIMINAL SEXUAL ASSAULT    41.89   -87.63               Donut Shop
83  CRIMINAL SEXUAL ASSAULT    41.89   -87.63       Indie Movie Theater
84  CRIMINAL SEXUAL ASSAULT    41.89   -87.63                    Hotel
85  CRIMINAL SEXUAL ASSAULT    41.89   -87.63        Mexican Restaurant
86  CRIMINAL SEXUAL ASSAULT    41.89   -87.63                    Hotel
87  CRIMINAL SEXUAL ASSAULT    41.89   -87.63                Steakhouse
88  CRIMINAL SEXUAL ASSAULT    41.89   -87.63        Seafood Restaurant
89  CRIMINAL SEXUAL ASSAULT    41.89   -87.63              Gourmet Shop
90  CRIMINAL SEXUAL ASSAULT    41.89   -87.63             Grocery Store
91  CRIMINAL SEXUAL ASSAULT    41.89   -87.63                    Hotel
92  CRIMINAL SEXUAL ASSAULT    41.89   -87.63             Women's Store
93  CRIMINAL SEXUAL ASSAULT    41.89   -87.63                Waterfront
94  CRIMINAL SEXUAL ASSAULT    41.89   -87.63       Gym / Fitness Center
95  CRIMINAL SEXUAL ASSAULT    41.89   -87.63                    Hotel
96  CRIMINAL SEXUAL ASSAULT    41.89   -87.63                   Theater
97  CRIMINAL SEXUAL ASSAULT    41.89   -87.63        Frozen Yogurt Shop
98  CRIMINAL SEXUAL ASSAULT    41.89   -87.63         Italian Restaurant
99  CRIMINAL SEXUAL ASSAULT    41.89   -87.63         Italian Restaurant

[100 rows x 4 columns]
```

[25]: `DF.tail(100)`

```
[25]:                  Crime  Latitude  Longitude     Venue_Type
514101             THEFT    41.99     -87.84   Grocery Store
514102             THEFT    41.99     -87.84     Coffee Shop
514103             THEFT    41.99     -87.84   Grocery Store
514104             THEFT    41.99     -87.84     Coffee Shop
514105             THEFT    41.99     -87.84   Grocery Store
514106             THEFT    41.99     -87.84     Coffee Shop
514107             THEFT    41.99     -87.84   Grocery Store
514108             THEFT    41.99     -87.84     Coffee Shop
514109   CRIMINAL DAMAGE    41.99     -87.84   Grocery Store
514110   CRIMINAL DAMAGE    41.99     -87.84     Coffee Shop
514111             THEFT    41.99     -87.84   Grocery Store
514112             THEFT    41.99     -87.84     Coffee Shop
514113 DECEPTIVE PRACTICE    41.99     -87.84   Grocery Store
514114 DECEPTIVE PRACTICE    41.99     -87.84     Coffee Shop
514115     OTHER OFFENSE    41.99     -87.84   Grocery Store
514116     OTHER OFFENSE    41.99     -87.84     Coffee Shop
514117     OTHER OFFENSE    41.99     -87.84   Grocery Store
514118     OTHER OFFENSE    41.99     -87.84     Coffee Shop
514119   CRIMINAL DAMAGE    41.99     -87.84   Grocery Store
514120   CRIMINAL DAMAGE    41.99     -87.84     Coffee Shop
514121             THEFT    41.99     -87.84   Grocery Store
514122             THEFT    41.99     -87.84     Coffee Shop
514123 DECEPTIVE PRACTICE    41.99     -87.84   Grocery Store
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514124  DECEPTIVE PRACTICE      41.99   -87.84      Coffee Shop
514125  DECEPTIVE PRACTICE      42.01   -87.79    Burrito Place
514126     OTHER OFFENSE        42.01   -87.79    Burrito Place
514127     OTHER OFFENSE        42.01   -87.79    Burrito Place
514128  DECEPTIVE PRACTICE      42.01   -87.79    Burrito Place
514129     OTHER OFFENSE        42.01   -87.79    Burrito Place
514130     OTHER OFFENSE        42.01   -87.79    Burrito Place
...                  ...          ...      ...              ...
514171             THEFT        41.70   -87.52       Donut Shop
514172             THEFT        41.70   -87.52   Breakfast Spot
514173           ASSAULT        41.70   -87.52   Sandwich Place
514174           ASSAULT        41.70   -87.52           Casino
514175           ASSAULT        41.70   -87.52     Wings Joint
514176           ASSAULT        41.70   -87.52       Donut Shop
514177           ASSAULT        41.70   -87.52   Breakfast Spot
514178         NARCOTICS        41.70   -87.52   Sandwich Place
514179         NARCOTICS        41.70   -87.52           Casino
514180         NARCOTICS        41.70   -87.52     Wings Joint
514181         NARCOTICS        41.70   -87.52       Donut Shop
514182         NARCOTICS        41.70   -87.52   Breakfast Spot
514183           BATTERY        41.70   -87.52   Sandwich Place
514184           BATTERY        41.70   -87.52           Casino
514185           BATTERY        41.70   -87.52     Wings Joint
514186           BATTERY        41.70   -87.52       Donut Shop
514187           BATTERY        41.70   -87.52   Breakfast Spot
514188     OTHER OFFENSE        41.70   -87.52   Sandwich Place
514189     OTHER OFFENSE        41.70   -87.52           Casino
514190     OTHER OFFENSE        41.70   -87.52     Wings Joint
514191     OTHER OFFENSE        41.70   -87.52       Donut Shop
514192     OTHER OFFENSE        41.70   -87.52   Breakfast Spot
514193           BATTERY        41.70   -87.52   Sandwich Place
514194           BATTERY        41.70   -87.52           Casino
514195           BATTERY        41.70   -87.52     Wings Joint
514196           BATTERY        41.70   -87.52       Donut Shop
514197           BATTERY        41.70   -87.52   Breakfast Spot
514198           ASSAULT        42.01   -87.93      Video Store
514199           ASSAULT        42.01   -87.93      Video Store
514200  WEAPONS VIOLATION       41.77   -87.75            Hotel

[100 rows x 4 columns]
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[ ]: