

Park Ridge 38 B-A Schiller Park Franklin Park Northlake Melrose Park Bellwood Maywood Westchester Berwyn Cicero-Brookfield Lyons La Grange. Bridgeview Burbank Hickory Hills Oak Lawn Palos Hills

CRIMES IN CHICAGO SCATTER

- Too much data to properly view as scatter points,
- Un-readable

RELOCATE POLICE STATION BY KMEAN

- Take account only 2019 year to be up to date
- Current data: 23 police stations in Chicago (with one headquarter)
- Divide police stations into two types: main and quick response station
- Our goal: get higher ratio of arrested people in criminal reports

Park Ridge 39B 39B 78 79B 80 81A 82C Norridge Schiller Park Franklin Park Elmwood Park Northlake Melrose Park -Oak-Park Bellwood Maywood Hillside 184-194-20-21A Westchester Berwyn Cicero Brookfield Lyons La Grange Summit Airport Bridgeview Burbank Hickory Hills Evergreen Oák Lawn Palos Hills

NARCOTIC RELATED CRIMES 2018

Now we can clearly see which area is most problematic

```
> crimes <- read.csv("month_to_crime1.csv")
> crimes2019<-crimes[crimes$Year>2018,]
 summary(crimes2019)
                Crimes.Amount
                                                   Domestic
     Year
                                   Arrest
        :2019
                Min.
Min.
                       :1
                              Min.
                                      :0.0000
                                                Min.
                                                       :0.0000
              1st Qu.:1
1st Qu.:2019
                              1st Qu.:0.0000
                                                1st Qu.:0.0000
Median:2019
               Median :1
                              Median :0.0000
                                                Median :0.0000
        :2019
                Mean
                              Mean
                                      :0.2109
                                                Mean
                                                       :0.1669
Mean
3rd Qu.:2019
               3rd Qu.:1
                              3rd Qu.:0.0000
                                                3rd Qu.:0.0000
        :2019
                       :1
                                      :1.0000
                                                       :1.0000
Max.
                Max.
                              Max.
                                                Max.
                                               Primary. Type
   Latitude
                   Longitude
        :36.62
Min.
                 Min. :-91.69
                                  THEFT
                                                     :51894
                 1st Qu.:-87.71
                                                     :42053
1st Qu.:41.77
                                  BATTERY
Median :41.86
                 Median :-87.66
                                                     :22723
                                  CRIMINAL DAMAGE
        :41.84
                        :-87.67
                                                     :17608
                                  ASSAULT
Mean
                 Mean
3rd Qu.:41.90
                 3rd Qu.:-87.63
                                  DECEPTIVE PRACTICE:14516
Max.
        :42.02
                 Max.
                        :-87.52
                                  OTHER OFFENSE
                                                     :14133
NA's
        :1096
                 NA's
                        :1096
                                   (Other)
                                                     :54396
```

INVESTIGATE
DATASET BY
2019 YEAR

REMOVE NA'S IN LATITUDE AND LONGITUDE

REMOVE OUTLIER IN LONGITUDE AND LATITUDE

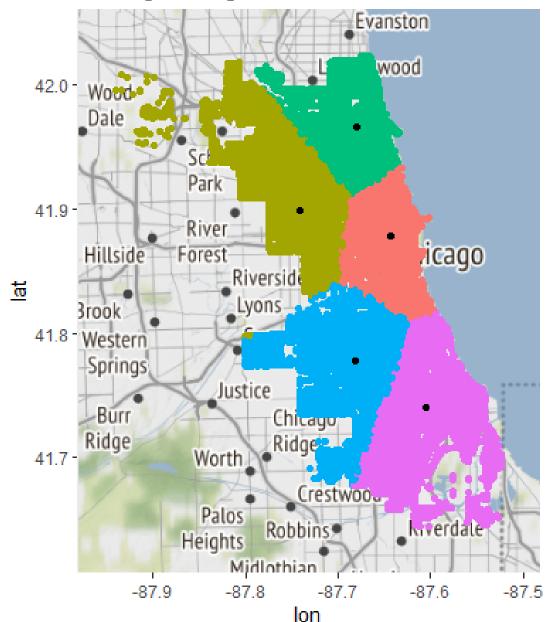
Year	Crimes.Amount	Arrest	Domestic
Min. :2019	Min. :1 N	Min. :0.0000	Min. :0.0000
1st Qu.:2019	1st Qu.:1 1	lst Qu.:0.0000	1st Qu.:0.0000
Median :2019	Median :1 N	Median :0.0000	Median :0.0000
Mean :2019	Mean :1 N	Mean :0.2119	Mean :0.1677
3rd Qu.:2019	3rd Qu.:1	3rd Qu.:0.0000	3rd Qu.:0.0000
Max. :2019	Max. :1 N	Max. :1.0000	Max. :1.0000
Latitude	Longitude		Primary.Type
Min. :36.62	Min. :-91.69	THEFT	:51266
1st Qu.:41.77	1st Qu.:-87.71	L BATTERY	:42016
Median :41.86	Median :-87.60	5 CRIMINAL DAM	IAGE :22654
Mean :41.84	Mean :-87.67	7 ASSAULT	:17591
3rd Qu.:41.90	3rd Qu.:-87.63	B DECEPTIVE PR	RACTICE:14247
Max. :42.02	Max. :-87.52		SE :14114
		(Other)	:54339

PREPARED DATASET IS READY TO ANALYZE

```
> cleanedcrimes<-cleanedcrimes[cleanedcrimes$Longitude>-91.68,]
> summary(cleanedcrimes)
    Year Crimes.Amount Arrest Domestic
Min. :2019 Min. :1 Min. :0.0000
                                     Min. :0.0000
                                     1st Qu.:0.0000
Median: 2019 Median: 1 Median: 0.0000
                                     Median :0.0000
Mean :2019 Mean :1 Mean :0.2119
                                     Mean :0.1676
3rd Qu.:2019 3rd Qu.:1 3rd Qu.:0.0000
                                     3rd Qu.:0.0000
Max. :2019 Max. :1
                       Max. :1.0000
                                     Max. :1.0000
              Longitude
                                    Primary. Type
  Latitude
Min. :41.64
             Min. :-87.94 THEFT
                                         :51266
1st Qu.:41.77
             1st Qu.:-87.71 BATTERY :42015
             Median: -87.66 CRIMINAL DAMAGE: 22654
Median :41.86
Mean :41.84
             Mean :-87.67 ASSAULT
                                 :17591
3rd Qu.:41.90
             3rd Qu.:-87.63 DECEPTIVE PRACTICE:14247
Max. :42.02
             Max. :-87.52
                           OTHER OFFENSE :14114
                           (Other)
                                         :54339
```

SET 5 MAIN POLICE STATION BASED ON ALL CRIMINAL REPORTS

Chicago using KMean, k=5

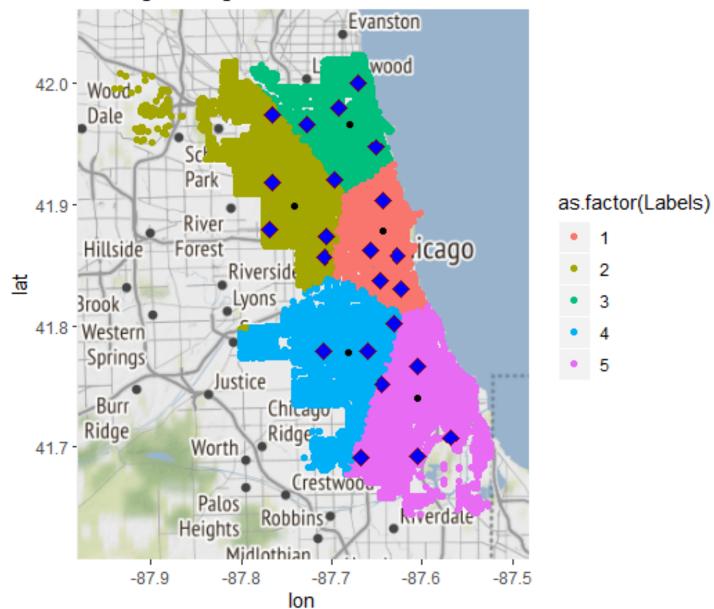


as.factor(Labels)

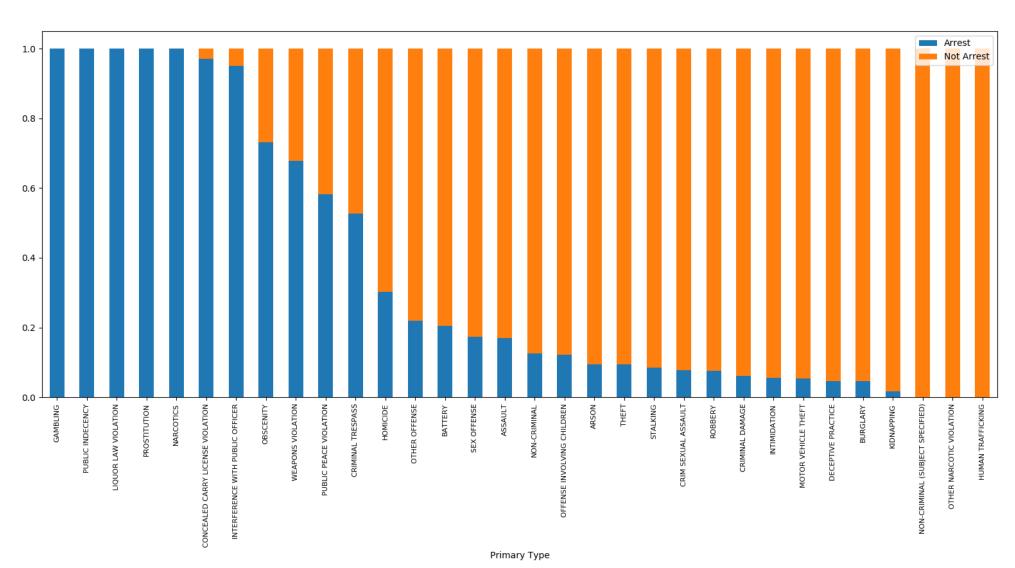
SET 5 MAIN POLICE STATIONS BASED ON ALL CRIMINAL REPORTS

BLUE DIAMONDS: CURRENT POLICE STATIONS

Chicago using KMean, k=5



NORMALIZATION OF DATASET BY PRIMARY TYPE



TAKE 6 PRIMARY TYPE WITH THE LOWEST RATIO (WITH CRIMES AMOUNT>5000) TO DETERMINE QUICK RESPONSE POLICE STATIONS LOCALIZATION

Year	Primary Type	Crimes Amount	Arrest	Domestic	Ratio [%]
	2019THEFT	51894	5011	1946	9.66
	2019BATTERY	42053	8622	20172	20.50
	2019 CRIMINAL DAMAGE	22723	1410	2701	6.21
	2019 ASSAULT	17608	3156	4482	17.92
	2019 DECEPTIVE PRACTICE	14516	655	116	4.51
	2019 OTHER OFFENSE	14133	3125	4471	22.11
	2019NARCOTICS	11758	11750	5	99.93
	2019BURGLARY	7996	410	142	5.13
	2019MOTOR VEHICLE THEFT	7506	406	120	5.41
	2019ROBBERY	6603	530	146	8.03
	2019 CRIMINAL TRESPASS	5782	3215	292	55.60
	2019 WEAPONS VIOLATION	5372	3598	13	66.98

"WINDOWS" – MAIN POLICE STATIONS

BLUE DIAMONS –
CURRENT POLICE
STATIONS

BLACK DOT –
CENTROID BY KMEAN

