Craigslist apartments

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Overview

We wish to build an application that helps a user find out the price and size of the apartment that the user is likely to get, given a city and the desired number of bedrooms.

To do this we are going to obtain recent data from craigslist's "apt/housing" for a few United States cities and use it to train a model to predict price and size.

Data processing

It may not be exactly enough data, but lets try doing this with just the 100 most recent posts from each city. `get_craigslist_data.R` was used to download the data, and it stored into `data/citiesdf.rds`

Print summary.

```r
citiesdf <- readRDS('data/citiesdf.rds')
str(citiesdf)
```

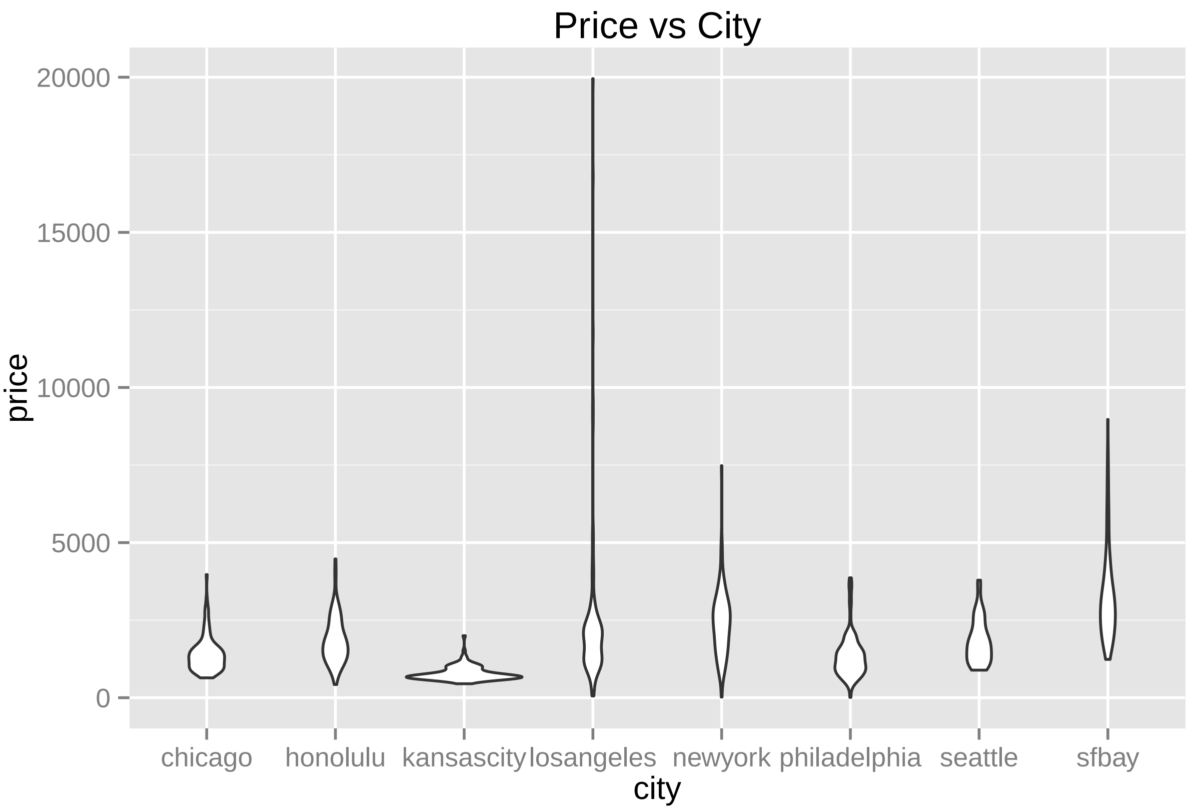
```
## 'data.frame':    800 obs. of  7 variables:
##  $ city    : Factor w/ 8 levels "chicago","honolulu",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ date    : Factor w/ 1 level "Nov 21": 1 1 1 1 1 1 1 1 1 1 ...
##  $ title   : Factor w/ 740 levels "**SHORT TERM!** 1 bedroom Located in Lincoln Park",..: 26 62 1 49
##  $ price   : num  2848 985 1295 1225 1300 ...
##  $ bedrooms: num  2 NA 1 3 2 NA 1 4 1 2 ...
##  $ sqft    : num  1123 NA NA NA NA ...
##  $ href    : Factor w/ 800 levels "http://chicago.craigslist.org/chc/apa/5283655742.html",..: 76 62
```

```r
summary(citiesdf)
```

```
##             city         date    
##  chicago     :100   Nov 21:800  
##  honolulu    :100               
##  kansascity  :100               
##  losangeles  :100               
##  newyork     :100               
##  philadelphia:100               
##  (Other)     :200               
##                                                                    title    
##  The Park Apartments                                                 : 17  
##  Your New Home Is Waiting in Olathe, KS                              :  8  
##  Live in the Heart of It All, Community Clubhouse, Quartz Countertops:  7  
##  Beverly Plaza Apartments                                            :  6  
##  1BR LEFFERT GARDEN NEAR EVERYTHING                                  :  5  
##  Centrally Located Studio, 1 Bath in Lakeview, Available: Now        :  3  
##  (Other)                                                             :754
##      price          bedrooms          sqft
##  Min.   :    1   Min.   :1.000   Min.   : 175
##  1st Qu.: 1032   1st Qu.:1.000   1st Qu.: 700
##  Median : 1595   Median :2.000   Median : 904
##  Mean   : 1928   Mean   :1.954   Mean   :1038
##  3rd Qu.: 2406   3rd Qu.:2.000   3rd Qu.:1200
##  Max.   :20010   Max.   :8.000   Max.   :4490
##                  NA's   :101     NA's   :300
##                                                      href
##  http://chicago.craigslist.org/chc/apa/5283655742.html:  1
##  http://chicago.craigslist.org/chc/apa/5285745015.html:  1
##  http://chicago.craigslist.org/chc/apa/5286189411.html:  1
##  http://chicago.craigslist.org/chc/apa/5286848681.html:  1
##  http://chicago.craigslist.org/chc/apa/5286911383.html:  1
##  http://chicago.craigslist.org/chc/apa/5286912144.html:  1
##  (Other)                                              :794
```

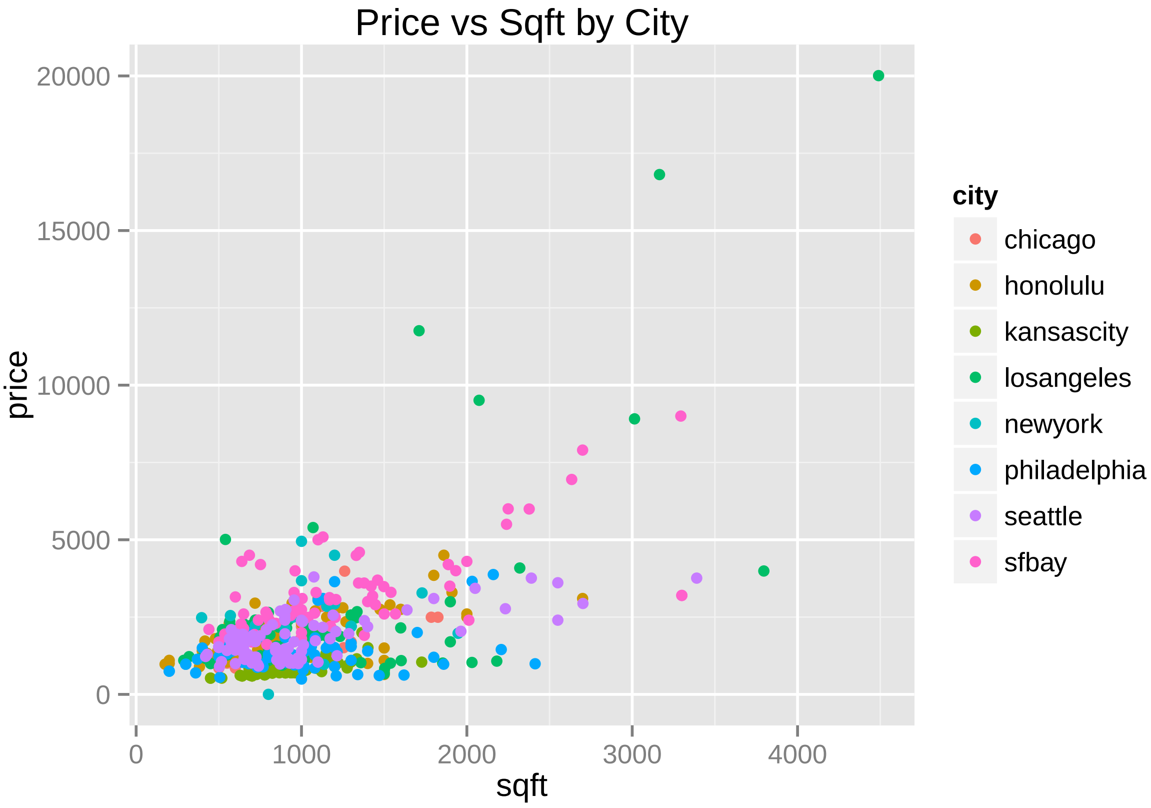
Exploratory plots

```r
library(ggplot2)
ggplot(citiesdf, aes(y=price, x=city)) + geom_violin() +
    labs(title="Price vs City")
```



```
ggplot(citiesdf, aes(x=sqft, y=price, color=city)) + geom_point() +
    labs(title="Price vs Sqft by City")
```

```
## Warning: Removed 300 rows containing missing values (geom_point).
```



```
ggplot(citiesdf, aes(x=bedrooms, fill=as.factor(bedrooms))) + geom_histogram() +
    coord_flip() + facet_wrap(~ city) +
    labs(title="Number of Bedrooms per City")
```

```
## stat_bin: binwidth defaulted to range/30. Use 'binwidth = x' to adjust this.
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```

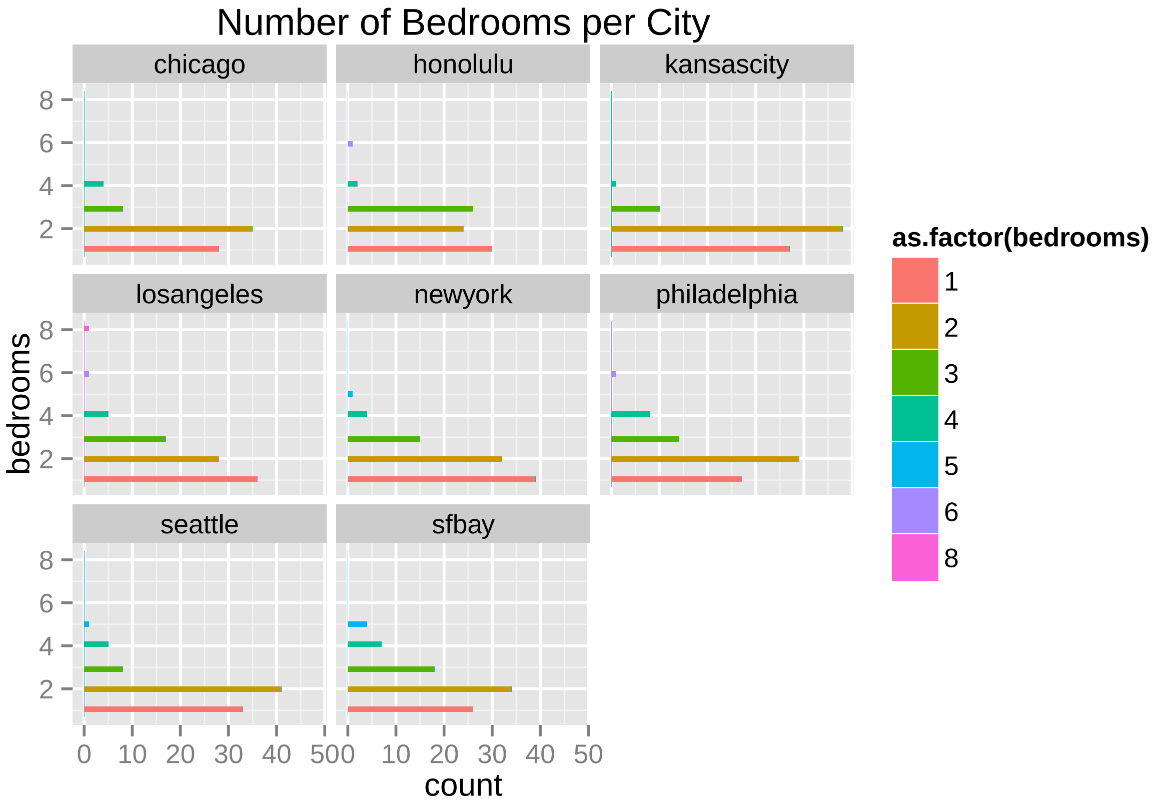

Model training

train_models.R was used to train two models, which are as follows.

model formula	saved to file
price ~ city + bedrooms	data/pricemod.rds
sqft ~ city + bedrooms	data/sqftmod.rds

```r
pricemod <- readRDS('data/pricemod.rds')
summary(pricemod)
```

```
##
## Call:
## lm(formula = price ~ city + bedrooms, data = citiesdf)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2575.5  -523.2  -117.4   274.1 16421.5
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)        639.51     174.18   3.672 0.000260 ***
## cityhonolulu       297.52     203.51   1.462 0.144208    
## citykansascity    -730.79     196.66  -3.716 0.000219 ***
## citylosangeles     955.74     200.67   4.763 2.33e-06 ***
## citynewyork        893.34     198.96   4.490 8.34e-06 ***
## cityphiladelphia  -272.08     200.32  -1.358 0.174840    
## cityseattle        321.24     200.48   1.602 0.109543    
## citysfbay         1691.29     200.80   8.423  < 2e-16 ***
## bedrooms           498.32      50.52   9.864  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 1276 on 690 degrees of freedom
##   (101 observations deleted due to missingness)
## Multiple R-squared:  0.3414, Adjusted R-squared:  0.3337 
## F-statistic:  44.7 on 8 and 690 DF,  p-value: < 2.2e-16
```

```r
sqftmod <- readRDS('data/sqftmod.rds')
summary(sqftmod)
```

```
## 
## Call:
## lm(formula = sqft ~ city + bedrooms, data = citiesdf)
## 
## Residuals:
##      Min       1Q   Median       3Q      Max 
## -1585.32  -168.28   -17.71    98.83  2402.07 
## 
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)    
## (Intercept)        207.29      77.66   2.669  0.00788 ** 
## cityhonolulu      -157.92      81.81  -1.930  0.05422 .  
## citykansascity     -31.11      81.90  -0.380  0.70420    
## citylosangeles      63.25      81.79   0.773  0.43975    
## citynewyork        -14.82     102.97  -0.144  0.88565    
## cityphiladelphia    20.93      82.41   0.254  0.79964    
## cityseattle        -24.93      79.35  -0.314  0.75355    
## citysfbay           31.60      80.85   0.391  0.69609    
## bedrooms           454.35      15.60  29.117  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## 
## Residual standard error: 313 on 440 degrees of freedom
##   (351 observations deleted due to missingness)
## Multiple R-squared:  0.6791, Adjusted R-squared:  0.6732 
## F-statistic: 116.4 on 8 and 440 DF,  p-value: < 2.2e-16
```

Check out some predictions

```r
test <- data.frame(
    city = rep(c('chicago', 'honolulu', 'kansascity', 'losangeles', 'newyork', 'philadelphia', 'sfbay',
    bedrooms = rep(c(1,2,3)))
```

```
test <- test[order(test$city, test$bedrooms),]

# Predict price (USD) and size (sqft).
cbind(test,
      predictedPrice=predict(pricemod, newdata = test),
      predictedSize=predict(sqftmod, newdata = test))
```

```
##             city bedrooms predictedPrice predictedSize
## 1        chicago        1      1137.8344      661.6365
## 17       chicago        2      1636.1585     1115.9839
## 9        chicago        3      2134.4827     1570.3314
## 10      honolulu        1      1435.3590      503.7144
## 2       honolulu        2      1933.6832      958.0618
## 18      honolulu        3      2432.0073     1412.4093
## 19    kansascity        1       407.0415      630.5227
## 11    kansascity        2       905.3657     1084.8701
## 3     kansascity        3      1403.6898     1539.2175
## 4     losangeles        1      2093.5699      724.8854
## 20    losangeles        2      2591.8940     1179.2329
## 12    losangeles        3      3090.2182     1633.5803
## 13       newyork        1      2031.1727      646.8192
## 5        newyork        2      2529.4969     1101.1667
## 21       newyork        3      3027.8210     1555.5141
## 22  philadelphia        1       865.7515      682.5663
## 14  philadelphia        2      1364.0756     1136.9137
## 6   philadelphia        3      1862.3998     1591.2611
## 16       seattle        1      1459.0723      636.7086
## 8        seattle        2      1957.3965     1091.0561
## 24       seattle        3      2455.7206     1545.4035
## 7          sfbay        1      2829.1272      693.2376
## 23         sfbay        2      3327.4513     1147.5850
## 15         sfbay        3      3825.7754     1601.9324
```