Incidence of crimes in San Francisco during evening hours in general and larceny specifically.

This report attempts to visualize some specific crime trends in the San Francisco areas during the summer of 2014. Specifically, this report presents a brief analysis of the total number of crimes, the total number of crimes during the evening hours, and the location of all larceny/theft crimes. Please note that this report is not intended to present publication-ready graphs but, instead, is used to present relevant data in a concise format.

Start with the import of necessary libraries and a summary of the data

```
library(ggplot2)
library(maps)
library(ggmap)
dfSFCrime = read.csv("sanfrancisco_incidents_summer_2014.csv")
```

```
summary(dfSFCrime)
```

```
##    IncidntNum                 Category
##  Min.   : 10284385   LARCENY/THEFT :9466
##  1st Qu.:140545607   OTHER OFFENSES:3567
##  Median :140632022   NON-CRIMINAL  :3023
##  Mean   :142017280   ASSAULT       :2882
##  3rd Qu.:140719664   VEHICLE THEFT :1966
##  Max.   :990367398   WARRANTS      :1782
##                      (Other)       :6307
##                          Descript         DayOfWeek            Da
##  GRAND THEFT FROM LOCKED AUTO: 3766   Friday   :4451   06/28/2014
##  STOLEN AUTOMOBILE           : 1350   Monday   :4005   08/09/2014
##  LOST PROPERTY               : 1202   Saturday :4319   08/08/2014
##  PETTY THEFT OF PROPERTY     : 1125   Sunday   :4218   06/29/2014
##  WARRANT ARREST              :  980   Thursday :3968   08/29/2014
##  PETTY THEFT FROM LOCKED AUTO:  955   Tuesday  :3930   06/04/2014
##  (Other)                     :19615   Wednesday:4102   (Other)
##       Time           PdDistrict              Resolution
##  12:00  :  784   SOUTHERN :5739   NONE           :19139
##  00:01  :  661   MISSION  :3700   ARREST, BOOKED : 6502
##  18:00  :  649   NORTHERN :3589   ARREST, CITED  : 1419
##  19:00  :  621   CENTRAL  :3513   LOCATED        : 1042
##  17:00  :  594   BAYVIEW  :2725   UNFOUNDED      :  260
##  20:00  :  586   INGLESIDE:2378   JUVENILE BOOKED:  163
##  (Other):25098   (Other)  :7349   (Other)        :  468
##                       Address            X                Y
##  800 Block of BRYANT ST  :  948   Min.   :-122.5   Min.   :37.71
##  800 Block of MARKET ST  :  288   1st Qu.:-122.4   1st Qu.:37.76
##  900 Block of POTRERO AV :  230   Median :-122.4   Median :37.78
##  1000 Block of POTRERO AV:  199   Mean   :-122.4   Mean   :37.77
##  2000 Block of MISSION ST:  149   3rd Qu.:-122.4   3rd Qu.:37.79
##  16TH ST / MISSION ST    :  116   Max.   :-122.4   Max.   :37.82
##  (Other)                 :27063
##                                  Location          PdId
##  (37.775420706711, -122.403404791479) :  940   Min.   :1.028e+12
##  (37.7571580431915, -122.406604919508):  224   1st Qu.:1.405e+13
##  (37.7564864109309, -122.406539115148):  196   Median :1.406e+13
##  (37.7650501214668, -122.419671780296):  152   Mean   :1.420e+13
##  (37.7841893501425, -122.407633520742):  150   3rd Qu.:1.407e+13
##  (37.7285280627465, -122.475647460786):  102   Max.   :9.904e+13
##  (Other)                                :27229
##      Hour
##  Length:28993
##  Class :character
##  Mode  :character
##
##
```

```
##
##
```

It can be seen that the category with the most offenses (excluding “Other”) are those labeled as “LARCENY/THEFT”. Please note that the days of the week are not ordered but it can be seen that the number of crimes labeled “LARCENY/THEFT” is approximately the same for each particular day during the summer of 2014.

```
with(dfSFCrime, table(Category, DayOfWeek))
```

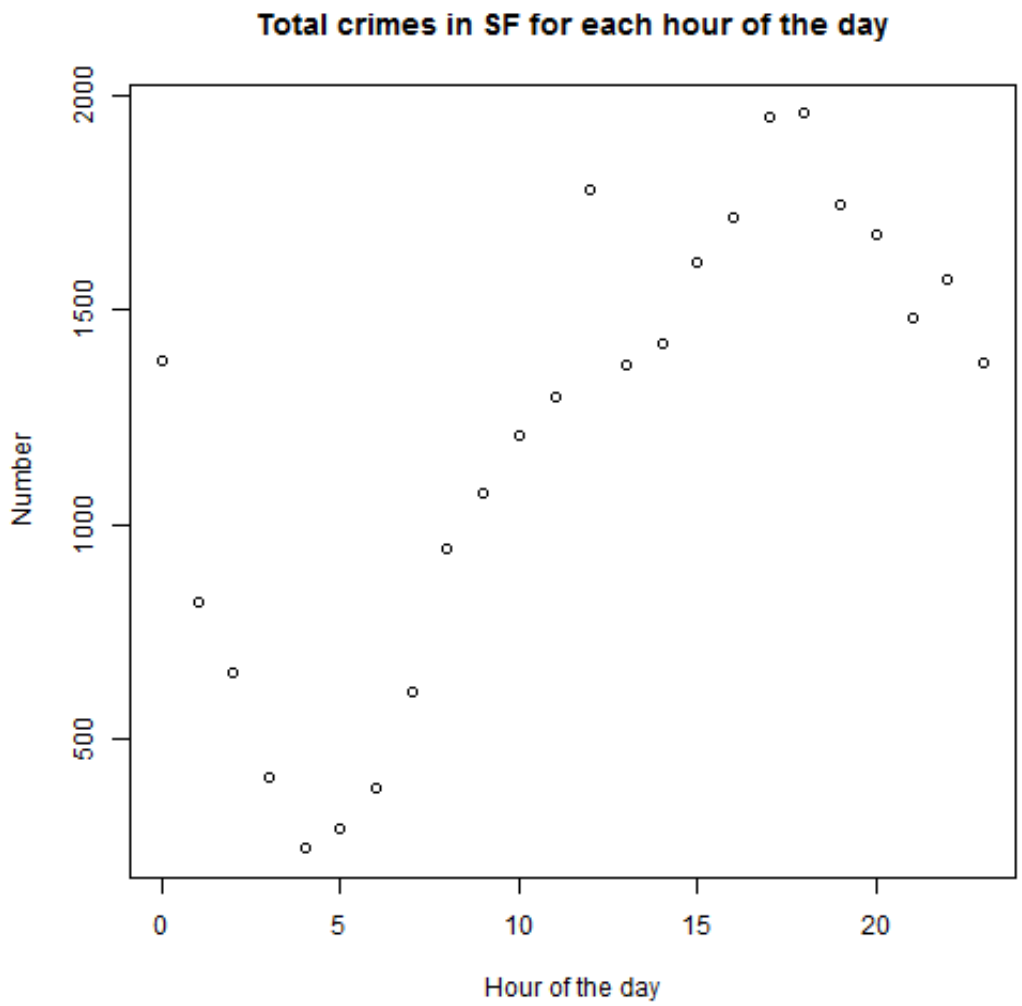
```
##                                DayOfWeek
## Category                        Friday Monday Saturday Sunday Thurs
##   ARSON                              5      7       10     12
##   ASSAULT                          440    406      452    462
##   BRIBERY                            0      0        0      0
##   BURGLARY                           0      0        0      1
##   DISORDERLY CONDUCT                 6      5        1      8
##   DRIVING UNDER THE INFLUENCE       18      7       23     19
##   DRUG/NARCOTIC                    208    193      145    156
##   DRUNKENNESS                       27     14       26     24
##   EMBEZZLEMENT                       2      3        1      2
##   EXTORTION                          2      1        2      0
##   FAMILY OFFENSES                    2      1        0      0
##   FORGERY/COUNTERFEITING             2      1        3      1
##   FRAUD                             30     29       41     27
##   GAMBLING                           0      0        0      0
##   KIDNAPPING                        14     20       21     15
##   LARCENY/THEFT                   1445   1233     1583   1505     1
##   LIQUOR LAWS                       13      4        7      7
##   LOITERING                          0      1        0      0
##   MISSING PERSON                   219    206      158    182
##   NON-CRIMINAL                     468    440      455    445
##   OTHER OFFENSES                   547    496      507    433
##   PORNOGRAPHY/OBSCENE MAT            0      0        0      0
##   PROSTITUTION                      59      8        8      7
##   ROBBERY                           44     54       38     50
##   RUNAWAY                            7     15       10     13
##   SECONDARY CODES                   62     61       70     57
##   STOLEN PROPERTY                    1      2        0      2
##   SUICIDE                            1      5        4      1
##   SUSPICIOUS OCC                   188    181      155    170
##   TRESPASS                          48     32       33     41
##   VANDALISM                          0      5        2      2
##   VEHICLE THEFT                    297    288      281    314
##   WARRANTS                         255    241      238    212
##   WEAPON LAWS                       41     46       45     50
##                                DayOfWeek
## Category                        Tuesday Wednesday
##   ARSON                               8        13
##   ASSAULT                           356       379
##   BRIBERY                             1         0
##   BURGLARY                            1         3
##   DISORDERLY CONDUCT                  4         3
##   DRIVING UNDER THE INFLUENCE        10        12
##   DRUG/NARCOTIC                     209       216
##   DRUNKENNESS                        16        24
```

```
##   EMBEZZLEMENT                   0         1
##   EXTORTION                      0         1
##   FAMILY OFFENSES                3         1
##   FORGERY/COUNTERFEITING         5         3
##   FRAUD                         38        35
##   GAMBLING                       1         0
##   KIDNAPPING                    13        18
##   LARCENY/THEFT               1237      1228
##   LIQUOR LAWS                    3         5
##   LOITERING                      1         0
##   MISSING PERSON               150       203
##   NON-CRIMINAL                 404       418
##   OTHER OFFENSES               536       522
##   PORNOGRAPHY/OBSCENE MAT        0         1
##   PROSTITUTION                   8         9
##   ROBBERY                       35        46
##   RUNAWAY                        5         4
##   SECONDARY CODES               75        56
##   STOLEN PROPERTY                1         0
##   SUICIDE                        2         0
##   SUSPICIOUS OCC               194       212
##   TRESPASS                      44        35
##   VANDALISM                      3         3
##   VEHICLE THEFT                225       291
##   WARRANTS                     286       293
##   WEAPON LAWS                   56        67
```

Next, the data is prepared in order to plot the total number of crimes for each hour.

```
dfSFCrime$Hour = substr(dfSFCrime$Time, 1, 2)
dfSFCrimeHourCat = aggregate(IncidntNum ~ Hour + Category, data = df
  FUN = length)
dfSFCrimeHourCatSum = aggregate(IncidntNum ~ Hour, data = dfSFCrimeH
  FUN = sum)
dfSFCrimeHourCatSum$IncidntNum = as.numeric(dfSFCrimeHourCatSum$Inci
```

```
plot(dfSFCrimeHourCatSum$Hour, dfSFCrimeHourCatSum$IncidntNum, main
```

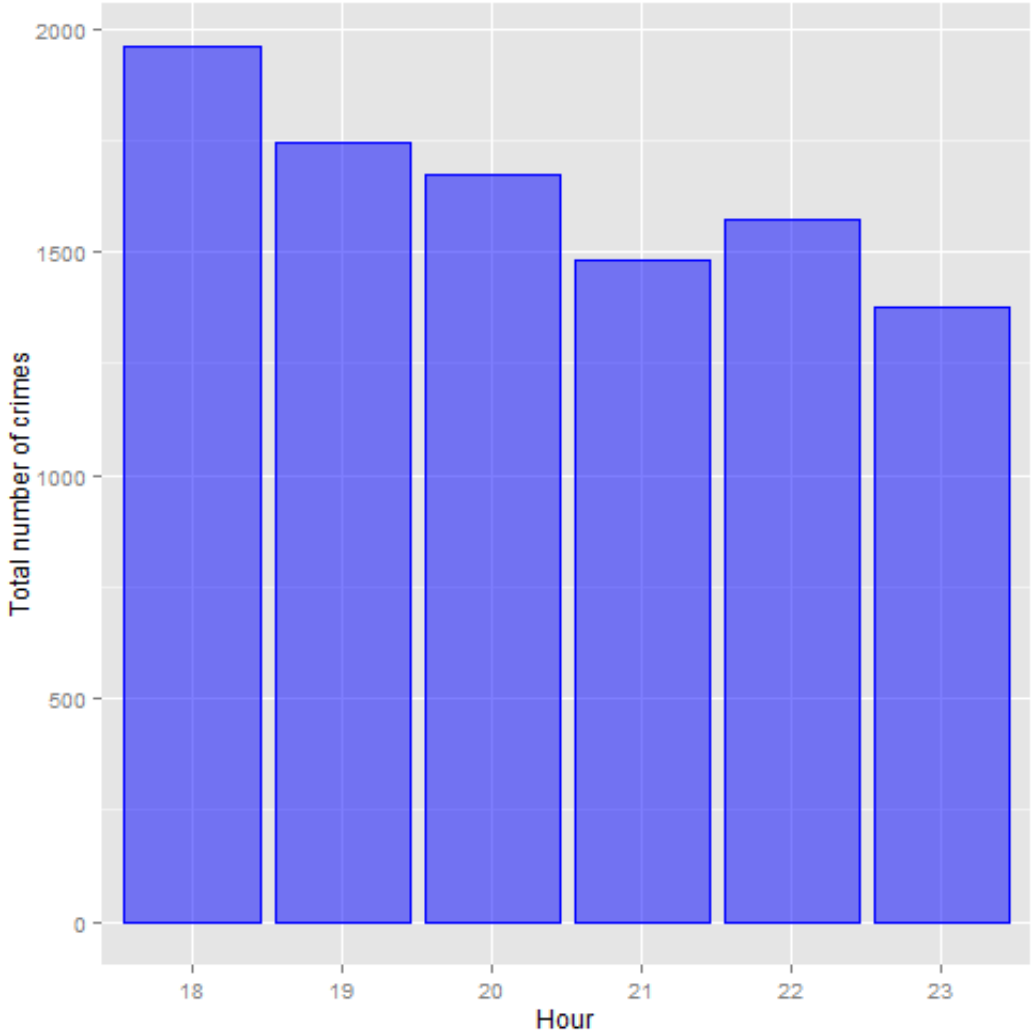


It can be seen that the incidence of crime is at its lowest around 4 AM after which it increases steadily until about 6 PM. During the evening hours there seems to be decrease in the number of crimes.

In order to visualize the number of crimes for the evening hours only, the following steps were taken after which ggplot was used to visualize the overall crime trend during the evening hours:

```
dfSFCrimeHourCat$Hour = as.numeric(dfSFCrimeHourCat$Hour)
eveningCrime = subset(dfSFCrimeHourCat, Hour >= 18)
eveningCrimeHourSum = aggregate(IncidntNum ~ Category, data = evenir
```

```
ggplot(subset(dfSFCrimeHourCatSum, Hour >= 18), aes(x=Hour, y=Incidr
  geom_bar(alpha=.5,stat="identity", colour = "blue", fill = "blue")
  ylab("Total number of crimes")
```



It would appear that during the evening hours there is a decrease in criminal offenses from 6 PM to 12 AM.

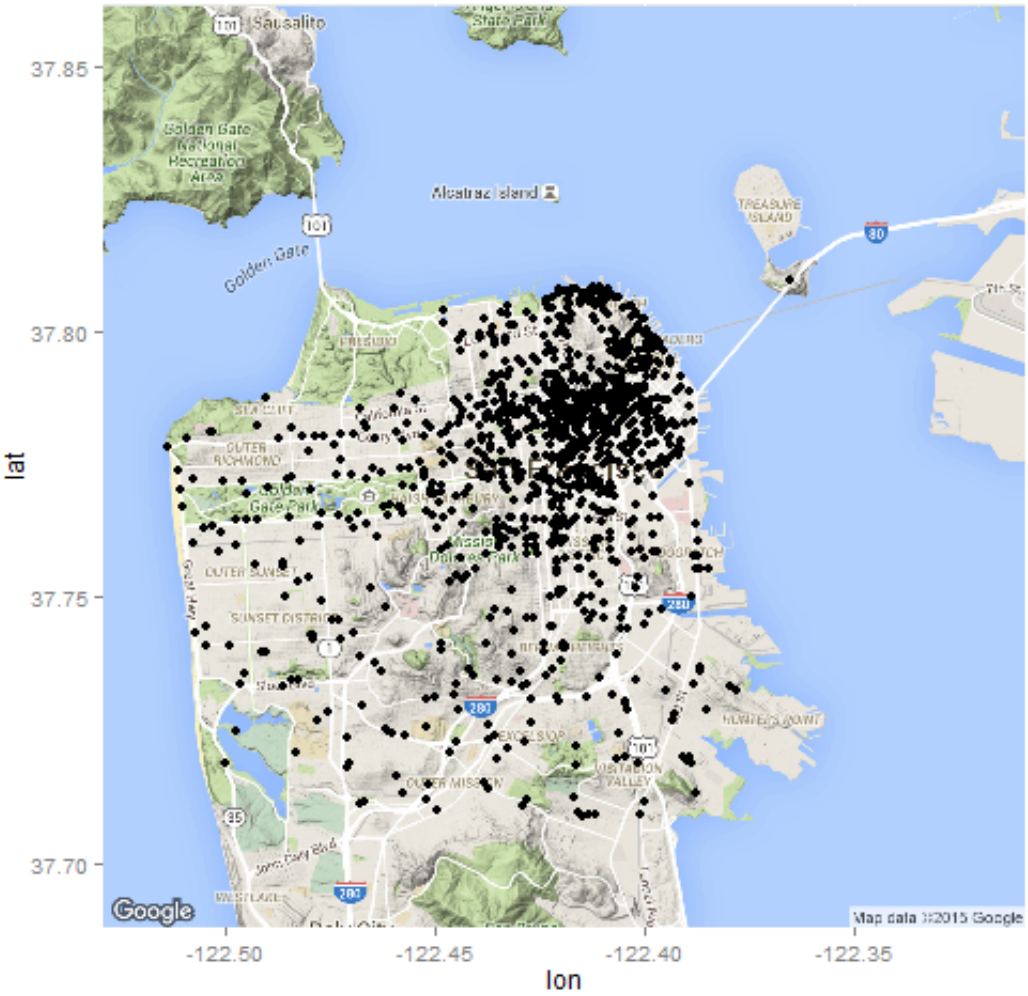
Finally, in order to visualize the locations at which a selected crime, namely “LARCENY/THEFT” took place during the summer of 2014 on Sundays, the following steps were taken:

```
sf =  get_map(location = "sanfrancisco", zoom = 12)
```

```
## Map from URL : http://maps.googleapis.com/maps/api/staticmap?cent
```

```
larceny = subset(dfSFCrime, Category=="LARCENY/THEFT")
larcenySun = subset(larceny, DayOfWeek == "Sunday")
```

```
ggmap(sf) + geom_point(data=larcenySun, aes(x=X, y=Y), main="Larceno
```



Each point in the graph is a single occurence. From the graph, it would appear that there was a significant number of crimes labeled “LARCENY/THEFT” in the North Beach area (area in the NW portion of the graph) as well as in the TenderLoin area (south of North Beach).

END