Real Estate EDA

Edris Safari

2/27/2020

Final Project

The purpose of this project is to use techniques learned in this class to exercise exploratory data analysis on a given data set, The dataset chosen for this project are:

- properties_2016.csv
- transactions_2016.csv

properties dataset contins the information about individual homes that were sold in 2016. The transaction dataset has the transaction date when the house was sold and the log error from the sales price estimated by zillow(zestimate).

For more details about the progression and assembly of this project, please refer to the accompanying document ***DSC520_FinalProject-EdrisSafari-week_12.pdf***

NOTE The properties data file was far too large and took a lot of time to process, so we reduced its size by to 20, and 30 percent respectively. After tests, we submit this project with the smaller size of 20 percent.

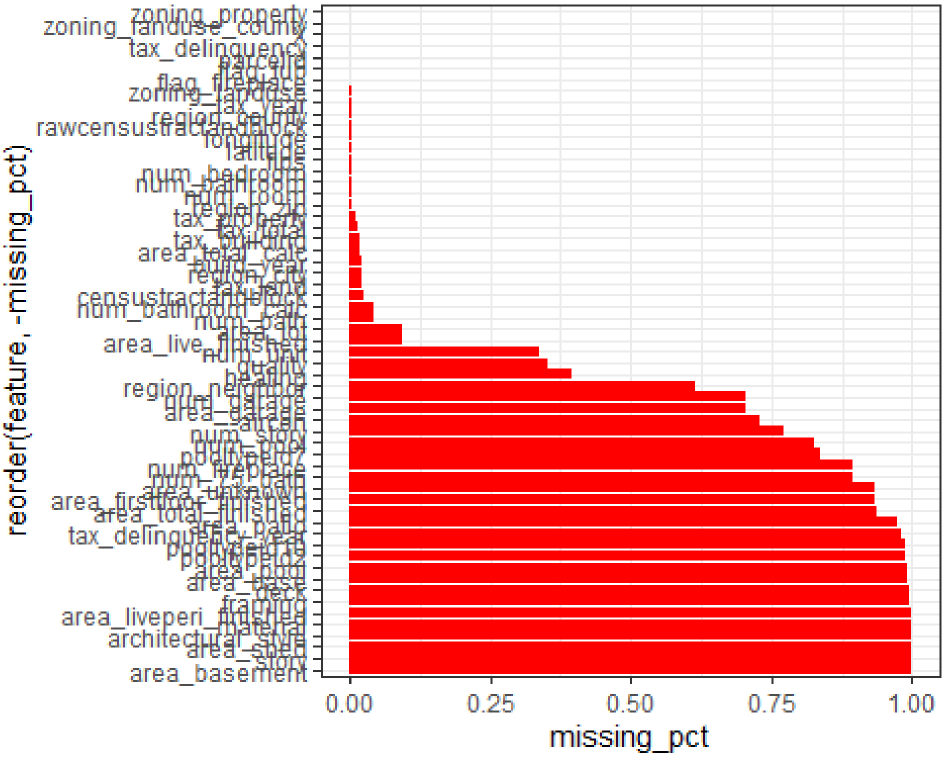
properties <- read.csv(“zillow-prize-1/properties_2016.csv”) nrow(properties) # almost 3 million records sample_20 <- properties[sample(nrow(properties), nrow(properties)*.20),] sample_30 <- properties[sample(nrow(properties), nrow(properties)*.30),] nrow(sample_20) nrow(sample_30) write.csv(sample_20,“zillow-prize-1/properties_2016_sample_20.csv”) write.csv(sample_30,“zillow-prize-1/properties_2016_sample_30.csv”)

properties <- read.csv(“zillow-prize-1/properties_2016_sample_20.csv”) nrow(properties)

Also note that the output to pdf is not supported, and the absolute log error map at the end of this file does not output to word document, so we copied it from HTML file, and saved the word document as pdf for submission.

Data Preparation

Features with percentage of missing values



Selected features

X, parcelid, aircon, num_bathroom, num_bedroom, quality, num_bathroom_calc, area_total_calc, area_live_finished, fips, num_bath, num_garage, area_garage, flag_tub, heating, latitude, longitude, area_lot, zoning_landuse_county, zoning_landuse, zoning_property, rawcensustractandblock, region_city, region_county, region_neighbor, region_zip, num_room, num_unit, build_year, flag_fireplace, tax_building, tax_total, tax_year, tax_land, tax_property, tax_delinquency, censustractandblock

Data set info

Summary of transactions data set

```
##     parcelid            logerror                 date      
##  Min.   : 10711738   Min.   :-4.60500   2016-07-29:  910  
##  1st Qu.: 11559500   1st Qu.:-0.02530   2016-04-29:  902  
##  Median : 12547337   Median : 0.00600   2016-09-30:  894  
##  Mean   : 12984656   Mean   : 0.01146   2016-06-30:  874  
##  3rd Qu.: 14227552   3rd Qu.: 0.03920   2016-05-27:  863  
##  Max.   :162960842   Max.   : 4.73700   2016-08-31:  737
##                                          (Other)   :85095
```

head of transactions data set

```
##   parcelid logerror       date
## 1 11016594   0.0276 2016-01-01
## 2 14366692  -0.1684 2016-01-01
## 3 12098116  -0.0040 2016-01-01
## 4 12643413   0.0218 2016-01-02
## 5 14432541  -0.0050 2016-01-02
## 6 11509835  -0.2705 2016-01-02
```

head of properties data set

```
##         X parcelid aircon architectural_style area_basement num_bathroom
## 1 2342182 12484350      1                  NA            NA            4
## 2  541880 12181530     NA                  NA            NA            1
## 3 1617969 14222705     NA                  NA            NA            0
## 4 1729095 11467838     NA                  NA            NA            2
## 5   84189 13015665     NA                  NA            NA            1
## 6 1570086 12633721     NA                  NA            NA            4
##   num_bedroom framing quality num_bathroom_calc deck area_firstfloor_finis
hed
## 1           6      NA       4                 4   NA
NA
## 2           2      NA       7                 1   NA
NA
## 3           0      NA      NA                NA   NA
NA
## 4           3      NA       7                 2   NA
NA
## 5           2      NA       7                 1   NA
NA
## 6           6      NA       7                 4   NA
NA
##   area_total_calc area_live_finished area_liveperi_finished area_total_fin
ished
## 1            3315               3315                     NA
NA
## 2            1088               1088                     NA
NA
## 3            4231                 NA                     NA
NA
## 4            1327               1327                     NA
NA
## 5             976                976                     NA
NA
## 6            3030                 NA                     NA
3030
##   area_unknown area_base fips num_fireplace num_bath num_garage area_garag
```

```
e
## 1           NA        NA 6037            NA        4         NA          N
A
## 2           NA        NA 6037            NA        1         NA          N
A
## 3           NA      4231 6059            NA       NA          0           
0
## 4           NA        NA 6037            NA        2         NA          N
A
## 5           NA        NA 6037            NA        1         NA          N
A
## 6           NA        NA 6037            NA        4         NA          N
A
##   flag_tub heating latitude  longitude area_lot num_pool area_pool pooltyp
eid10
## 1                2 33852329 -118125098     6548       NA        NA        
NA
## 2               NA 33986932 -118297793     6008       NA        NA        
NA
## 3               NA 33819470 -117832954     9118       NA        NA        
NA
## 4                7 33958756 -118398254     5145       NA        NA        
NA
## 5                7 34138321 -117908275     7000       NA        NA        
NA
## 6               NA 33782587 -118251435     7000       NA        NA        
NA
##   pooltypeid2 pooltypeid7 zoning_landuse_county zoning_landuse zoning_prop
erty
## 1          NA          NA                  0100            261          LK
R1YY
## 2          NA          NA                  0100            261            
LAR2
## 3          NA          NA                    96            248            
## 4          NA          NA                  0100            261            
LAR1
## 5          NA          NA                  0100            261          AZ
R1C*
## 6          NA          NA                  0200            246            
LAR2
##   rawcensustractandblock region_city region_county region_neighbor region_
zip
## 1               60375708       12292          3101              NA      96
212
## 2               60372372       12447          3101          118208      96
025
## 3               60590758       33252          1286              NA      97
063
## 4               60372780       12447          3101            7877      96
026
```

```
## 5               60374006       37015           3101              NA      96
464
## 6               60372947       12447           3101           48516      96
228
##   num_room story num_75_bath material num_unit area_patio area_shed build_
year
## 1        0    NA          NA       NA        1         NA        NA
1950
## 2        0    NA          NA       NA        1         NA        NA
1940
## 3        0    NA          NA       NA        4         NA        NA
1973
## 4        0    NA          NA       NA        1         NA        NA
1944
## 5        0    NA          NA       NA        1         NA        NA
1921
## 6        0    NA          NA       NA        2         NA        NA
1921
##   num_story flag_fireplace tax_building tax_total tax_year tax_land
## 1        NA                      255065    277073     2015    22008
## 2        NA                       22500    172568     2015   150068
## 3         2                      212125    353550     2015   141425
## 4        NA                       97880    370695     2015   272815
## 5        NA                       94231    262698     2015   168467
## 6        NA                      225985    242687     2015    16702
##   tax_property tax_delinquency tax_delinquency_year censustractandblock
## 1      3766.44                                   NA        6.037571e+13
## 2      2186.02                                   NA        6.037237e+13
## 3      4655.98                                   NA        6.059076e+13
## 4      4610.51                                   NA        6.037278e+13
## 5      3303.92                                   NA        6.037401e+13
## 6      3144.99                                   NA        6.037295e+13
```

Column names

properties

X, parcelid, aircon, architectural_style, area_basement, num_bathroom, num_bedroom, framing, quality, num_bathroom_calc, deck, area_firstfloor_finished, area_total_calc, area_live_finished, area_liveperi_finished, area_total_finished, area_unknown, area_base, fips, num_fireplace, num_bath, num_garage, area_garage, flag_tub, heating, latitude, longitude, area_lot, num_pool, area_pool, pooltypeid10, pooltypeid2, pooltypeid7, zoning_landuse_county, zoning_landuse, zoning_property, rawcensustractandblock, region_city, region_county, region_neighbor, region_zip, num_room, story, num_75_bath, material, num_unit, area_patio, area_shed, build_year, num_story, flag_fireplace, tax_building, tax_total, tax_year, tax_land, tax_property, tax_delinquency, tax_delinquency_year, censustractandblock

transactions

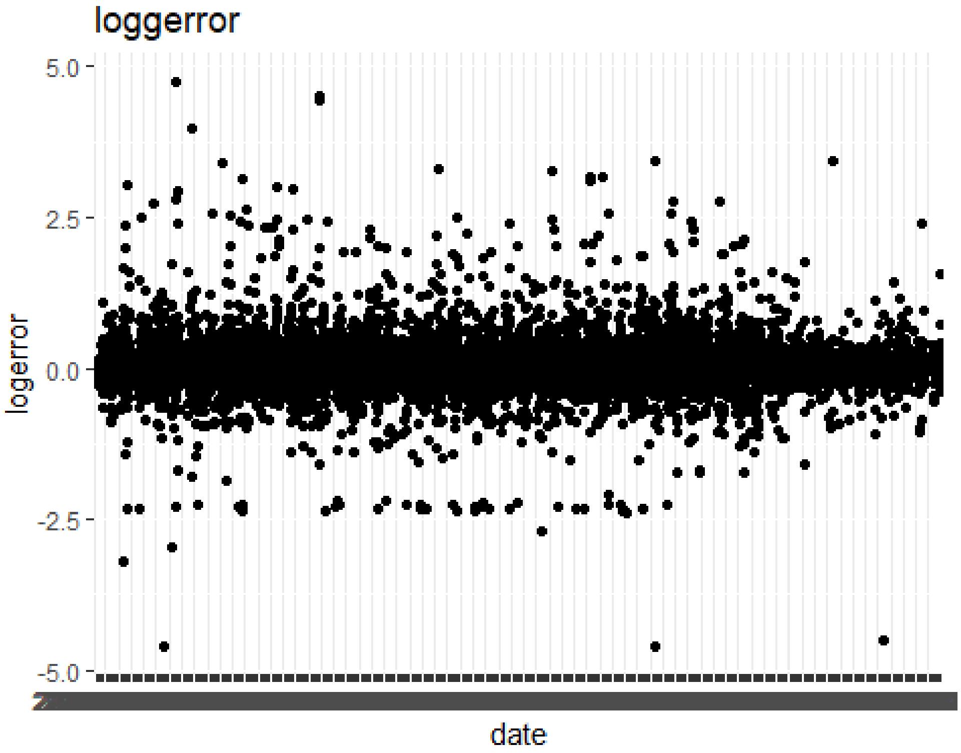
parcelid, logerror, date

statistics of logerror in transactions

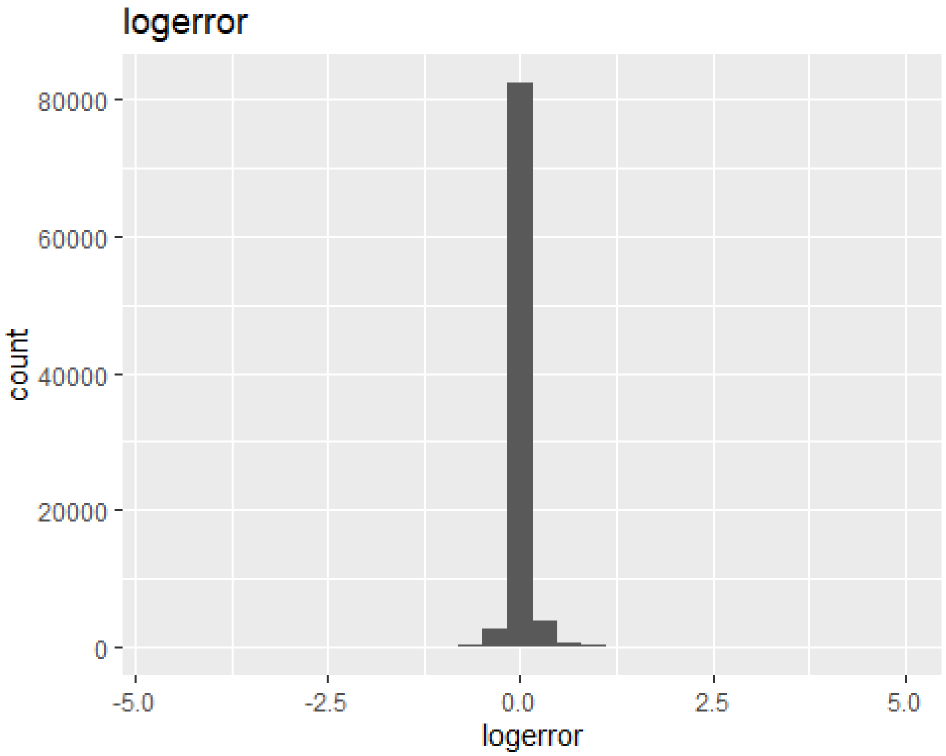
- Mean : 0.0114572
- median : 0.006
- std : ’ 0.1610788
- Max: 4.737
- Min: -4.605

Data exploration

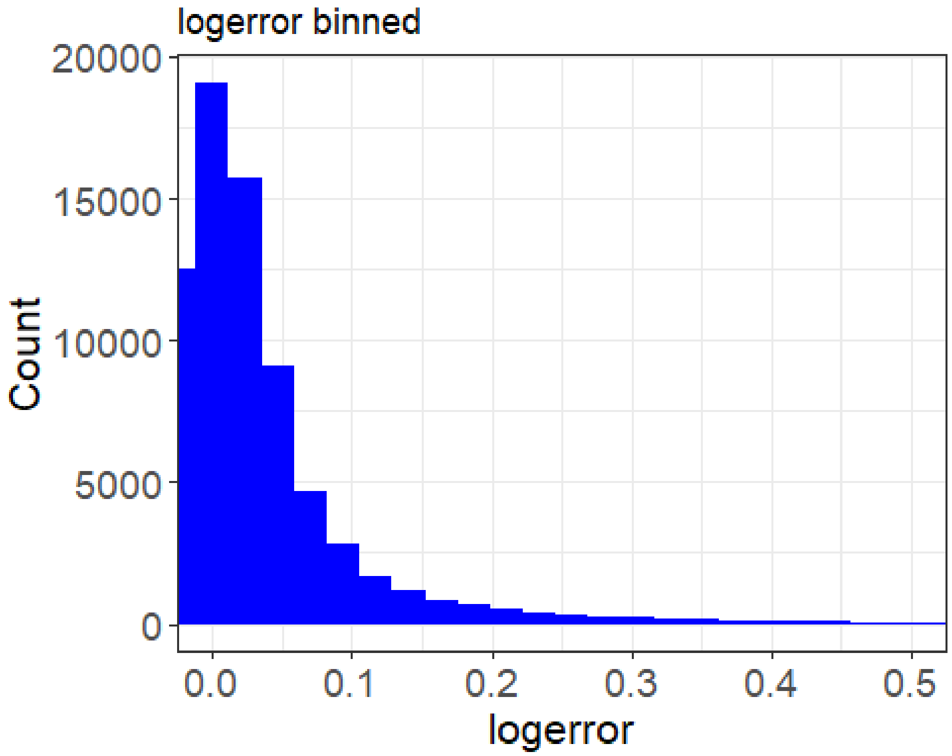
Scatter plot of logerror



histogram of logerror

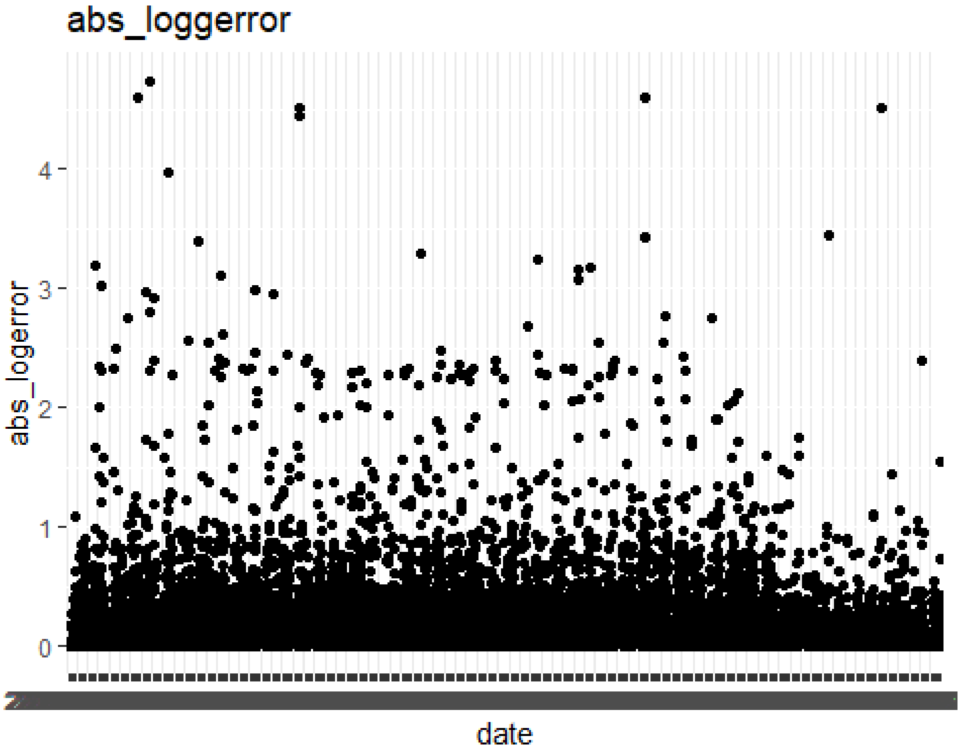


histogram of logerror binned



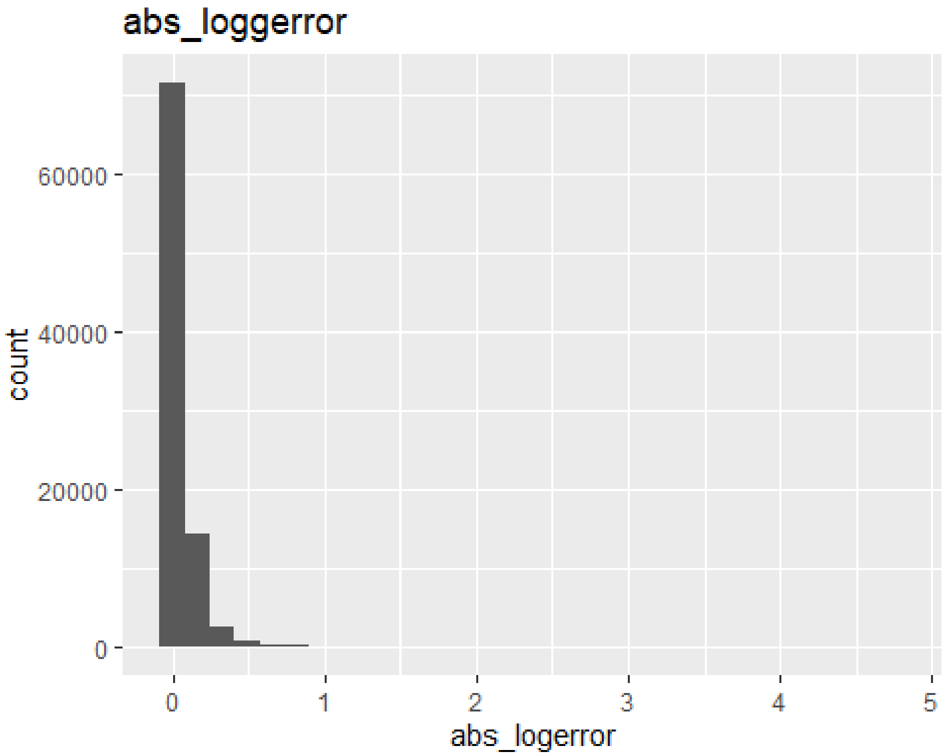
```
##   parcelid logerror       date year_month abs_logerror
## 1 11016594   0.0276 2016-01-01 2016-01-01       0.0276
## 2 14366692  -0.1684 2016-01-01 2016-01-01       0.1684
## 3 12098116  -0.0040 2016-01-01 2016-01-01       0.0040
## 4 12643413   0.0218 2016-01-02 2016-01-01       0.0218
## 5 14432541  -0.0050 2016-01-02 2016-01-01       0.0050
## 6 11509835  -0.2705 2016-01-02 2016-01-01       0.2705
```

Scatter plot of abs_loggerror

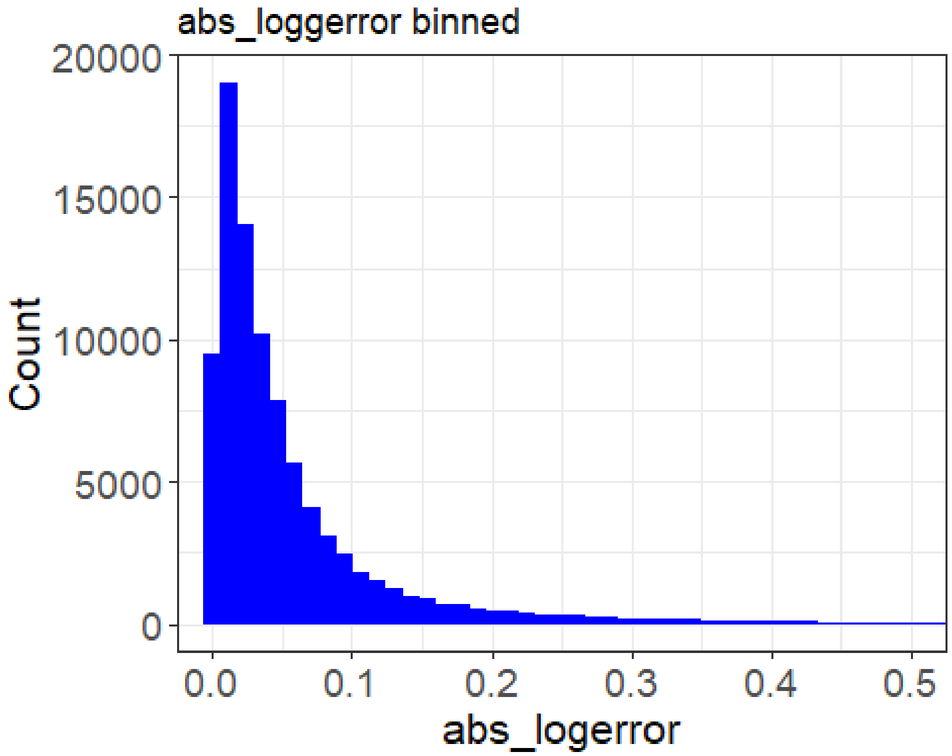


```
##   parcelid logerror       date year_month abs_logerror
## 1 11016594   0.0276 2016-01-01 2016-01-01       0.0276
## 2 14366692  -0.1684 2016-01-01 2016-01-01       0.1684
## 3 12098116  -0.0040 2016-01-01 2016-01-01       0.0040
## 4 12643413   0.0218 2016-01-02 2016-01-01       0.0218
## 5 14432541  -0.0050 2016-01-02 2016-01-01       0.0050
## 6 11509835  -0.2705 2016-01-02 2016-01-01       0.2705
```

Histogram of abs_loggerror

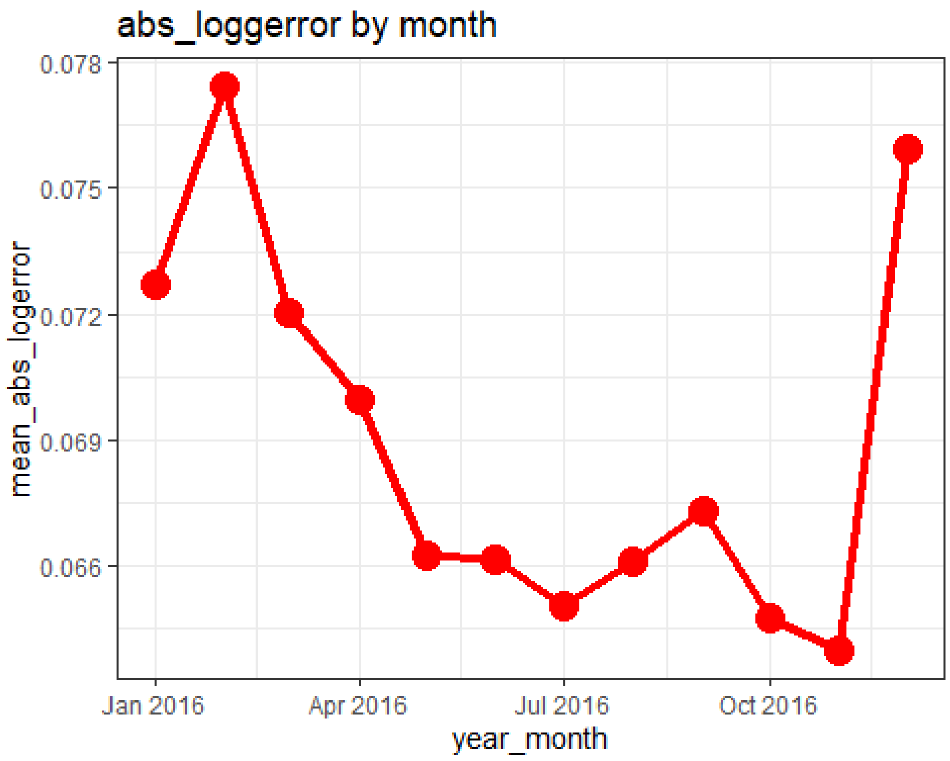


Histogram of abs_loggerror binned

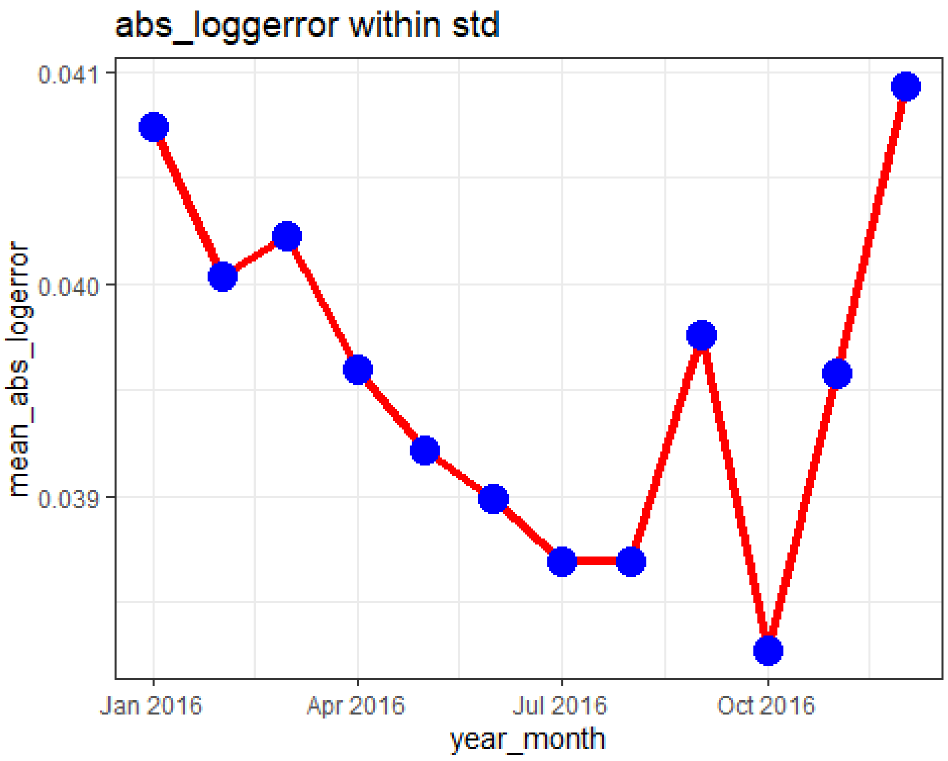


```
## geom_bar: na.rm = FALSE
## stat_bin: binwidth = NULL, bins = NULL, na.rm = FALSE, pad = FALSE
## position_stack
```

graph of abs_logerror groupped by month of year



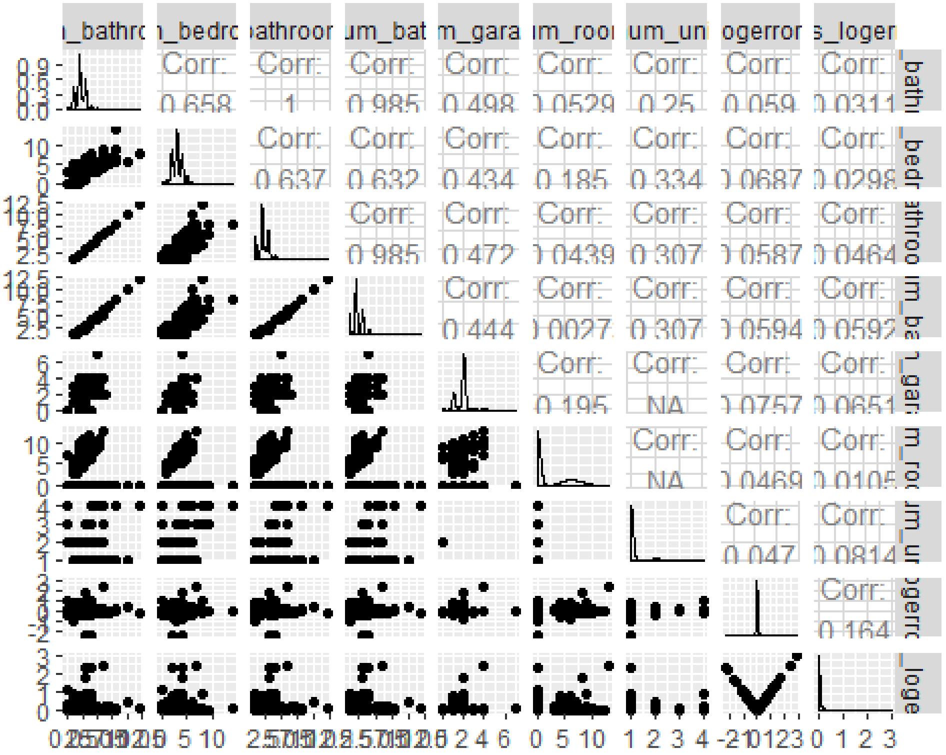
graph of abs_logerror within strandard deviation



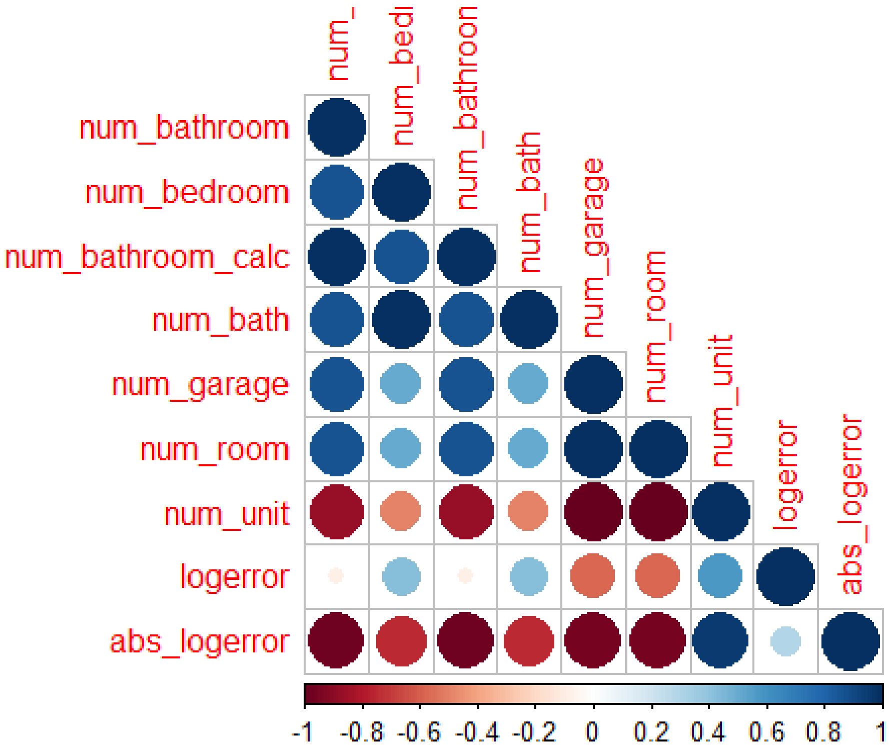
Correlations

```
##   num_bathroom num_bedroom num_bathroom_calc num_bath num_garage num_room
## 1           NA          NA                NA       NA         NA       NA
## 2           NA          NA                NA       NA         NA       NA
## 3            3           2                 3        3         NA        0
## 4           NA          NA                NA       NA         NA       NA
## 5           NA          NA                NA       NA         NA       NA
## 6            4           4                 4        4         NA        0
##   num_unit logerror abs_logerror
## 1       NA   0.0276       0.0276
## 2       NA  -0.1684       0.1684
## 3        1  -0.0040       0.0040
## 4       NA   0.0218       0.0218
## 5       NA  -0.0050       0.0050
## 6        1  -0.2705       0.2705
```

correlation using ggpairs using a subset of data(~10%)

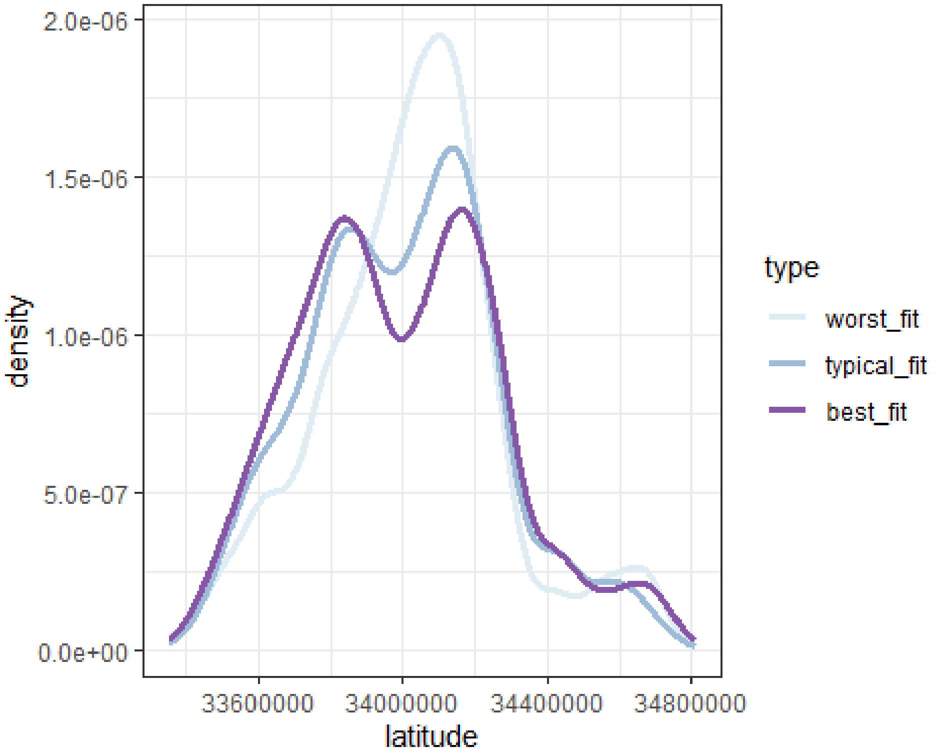


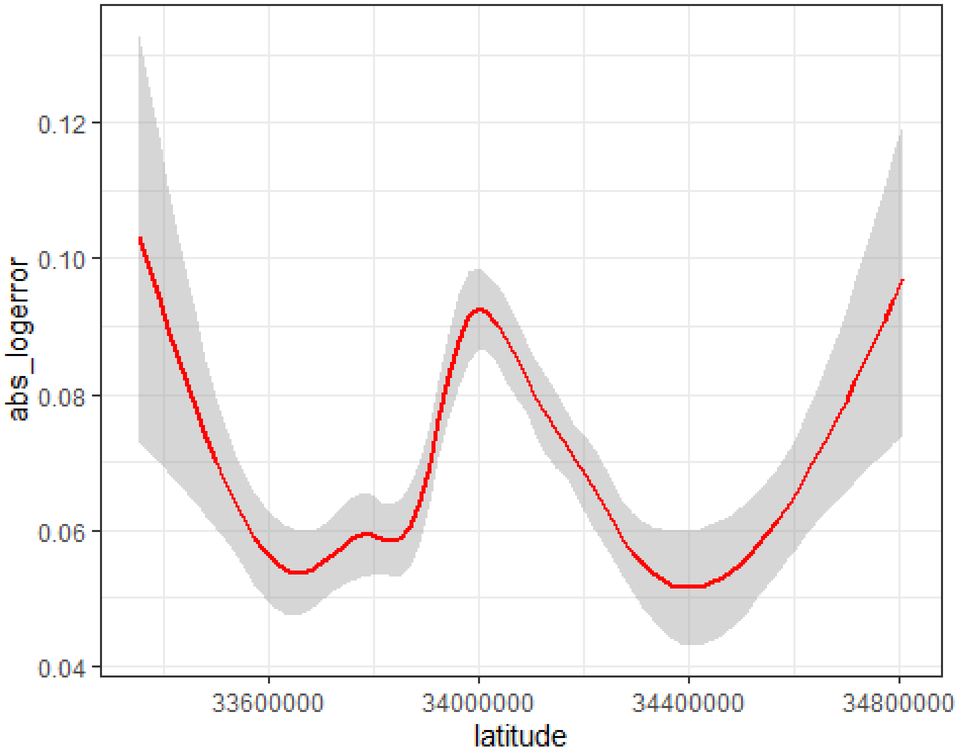
correlation using corrplot



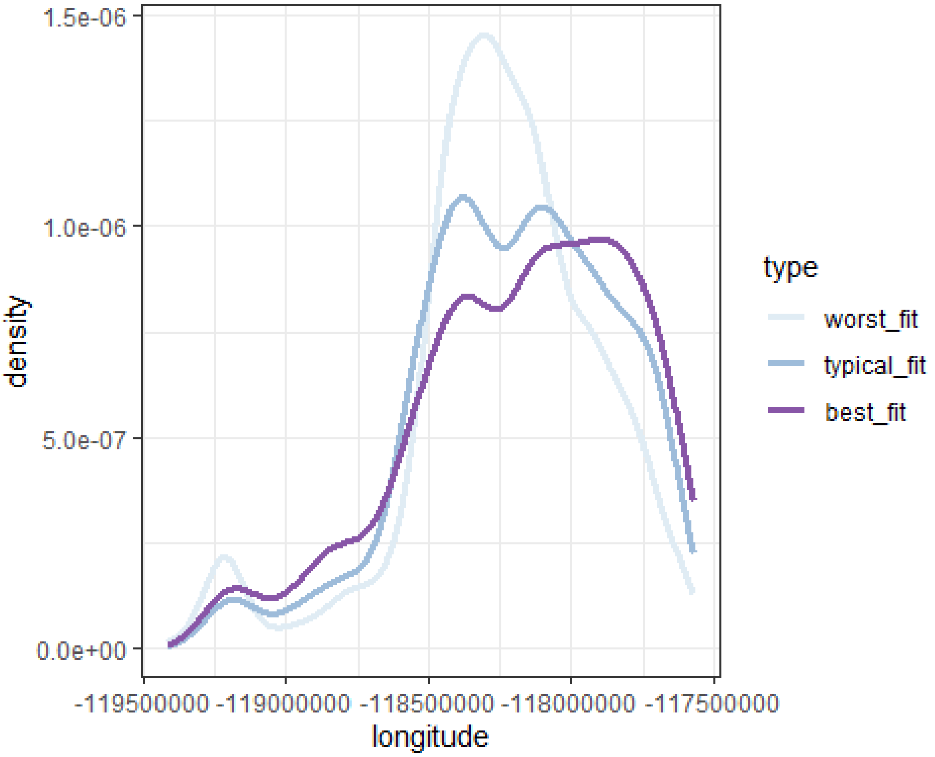
```
##   parcelid logerror       date year_month abs_logerror percentile
## 1 11016594   0.0276 2016-01-01 2016-01-01       0.0276          3
## 2 14366692  -0.1684 2016-01-01 2016-01-01       0.1684          5
## 3 12098116  -0.0040 2016-01-01 2016-01-01       0.0040          1
## 4 12643413   0.0218 2016-01-02 2016-01-01       0.0218          3
## 5 14432541  -0.0050 2016-01-02 2016-01-01       0.0050          1
## 6 11509835  -0.2705 2016-01-02 2016-01-01       0.2705          5
```

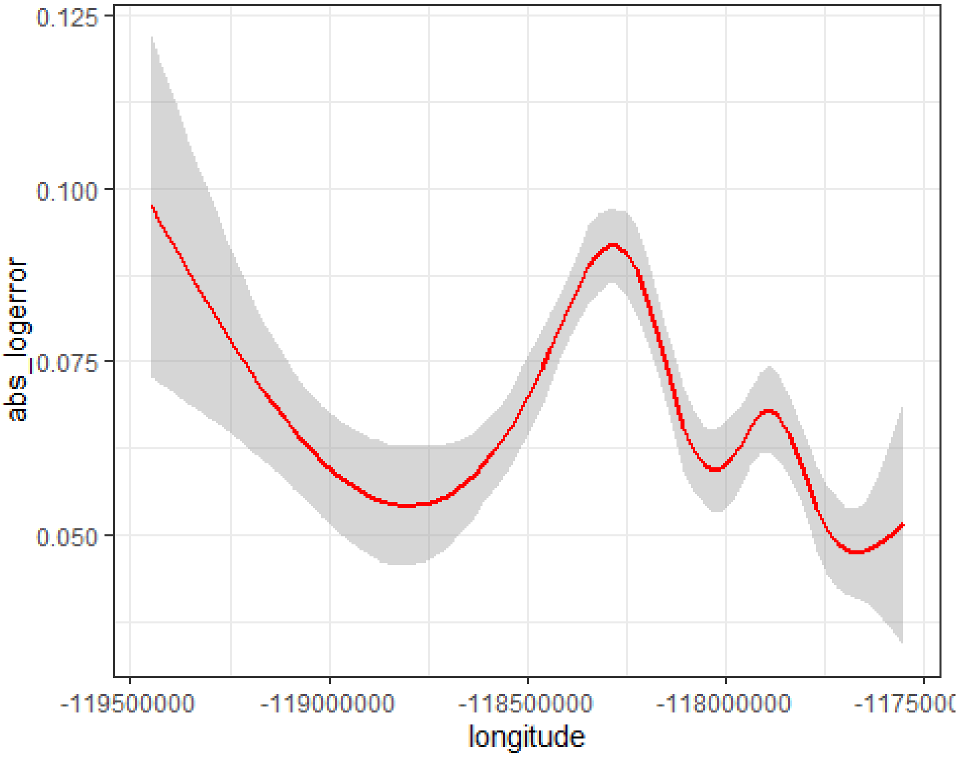
Density plot shows density of worst predicitons is lower in lower latitudes , but higher in median lattitude and lowwer around and above 34400000.



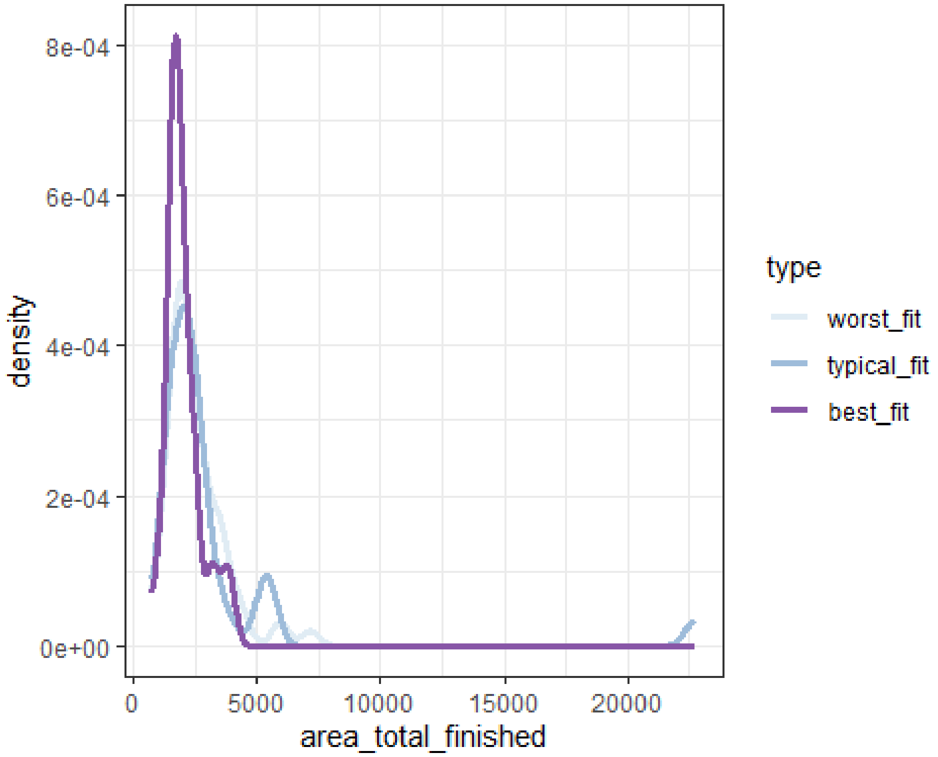


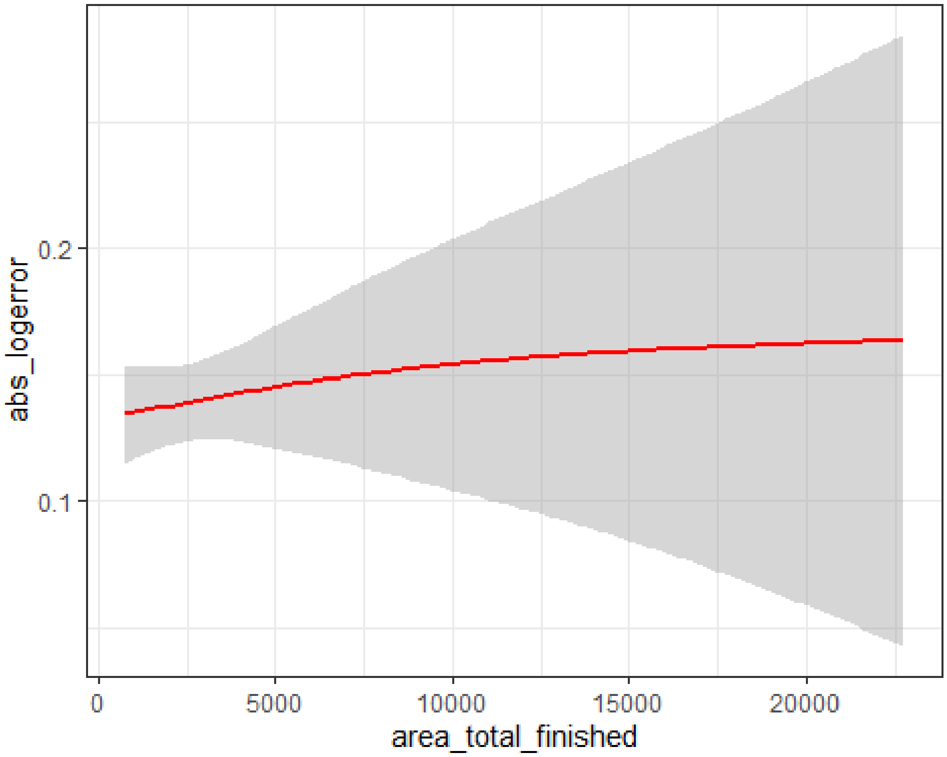
denisity of longitude. Worst predictions are in the -118500000 and -118000000



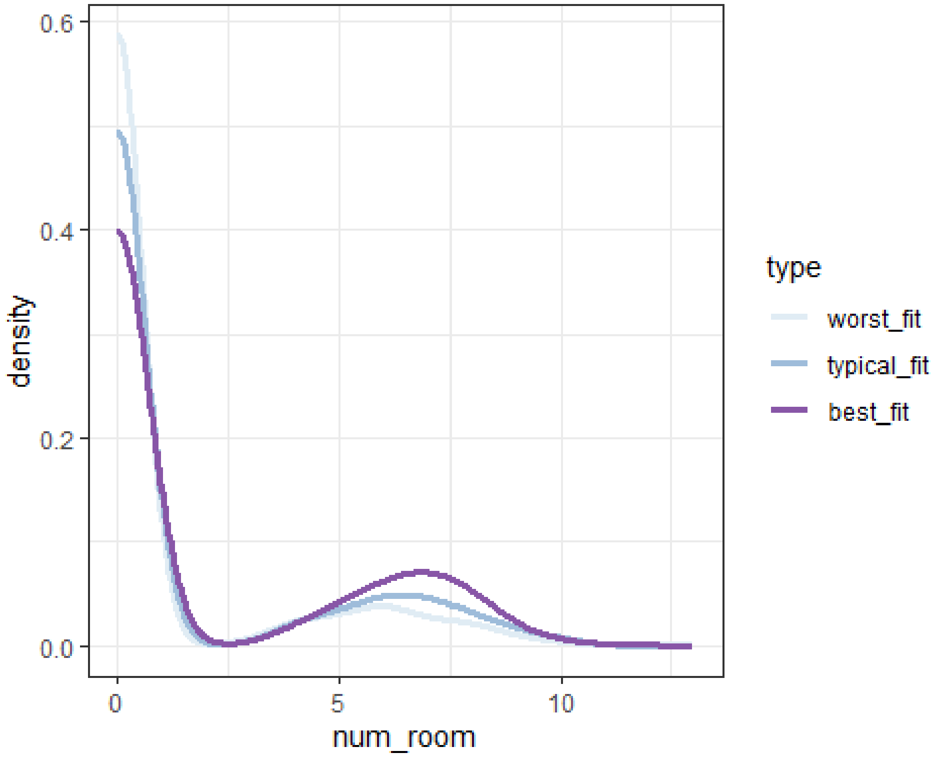


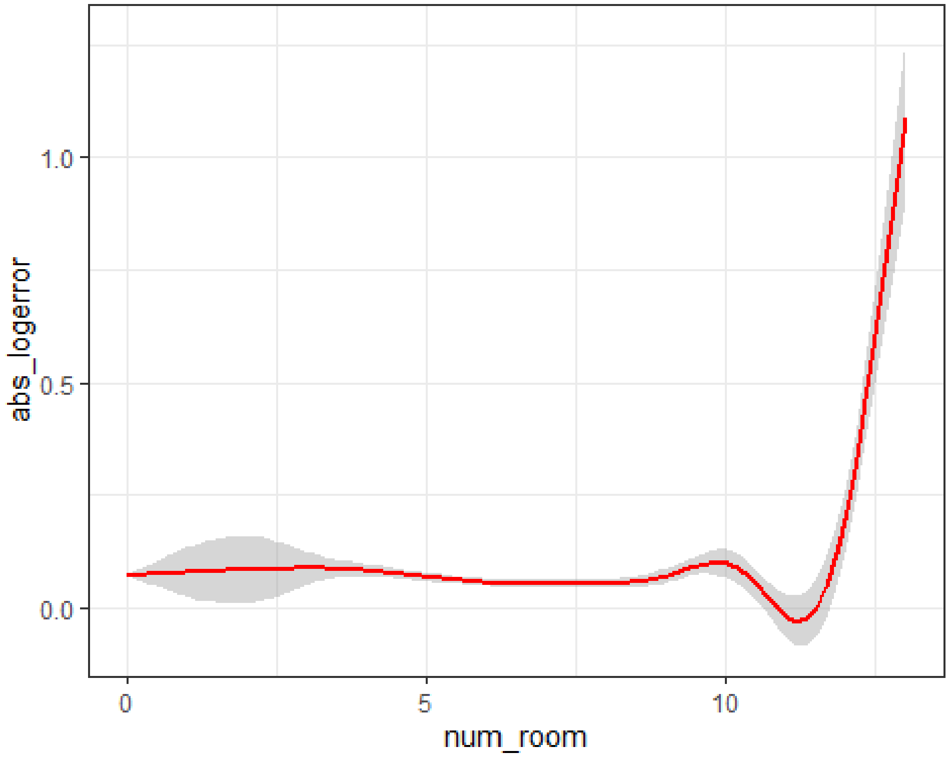
area_total_finished





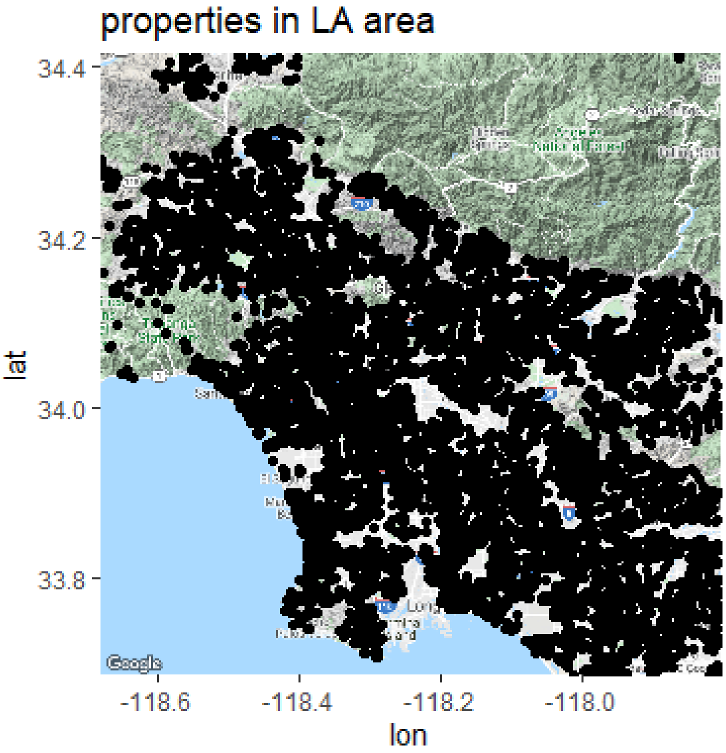
num_room


0.6
0.4
0.2
0.0
density
0
5
10
num_room
type
worst_fit
typical_fit
best_fit

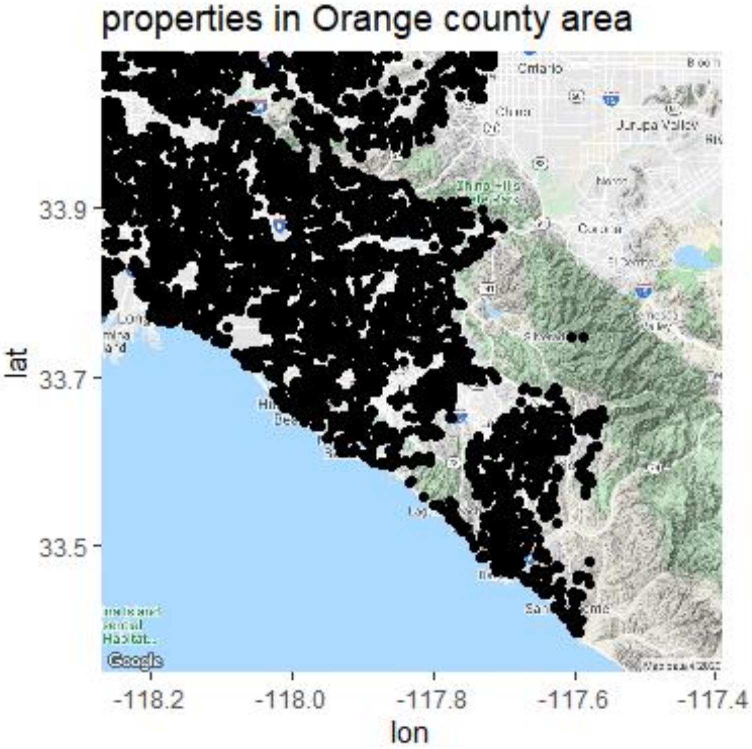

1.0
0.5
0.0
abs_logerror
0
5
10
num_room

maps based on a sampling of 10000 properties

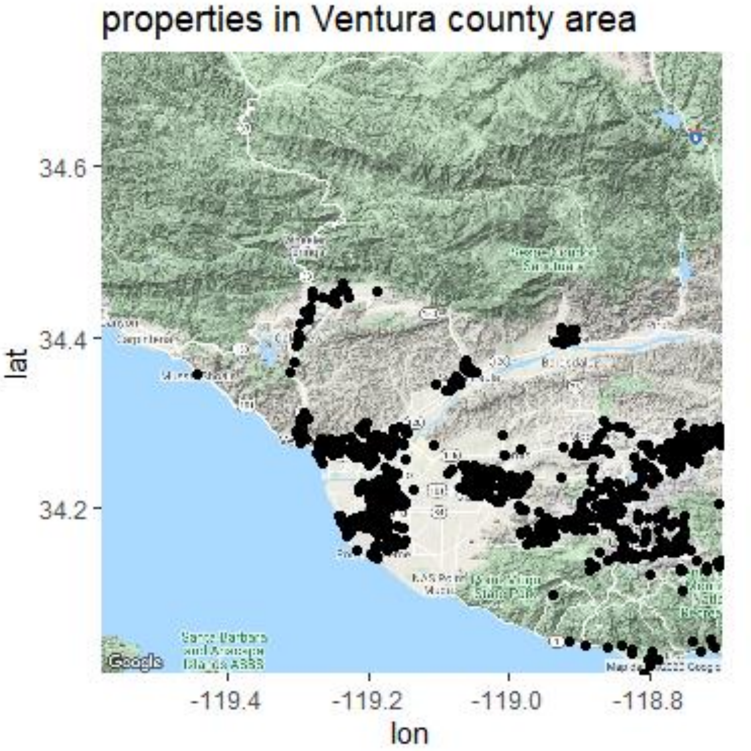
Map of Los Angels county



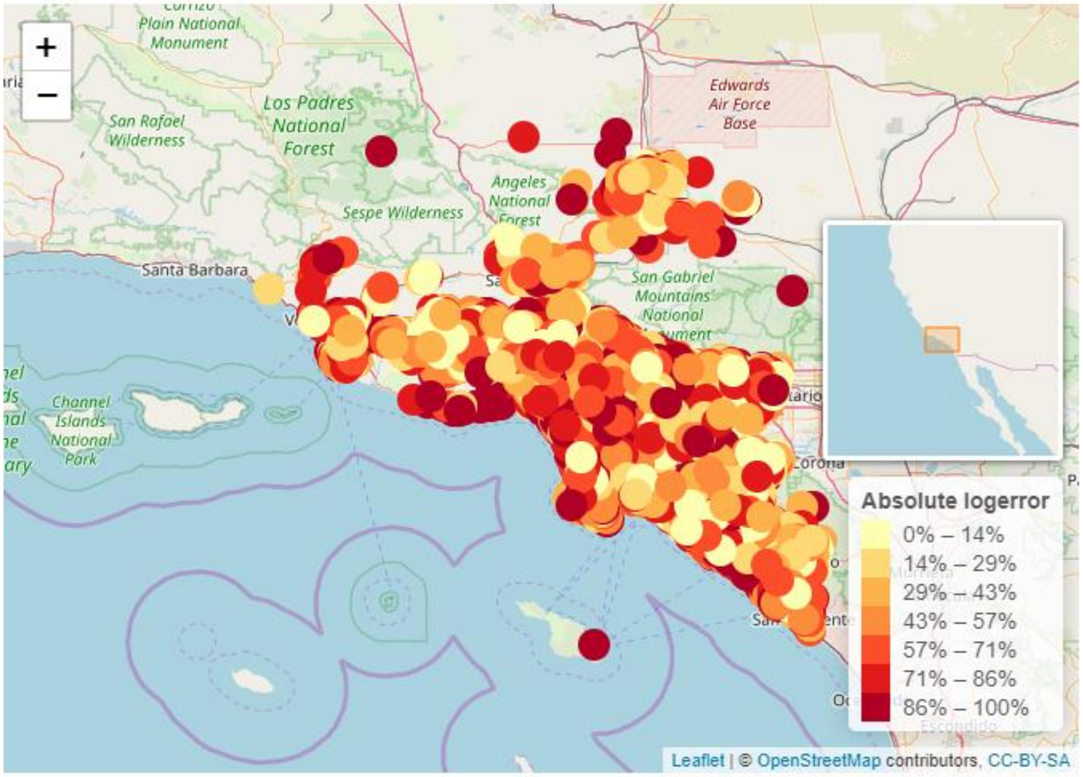
Map of Orange County



Map of Ventura County



Absolute log error based on location


+
−
Carrizo Plain National Monument
San Rafael Wilderness
Los Padres National Forest
Edwards Air Force Base
Angeles National Forest
Sespe Wilderness
Santa Barbara
San Gabriel Mountains National Monument
Channel Islands National Park
Corona
Absolute logerror
0% – 14%
14% – 29%
29% – 43%
43% – 57%
57% – 71%
71% – 86%
86% – 100%
Leaflet | © OpenStreetMap contributors, CC-BY-SA