# Assignment 1

Kevin Gardner

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## Following is the link to my GitHub account:

## https://github.com/Kgardner22/64060_-kgardner

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## 1. Download a dataset from the web.

## My data source is Kaggle. Following are the details:

## House Prices – Advanced Regression Techniques

## Predict sales prices and practice feature engineering, RFs, and gradient boosting

## https://www.kaggle.com/c/house-prices-advanced-regression-techniques/data

## 2. Import the dataset into R

```
  House_Prices_train <- read.csv("C:/R/MyData/House_Prices_train.csv",
header=TRUE)
```

## 3. Print out descriptive statistics for a selection of quantitative and categorical variables.

```
# The summary command will show a variety of descriptive statistics for each
variable in the data set including the minimum, 1st quartile, median, mean,
3rd quartile, maximum values and if any NAs are present

  summary(House_Prices_train)
```

```
##        Id          MSSubClass      MSZoning          LotFrontage
##  Min.   :   1.0   Min.   : 20.0   Length:1460        Min.   : 21.00
##  1st Qu.: 365.8   1st Qu.: 20.0   Class :character   1st Qu.: 59.00
##  Median : 730.5   Median : 50.0   Mode  :character   Median : 69.00
##  Mean   : 730.5   Mean   : 56.9                      Mean   : 70.05
##  3rd Qu.:1095.2   3rd Qu.: 70.0                      3rd Qu.: 80.00
##  Max.   :1460.0   Max.   :190.0                      Max.   :313.00
##                                                      NA's   :259
##     LotArea          Street             Alley              LotShape
##  Min.   :  1300   Length:1460        Length:1460        Length:1460
##  1st Qu.:  7554   Class :character   Class :character   Class :character
##  Median :  9478   Mode  :character   Mode  :character   Mode  :character
##  Mean   : 10517
##  3rd Qu.: 11602
##  Max.   :215245
##
##  LandContour         Utilities          LotConfig          LandSlope
##  Length:1460        Length:1460        Length:1460        Length:1460
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##
##  Neighborhood        Condition1         Condition2          BldgType
##  Length:1460        Length:1460        Length:1460        Length:1460
##  Class :character   Class :character   Class :character   Class :character
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character
##
##
##
##
##   HouseStyle         OverallQual      OverallCond      YearBuilt
##  Length:1460        Min.   : 1.000   Min.   :1.000   Min.   :1872
##  Class :character   1st Qu.: 5.000   1st Qu.:5.000   1st Qu.:1954
##  Mode  :character   Median : 6.000   Median :5.000   Median :1973
##                     Mean   : 6.099   Mean   :5.575   Mean   :1971
##                     3rd Qu.: 7.000   3rd Qu.:6.000   3rd Qu.:2000
##                     Max.   :10.000   Max.   :9.000   Max.   :2010
##
##   YearRemodAdd   RoofStyle           RoofMatl         Exterior1st
##  Min.   :1950   Length:1460        Length:1460        Length:1460       
##  1st Qu.:1967   Class :character   Class :character   Class :character  
##  Median :1994   Mode  :character   Mode  :character   Mode  :character  
##  Mean   :1985                                                           
##  3rd Qu.:2004                                                           
##  Max.   :2010                                                           
##                                                                         
##  Exterior2nd         MasVnrType          MasVnrArea      ExterQual        
##  Length:1460        Length:1460        Min.   :   0.0   Length:1460       
##  Class :character   Class :character   1st Qu.:   0.0   Class :character  
##  Mode  :character   Mode  :character   Median :   0.0   Mode  :character  
##                                        Mean   : 103.7                     
##                                        3rd Qu.: 166.0                     
##                                        Max.   :1600.0                     
##                                        NA's   :8                          
##   ExterCond          Foundation          BsmtQual            BsmtCond        
##  Length:1460        Length:1460        Length:1460        Length:1460       
##  Class :character   Class :character   Class :character   Class :character  
##  Mode  :character   Mode  :character   Mode  :character   Mode  :character  
##                                                                             
##                                                                             
##                                                                             
##                                                                             
##  BsmtExposure       BsmtFinType1         BsmtFinSF1     BsmtFinType2      
##  Length:1460        Length:1460        Min.   :   0.0   Length:1460       
##  Class :character   Class :character   1st Qu.:   0.0   Class :character  
##  Mode  :character   Mode  :character   Median : 383.5   Mode  :character  
##                                        Mean   : 443.6                     
##                                        3rd Qu.: 712.2                     
##                                        Max.   :5644.0                     
##                                                                           
##    BsmtFinSF2        BsmtUnfSF       TotalBsmtSF       Heating         
##  Min.   :   0.00   Min.   :   0.0   Min.   :   0.0   Length:1460       
##  1st Qu.:   0.00   1st Qu.: 223.0   1st Qu.: 795.8   Class :character  
##  Median :   0.00   Median : 477.5   Median : 991.5   Mode  :character  
##  Mean   :  46.55   Mean   : 567.2   Mean   :1057.4                     
##  3rd Qu.:   0.00   3rd Qu.: 808.0   3rd Qu.:1298.2                     
##  Max.   :1474.00   Max.   :2336.0   Max.   :6110.0                     
##                                                                        
##   HeatingQC          CentralAir         Electrical          X1stFlrSF   
##  Length:1460        Length:1460        Length:1460        Min.   : 334  
##  Class :character   Class :character   Class :character   1st Qu.: 882  
##  Mode  :character   Mode  :character   Mode  :character   Median :1087  
##                                                           Mean   :1163  
##                                                           3rd Qu.:1391  
##                                                           Max.   :4692  
##                                                                         
##    X2ndFlrSF     LowQualFinSF       GrLivArea     BsmtFullBath   
##  Min.   :   0   Min.   :  0.000   Min.   : 334   Min.   :0.0000  
##  1st Qu.:   0   1st Qu.:  0.000   1st Qu.:1130   1st Qu.:0.0000  
##  Median :   0   Median :  0.000   Median :1464   Median :0.0000  
##  Mean   : 347   Mean   :  5.845   Mean   :1515   Mean   :0.4253  
##  3rd Qu.: 728   3rd Qu.:  0.000   3rd Qu.:1777   3rd Qu.:1.0000  
##  Max.   :2065   Max.   :572.000   Max.   :5642   Max.   :3.0000  
##                                                                  
##   BsmtHalfBath        FullBath        HalfBath       BedroomAbvGr
##  Min.   :0.00000   Min.   :0.000   Min.   :0.0000   Min.   :0.000  
##  1st Qu.:0.00000   1st Qu.:1.000   1st Qu.:0.0000   1st Qu.:2.000  
##  Median :0.00000   Median :2.000   Median :0.0000   Median :3.000  
##  Mean   :0.05753   Mean   :1.565   Mean   :0.3829   Mean   :2.866  
##  3rd Qu.:0.00000   3rd Qu.:2.000   3rd Qu.:1.0000   3rd Qu.:3.000  
##  Max.   :2.00000   Max.   :3.000   Max.   :2.0000   Max.   :8.000  
##                                                                    
##   KitchenAbvGr   KitchenQual         TotRmsAbvGrd     Functional       
##  Min.   :0.000   Length:1460        Min.   : 2.000   Length:1460       
##  1st Qu.:1.000   Class :character   1st Qu.: 5.000   Class :character  
##  Median :1.000   Mode  :character   Median : 6.000   Mode  :character  
##  Mean   :1.047                      Mean   : 6.518                     
##  3rd Qu.:1.000                      3rd Qu.: 7.000                     
##  Max.   :3.000                      Max.   :14.000                     
##                                                                        
##    Fireplaces    FireplaceQu         GarageType         GarageYrBlt  
##  Min.   :0.000   Length:1460        Length:1460        Min.   :1900  
##  1st Qu.:0.000   Class :character   Class :character   1st Qu.:1961  
##  Median :1.000   Mode  :character   Mode  :character   Median :1980  
##  Mean   :0.613                                         Mean   :1979  
##  3rd Qu.:1.000                                         3rd Qu.:2002  
##  Max.   :3.000                                         Max.   :2010  
##                                                        NA's   :81    
##  GarageFinish         GarageCars      GarageArea      GarageQual       
##  Length:1460        Min.   :0.000   Min.   :   0.0   Length:1460       
##  Class :character   1st Qu.:1.000   1st Qu.: 334.5   Class :character  
##  Mode  :character   Median :2.000   Median : 480.0   Mode  :character  
##                     Mean   :1.767   Mean   : 473.0                     
##                     3rd Qu.:2.000   3rd Qu.: 576.0                     
##                     Max.   :4.000   Max.   :1418.0                     
##                                                                        
##   GarageCond         PavedDrive          WoodDeckSF      OpenPorchSF    
##  Length:1460        Length:1460        Min.   :  0.00   Min.   :  0.00  
##  Class :character   Class :character   1st Qu.:  0.00   1st Qu.:  0.00  
##  Mode  :character   Mode  :character   Median :  0.00   Median : 25.00  
##                                        Mean   : 94.24   Mean   : 46.66  
##                                        3rd Qu.:168.00   3rd Qu.: 68.00  
##                                        Max.   :857.00   Max.   :547.00  
##                                                                         
##  EnclosedPorch      X3SsnPorch      ScreenPorch        PoolArea      
##  Min.   :  0.00   Min.   :  0.00   Min.   :  0.00   Min.   :  0.000  
##  1st Qu.:  0.00   1st Qu.:  0.00   1st Qu.:  0.00   1st Qu.:  0.000  
##  Median :  0.00   Median :  0.00   Median :  0.00   Median :  0.000  
##  Mean   : 21.95   Mean   :  3.41   Mean   : 15.06   Mean   :  2.759  
##  3rd Qu.:  0.00   3rd Qu.:  0.00   3rd Qu.:  0.00   3rd Qu.:  0.000
##  Max.   :552.00   Max.   :508.00   Max.   :480.00   Max.   :738.000
##
##     PoolQC             Fence            MiscFeature           MiscVal
##  Length:1460        Length:1460        Length:1460        Min.   :    0.00
##  Class :character   Class :character   Class :character   1st Qu.:    0.00
##  Mode  :character   Mode  :character   Mode  :character   Median :    0.00
##                                                           Mean   :   43.49
##                                                           3rd Qu.:    0.00
##                                                           Max.   :15500.00
##
##      MoSold           YrSold       SaleType         SaleCondition
##  Min.   : 1.000   Min.   :2006   Length:1460        Length:1460
##  1st Qu.: 5.000   1st Qu.:2007   Class :character   Class :character
##  Median : 6.000   Median :2008   Mode  :character   Mode  :character
##  Mean   : 6.322   Mean   :2008
##  3rd Qu.: 8.000   3rd Qu.:2009
##  Max.   :12.000   Max.   :2010
##
##    SalePrice
##  Min.   : 34900
##  1st Qu.:129975
##  Median :163000
##  Mean   :180921
##  3rd Qu.:214000
##  Max.   :755000
##
```

## Following are individual descriptive statistics for quantitative variables:

```
  mean(House_Prices_train$SalePrice)  # Mean Sale Price

## [1] 180921.2

  median(House_Prices_train$SalePrice) # Median Sale Price

## [1] 163000

  sd(House_Prices_train$SalePrice) # Standard Deviation of Sale Price

## [1] 79442.5

  min(House_Prices_train$SalePrice) # Minimum Sale Price

## [1] 34900

  max(House_Prices_train$SalePrice) # Maximum Sale Price

## [1] 755000
```

## Following are descriptive statistics for categorical variables:

```
  table(House_Prices_train$Street) # shows the frequency of homes located on
gravel streets vs paved streets

##
## Grvl Pave
##    6 1454

  table(House_Prices_train$CentralAir) # shows the frequency of homes with
and without central air

##
##    N    Y
##   95 1365

  table(House_Prices_train$CentralAir, House_Prices_train$Electrical) # cross
classification of homes with and without central air (Y/N) and the type of
electrical for the home (fuse box, electrical)

##
##     FuseA FuseF FuseP  Mix SBrkr
##   N    22    18     3    0    52
##   Y    72     9     0    1  1282
```

## To show the percentage of the frequency for each value in a specific categorical variable (such as SaleCondition)

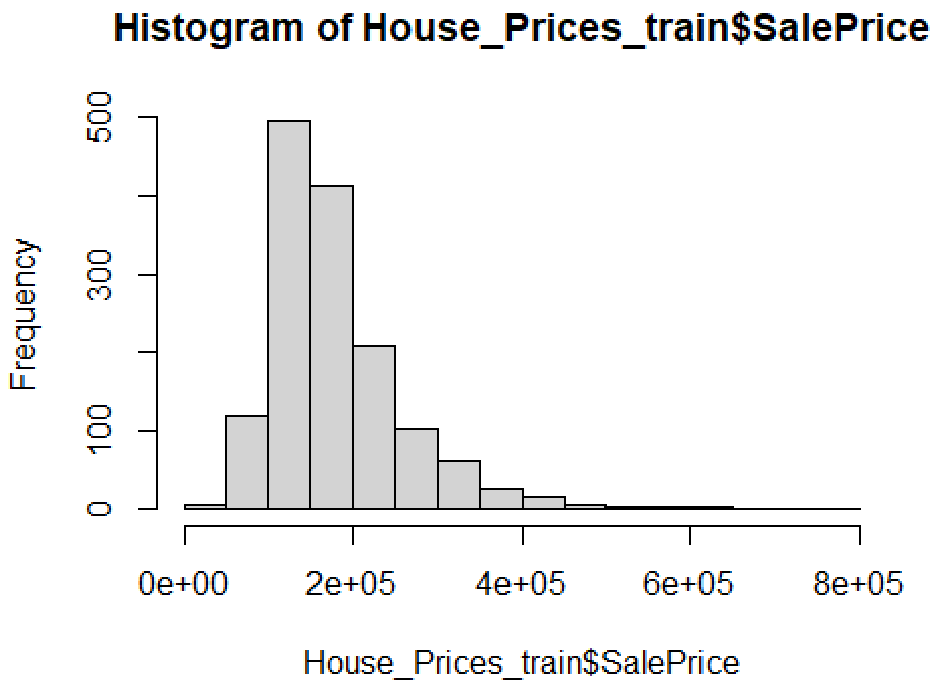
```
  table1 <- table(House_Prices_train$SaleCondition)
  prop.table(table1)

##
##     Abnorml     AdjLand      Alloca      Family      Normal     Partial
## 0.069178082 0.002739726 0.008219178 0.013698630 0.820547945 0.085616438
```

## 4. Transform at least one variable. It doesn’t matter what the transformation is.

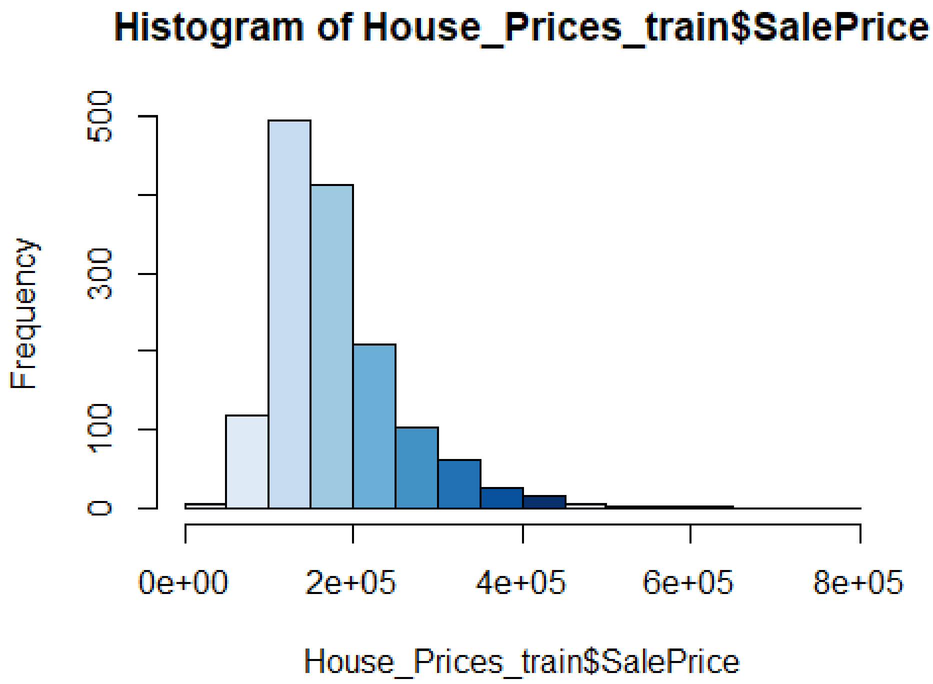
```
  House_Prices_train$SalePrice_Transformed <- (House_Prices_train$SalePrice -
mean(House_Prices_train$SalePrice))/sd(House_Prices_train$SalePrice)



# Create a new variable for total square feet (TotalLivingSF) which is the
square footage of the 1st and 2nd floor combined:

  House_Prices_train$TotalLivingSF <- (House_Prices_train$X1stFlrSF +
House_Prices_train$X2ndFlrSF)
```

## 5. Plot at least one quantitative variable, and one scatterplot.

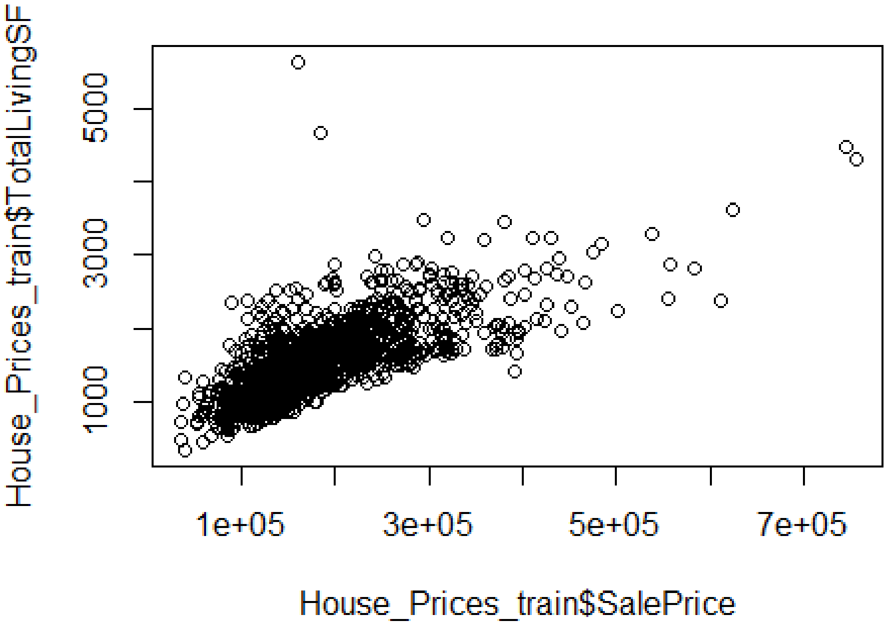
```
# Show histogram of SalePrice

  hist(House_Prices_train$SalePrice)
```



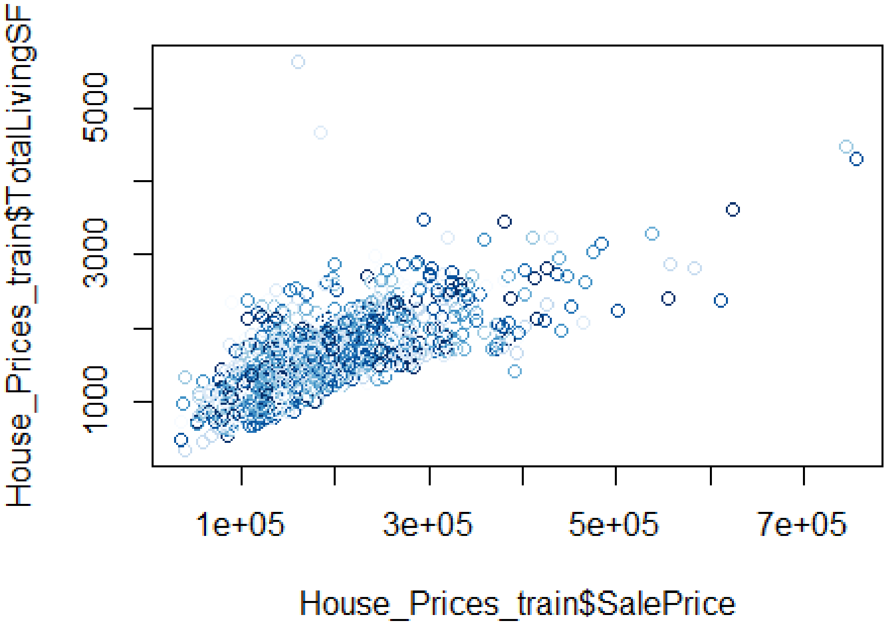
```
# We could also add color to the Histogram to improve the visualization

  hist(House_Prices_train$SalePrice, col = blues9)
```



```
# Show scatterplot of sales price (SalePrice) to total square footage
(TotalLivingSF):

  plot(House_Prices_train$SalePrice, House_Prices_train$TotalLivingSF)
```



```
# We can add color to the scatterplot as well to improve the visualization

  plot(House_Prices_train$SalePrice, House_Prices_train$TotalLivingSF, col =
blues9)
```


House_Prices_train$TotalLivingSF
1000
3000
5000
1e+05
3e+05
5e+05
7e+05
House_Prices_train$SalePrice