

EDA. Case Study 2 - Group 4

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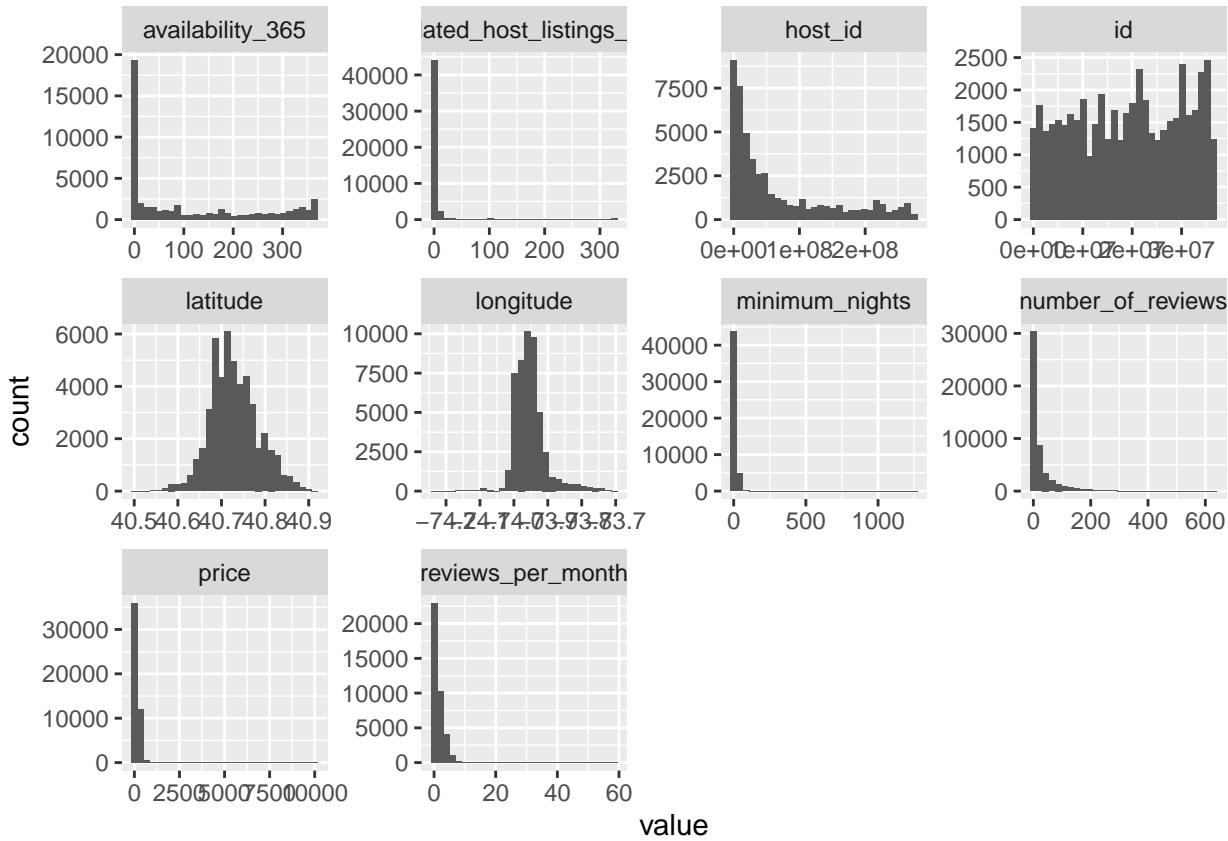
1. Load Data

```
dat = read.csv('AB_NYC_2019.csv', na.strings = c("", "NA"))

library(purrr)
library(tidyr)
library(ggplot2)

## Warning: package 'ggplot2' was built under R version 3.5.2
dat %>%
  keep(is.numeric) %>%
  gather() %>%
  ggplot(aes(value)) +
  facet_wrap(~ key, scales = "free") +
  geom_histogram()

## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
## Warning: Removed 10052 rows containing non-finite values (stat_bin).
```



```
lapply(dat, class)
```

```
## $id
## [1] "integer"
##
## $name
## [1] "factor"
##
## $host_id
## [1] "integer"
##
## $host_name
## [1] "factor"
##
## $neighbourhood_group
## [1] "factor"
##
## $neighbourhood
## [1] "factor"
##
## $latitude
## [1] "numeric"
##
## $longitude
## [1] "numeric"
##
## $room_type
```

```

## [1] "factor"
##
## $price
## [1] "integer"
##
## $minimum_nights
## [1] "integer"
##
## $number_of_reviews
## [1] "integer"
##
## $last_review
## [1] "factor"
##
## $reviews_per_month
## [1] "numeric"
##
## $calculated_host_listings_count
## [1] "integer"
##
## $availability_365
## [1] "integer"

```

2. Missing Data Manipulation

```

apply(dat, 2, function(x)(sum(is.na(x))))


##                  id                 name
##                      0                   16
##          host_id            host_name
##                      0                   21
## neighbourhood_group      neighbourhood
##                         0                   0
##             latitude           longitude
##                         0                   0
##        room_type              price
##                         0                   0
## minimum_nights   number_of_reviews
##                         0                   0
##       last_review reviews_per_month
##                         10052                10052
## calculated_host_listings_count availability_365
##                         0                   0

dat = dat[, !names(dat) %in% c('id', 'host_name', 'last_review')]
dat$reviews_per_month[is.na(dat$reviews_per_month)] = 0
apply(dat, 2, function(x)(sum(is.na(x))))


##                  name            host_id
##                     16                   0
## neighbourhood_group      neighbourhood
##                         0                   0
##             latitude           longitude
##                         0                   0

```

```

##          0          0
##      room_type      price
##          0          0
##      minimum_nights   number_of_reviews
##          0          0
##      reviews_per_month calculated_host_listings_count
##          0          0
##      availability_365
##          0

```

3. EDA plots

```

library(jpeg)
library(ggpubr)

## Warning: package 'ggpubr' was built under R version 3.5.2
## Loading required package: magrittr

##
## Attaching package: 'magrittr'

## The following object is masked from 'package:tidyverse':
## 
##     extract

## The following object is masked from 'package:purrr':
## 
##     set_names
library(grid)

img = readJPEG("New_York_City_.jpg")

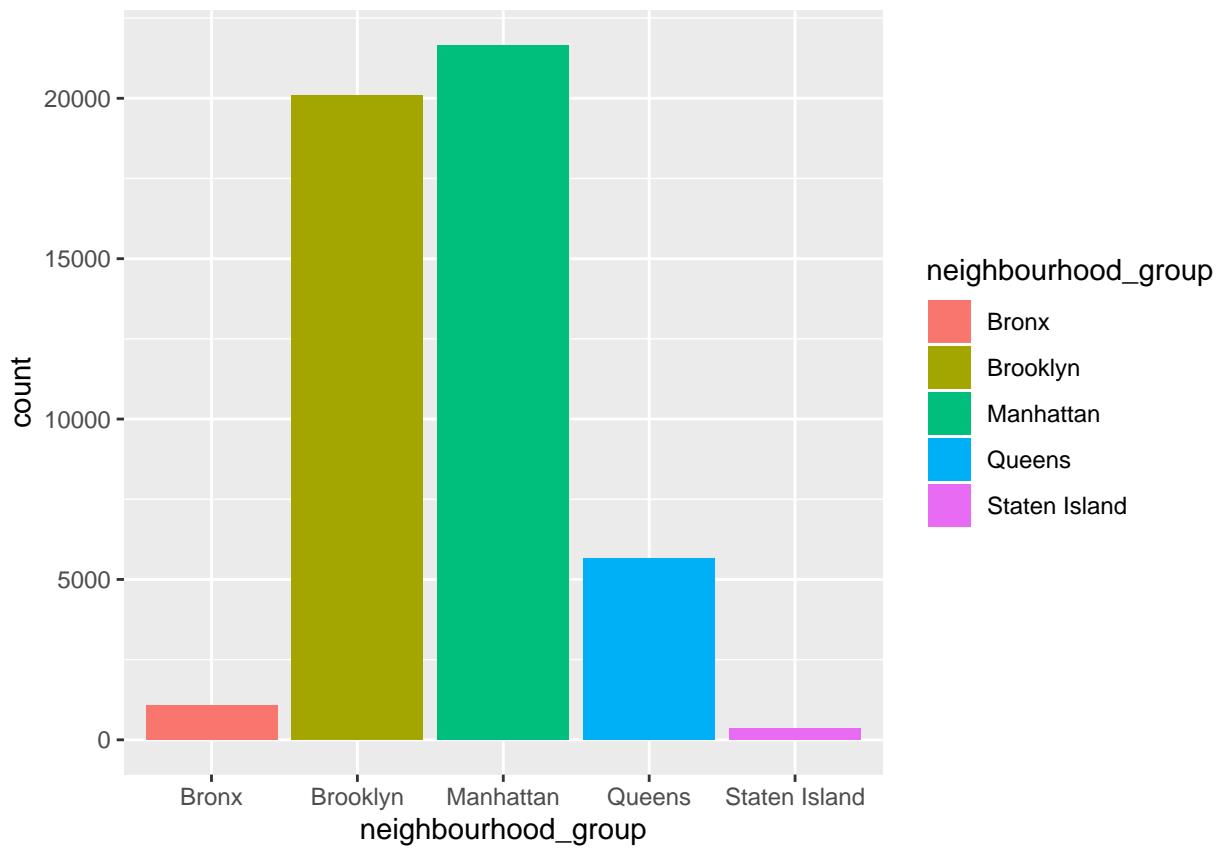
```

3.1 Neighbourhood Count

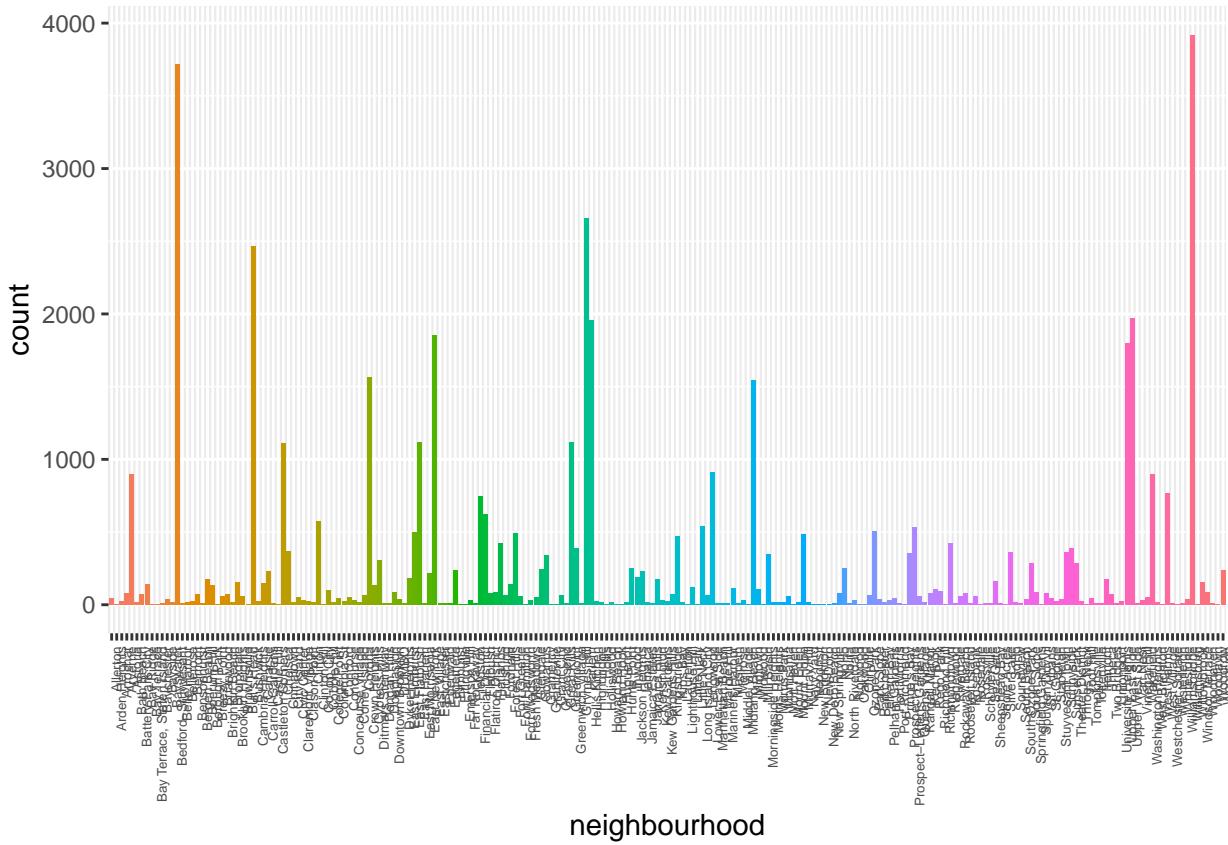
```

ggplot(dat, aes(x=neighbourhood_group)) +
  geom_bar(aes(fill=neighbourhood_group))

```



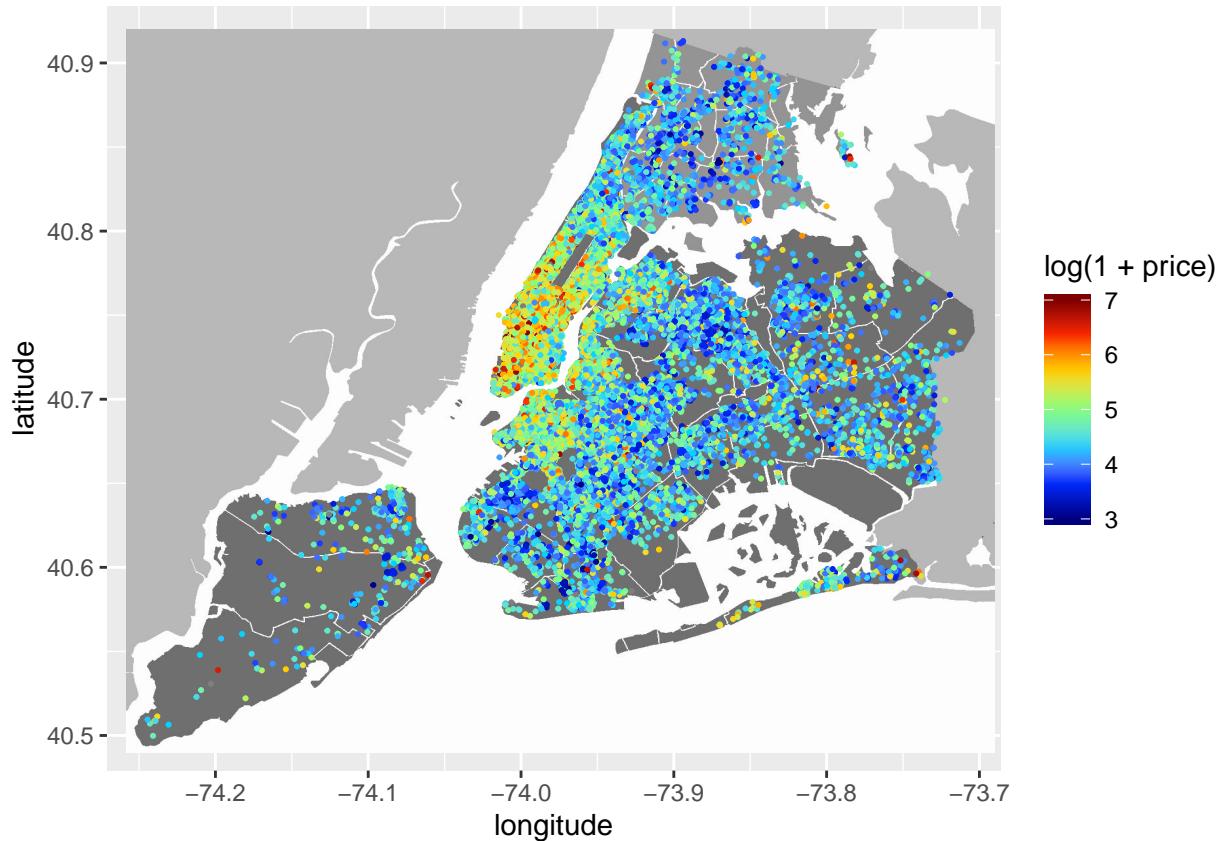
```
ggplot(dat, aes(x=neighbourhood)) +  
  geom_bar(aes(fill=neighbourhood), show.legend = FALSE) +  
  theme(axis.text.x = element_text(angle = 90, hjust = 1, size=5))
```



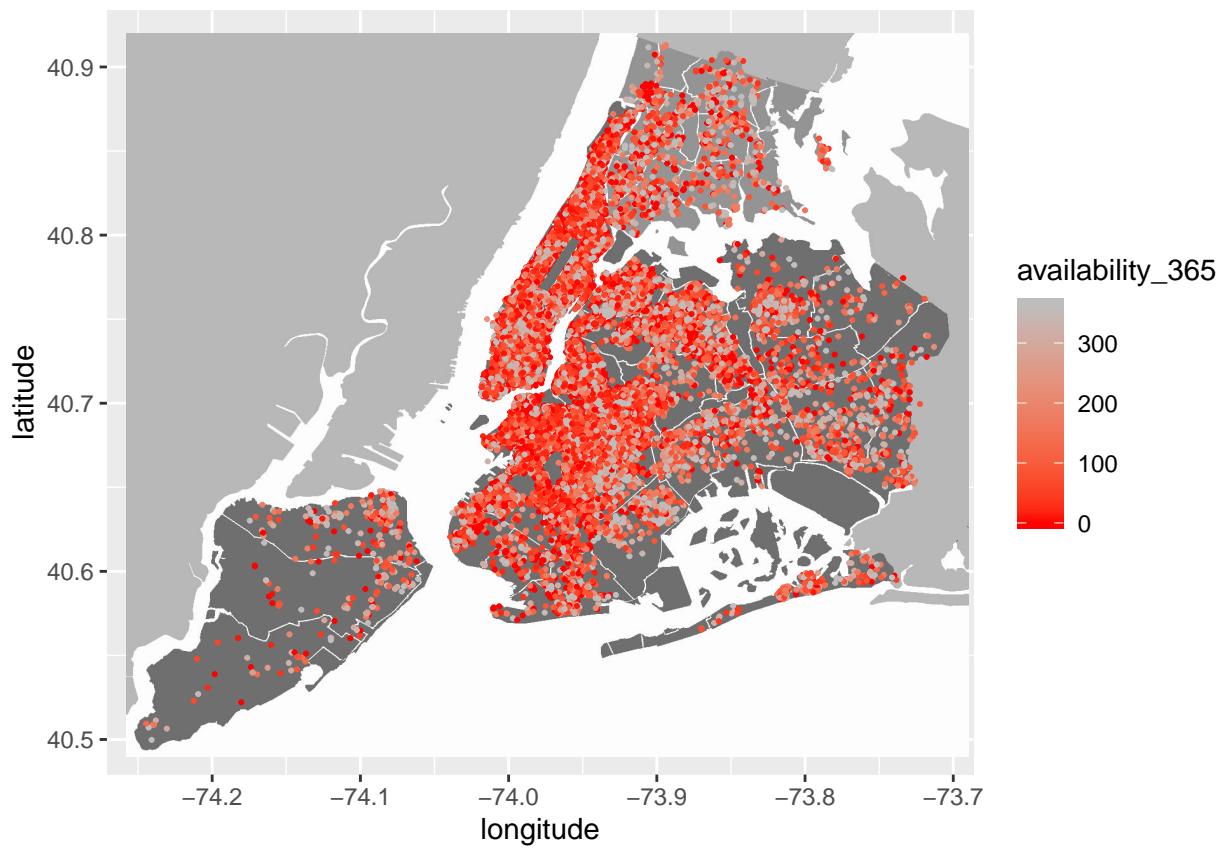
3.2 Maps

```
jet.colors <- colorRampPalette(c("#00007F", "blue", "#007FFF", "cyan", "#7FFF7F", "yellow", "#FF7F00", "#FF0000"))

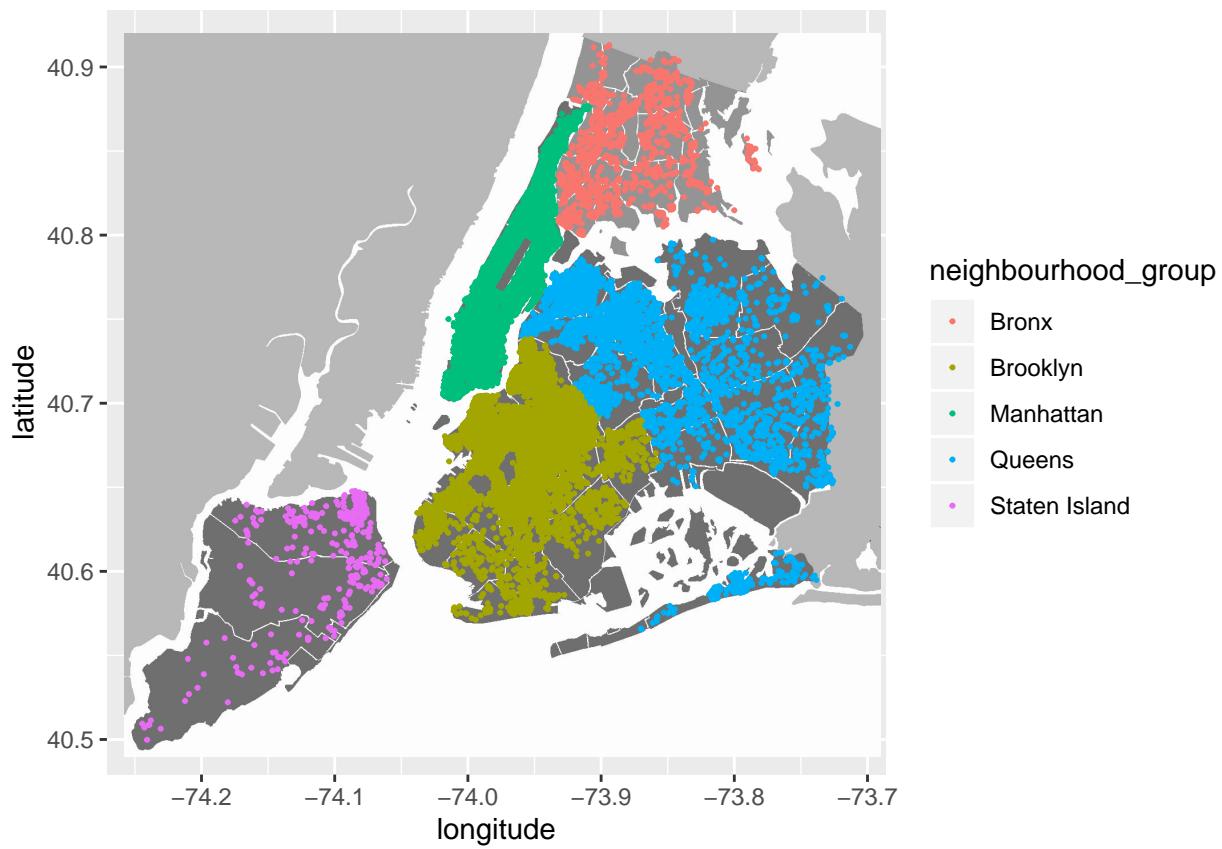
ggplot(dat, aes(x=longitude, y = latitude, color = log(1+price)))+
  annotation_custom(rasterGrob(img,
    width = unit(1, "npc"),
    height = unit(1, "npc")),
    -74.258, -73.69, 40.49,40.92) +
  geom_point(cex = 0.4) +
  scale_colour_gradientn(colors = jet.colors(7), limits = c(3,7))
```



```
ggplot(dat, aes(x=longitude, y = latitude, color = availability_365))+
  annotation_custom(rasterGrob(img,
                                width = unit(1, "npc"),
                                height = unit(1, "npc")),
                    -74.258, -73.69, 40.49,40.92) +
  geom_point(cex = 0.4) +
  scale_colour_gradient(low = 'red', high = 'grey')
```



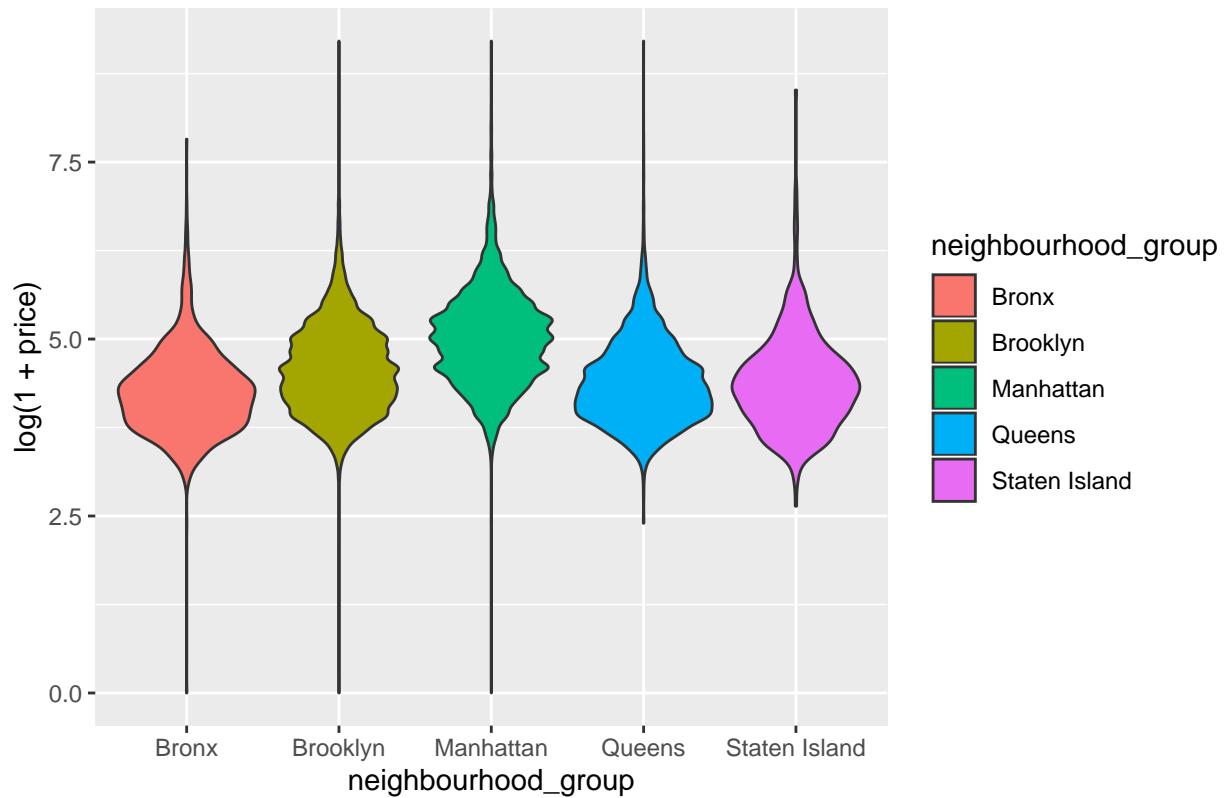
```
ggplot(dat, aes(x=longitude, y = latitude, color = neighbourhood_group))+  
  annotation_custom(rasterGrob(img,  
                                width = unit(1, "npc"),  
                                height = unit(1, "npc")),  
                    -74.258, -73.69, 40.49,40.92) +  
  geom_point(cex = 0.4)
```



3.3 Neighbourhood Group

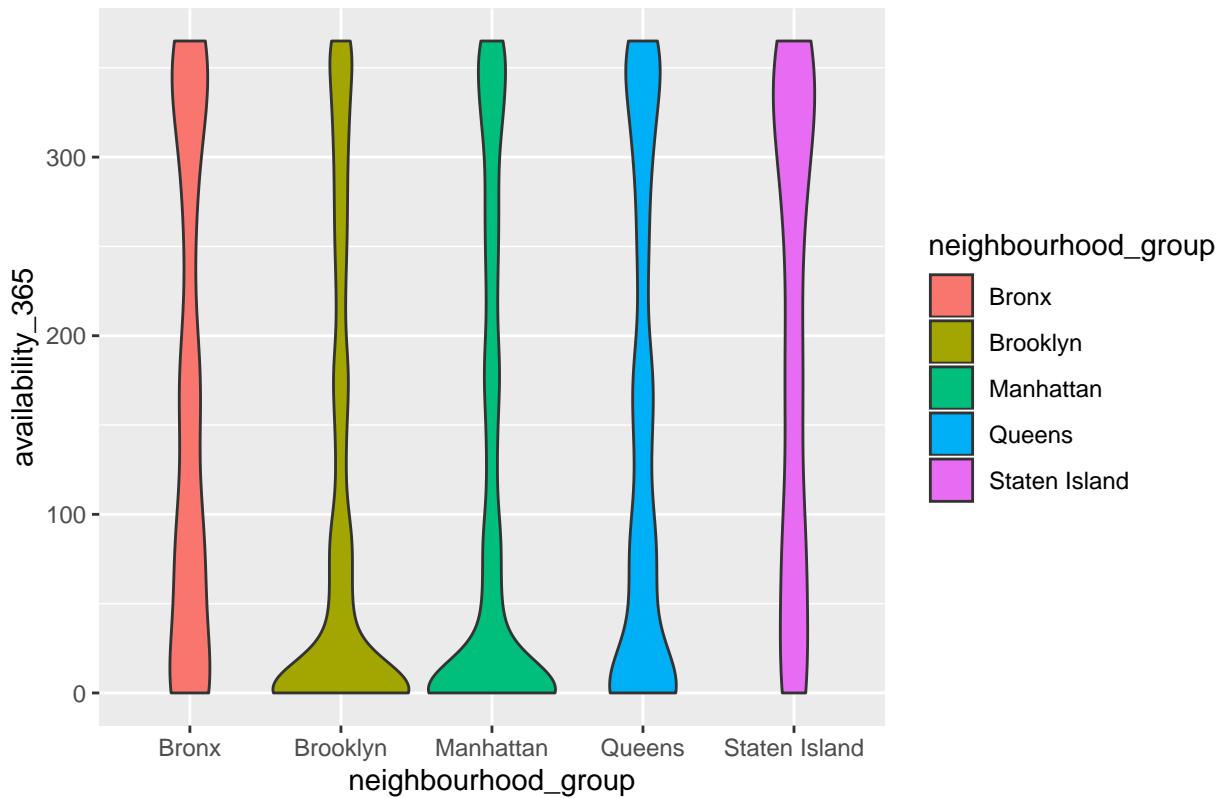
```
ggplot(dat, aes(x=neighbourhood_group, y = log(1+price), fill = neighbourhood_group))+
  geom_violin() +
  ggtitle('Neighbourhood group: price KDE')
```

Neighbourhood group: price KDE



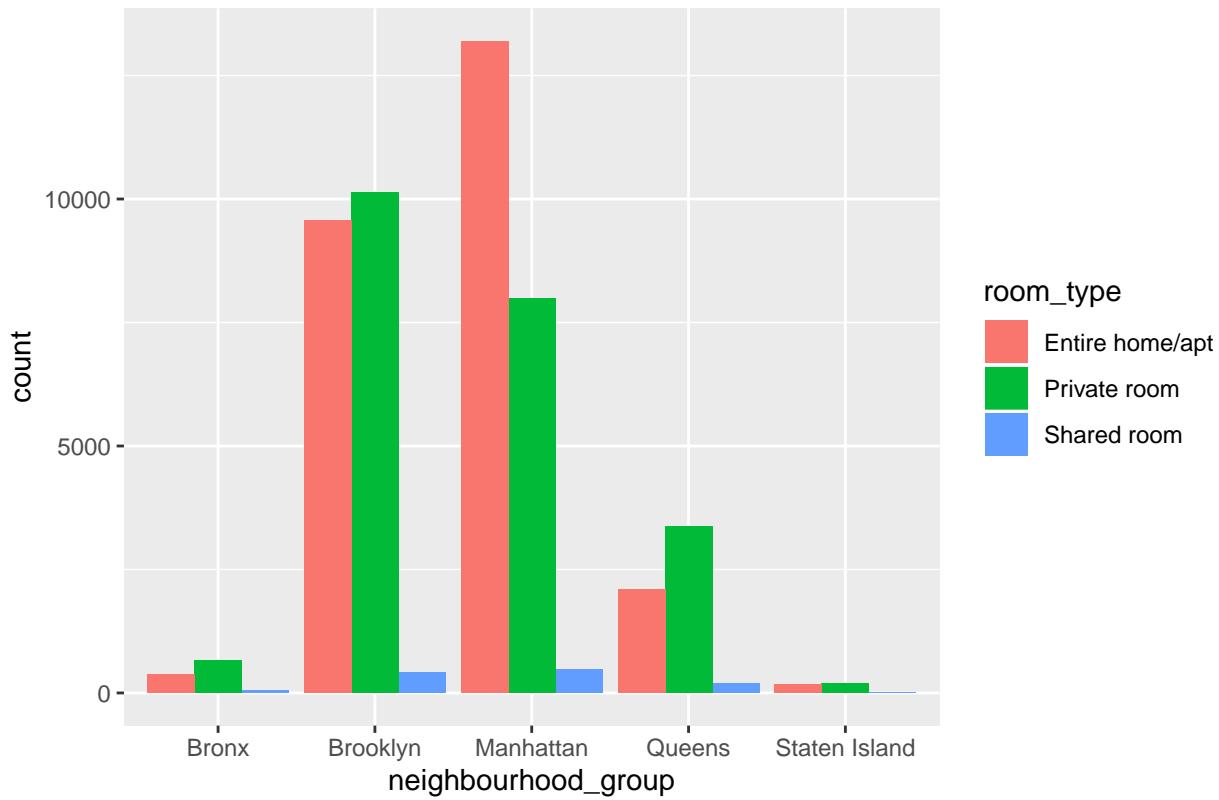
```
ggplot(dat, aes(x=neighbourhood_group, y = availability_365, fill = neighbourhood_group)) +  
  geom_violin() +  
  ggtitle('Neighbourhood group: availability KDE')
```

Neighbourhood group: availability KDE



```
ggplot(dat, aes(x = neighbourhood_group))+
  geom_bar(aes(fill = room_type), position='dodge')+
  ggtitle("Neighbourhood group: room type")
```

Neighbourhood group: room type



3.4 Number of Reviews

```

dat1 <- dat[with(dat,order(-number_of_reviews)),]

dat1[1:10,]

##                                     name host_id
## 11760          Room near JFK Queen Bed 47621202
## 2032           Great Bedroom in Manhattan 4734398
## 2031           Beautiful Bedroom in Manhattan 4734398
## 2016           Private Bedroom in Manhattan 4734398
## 13496          Room Near JFK Twin Beds 47621202
## 10624          Steps away from Laguardia airport 37312959
## 1880           Manhattan Lux Loft.Like.Love.Lots.Look ! 2369681
## 20404 Cozy Room Family Home LGA Airport NO CLEANING FEE 26432133
## 4871           Private brownstone studio Brooklyn 12949460
## 472            LG Private Room/Family Friendly 792159
##   neighbourhood_group  neighbourhood latitude longitude
## 11760             Queens        Jamaica 40.66730 -73.76831
## 2032              Manhattan      Harlem 40.82085 -73.94025
## 2031              Manhattan      Harlem 40.82124 -73.93838
## 2016              Manhattan      Harlem 40.82264 -73.94041
## 13496             Queens        Jamaica 40.66939 -73.76975
## 10624             Queens     East Elmhurst 40.77006 -73.87683
## 1880              Manhattan Lower East Side 40.71921 -73.99116

```

```

## 20404      Queens    East Elmhurst 40.76335 -73.87007
## 4871       Brooklyn   Park Slope 40.67926 -73.97711
## 472        Brooklyn   Bushwick 40.70283 -73.92131
##          room_type price minimum_nights number_of_reviews
## 11760     Private room 47           1            629
## 2032      Private room 49           1            607
## 2031      Private room 49           1            597
## 2016      Private room 49           1            594
## 13496     Private room 47           1            576
## 10624     Private room 46           1            543
## 1880      Private room 99           2            540
## 20404     Private room 48           1            510
## 4871      Entire home/apt 160          1            488
## 472       Private room 60           3            480
##          reviews_per_month calculated_host_listings_count availability_365
## 11760         14.58                      2            333
## 2032          7.75                      3            293
## 2031          7.72                      3            342
## 2016          7.57                      3            339
## 13496         13.40                     2            173
## 10624         11.59                     5            163
## 1880          6.95                      1            179
## 20404         16.22                     5            341
## 4871          8.14                      1            269
## 472           6.70                      1            0

```

4. Word Count

```

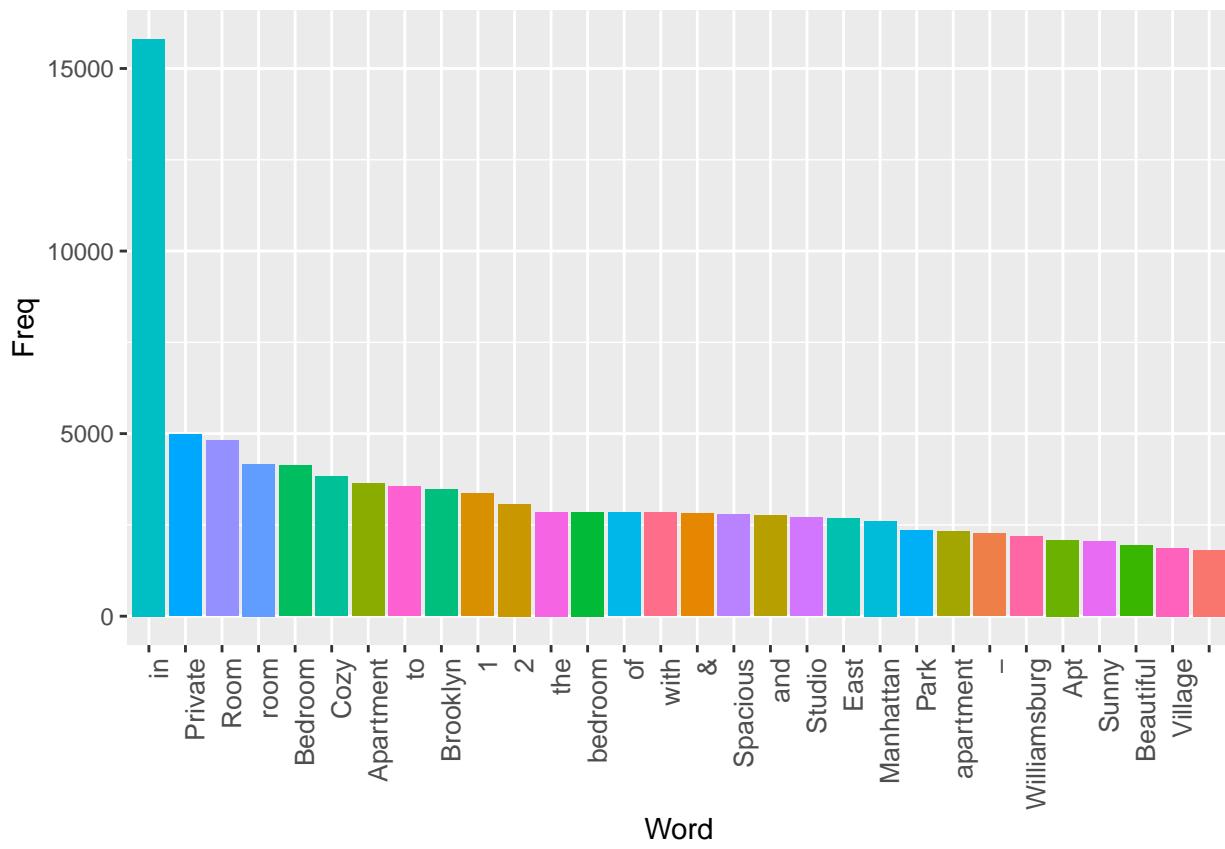
Names = paste(dat$name, collapse = " ")
Names = strsplit(Names, " ")[[1]]
Names = table(Names)

library(dplyr)

## Warning: package 'dplyr' was built under R version 3.5.2
##
## Attaching package: 'dplyr'
## The following objects are masked from 'package:stats':
## 
##     filter, lag
## The following objects are masked from 'package:base':
## 
##     intersect, setdiff, setequal, union
freq = Names %>% as.data.frame() %>% arrange(desc(Freq))

ggplot(freq[1:30,], aes(x = reorder(Names, -Freq), y = Freq))+
  geom_bar(stat = "identity", aes(fill = Names), show.legend = FALSE)+
  xlab("Word")+
  theme(axis.text.x = element_text(angle = 90, hjust = 1, size=10))

```



5.

5. Regression

5.1 Linear Regression

5.2 LASSO

5.3 Decision Tree & Random Forest

5.4