

CSE6242 Toy Model

Reading in Data and Libraries

```
library(glmnet)
```

```
## Loading required package: Matrix
```

```
## Loaded glmnet 4.1-4
```

```
set.seed(100)
```

```
frisco = read.csv(file = "Cleaned Frisco.csv")
```

```
frisco = data.frame(frisco)
```

```
frisco$Opening.Time <- as.character(frisco$Opening.Time)
```

```
frisco$Closing.Time <- as.character(frisco$Closing.Time)
```

```
head(frisco)
```

```
##      X                                id is_claimed is_closed review_count rating
## 1 0 9VqZZiaiyGH_6smpvUKaQQ             True      False        127      4.5
## 2 1 dPaJzxW0foPByEXbPFkh_Q             True      False        141      4.0
## 3 2 RhL6hXqiz_nMz06Xx7tBcg             True      False         8      4.5
## 4 3 yawhLqszfIp9q1aGNdLoig             True      False        23      4.5
## 5 4 g_XBHNmwfPUOI4qE_bBgPQ             True      False        83      3.0
## 6 5 n9xpJEWHDFXu5AdrOWBILQ             True      False         8      3.5
## Restaurant.Category.1 Pickup.Available Delivery.Available
## 1                bbq                        0                0
## 2                 thai                        1                1
## 3                soulfood                    1                1
## 4                foodtrucks                  1                1
## 5                 japanese                    1                1
## 6                 seafood                     0                0
## Reservation.Available Price.Level number.of.photos      City State
## 1                0      Medium                3      Aubrey    TX
## 2                0      Medium                3      Aubrey    TX
## 3                0                        3 East Aubrey    TX
## 4                0      Medium                3      Aubrey    TX
## 5                0                        3      Aubrey    TX
## 6                0                        3      Aubrey    TX
## Opening.Time Closing.Time Has.Messaging
## 1          700        2100            0
## 2         1100        2130            0
## 3         1500        2100            0
## 4         1100        1800            0
## 5         1100        1430            1
## 6         1400        2000            1
```

We have 17 columns and 895 rows in the data set.

Let's now split the data into testing and training data.

```
sample <- sample(c(TRUE, FALSE), nrow(frisco), replace=TRUE, prob=c(0.7,0.3))
train  <- frisco[sample, ]
test   <- frisco[!sample, ]
```

Now, let's train the first model.

```
first_model = lm(rating~review_count+Restaurant.Category.1+Pickup.Available+Delivery.Available+Reservat.
summary(first_model)
```

```
##
## Call:
## lm(formula = rating ~ review_count + Restaurant.Category.1 +
##     Pickup.Available + Delivery.Available + Reservation.Available +
##     Price.Level + number.of.photos + Opening.Time + Closing.Time +
##     Has.Messaging, data = train)
##
## Residuals:
##      Min       1Q   Median       3Q      Max
## -2.3036 -0.3710  0.0000  0.3887  1.6483
##
## Coefficients: (3 not defined because of singularities)
##              Estimate Std. Error t value
## (Intercept)      1.0659207   0.7548906   1.412
## review_count      0.0006667   0.0001755   3.799
## Restaurant.Category.1asianfusion    -0.5294648   0.5280945  -1.003
## Restaurant.Category.1bagels        -0.0874173   1.0281342  -0.085
## Restaurant.Category.1bakeries       0.0377073   0.5683242   0.066
## Restaurant.Category.1bars          -0.1805078   0.5710525  -0.316
## Restaurant.Category.1bbq           -0.1119393   0.4941156  -0.227
## Restaurant.Category.1bowling       -0.0990087   0.9005044  -0.110
## Restaurant.Category.1brazilian      0.0270609   1.0480247   0.026
## Restaurant.Category.1breakfast_brunch 0.5131131   0.4949155   1.037
## Restaurant.Category.1buffets        0.3429776   0.8360254   0.410
## Restaurant.Category.1burgers       -0.0757430   0.4729370  -0.160
## Restaurant.Category.1cafes          0.5773998   0.5430402   1.063
## Restaurant.Category.1cajun         -0.2037210   0.5579154  -0.365
## Restaurant.Category.1cakeshop       1.1333043   0.7499660   1.511
## Restaurant.Category.1cheesesteaks   1.1248587   0.8459804   1.330
## Restaurant.Category.1chicken_wings  -0.3798297   0.4863805  -0.781
## Restaurant.Category.1chickenshop    -0.0903819   0.6327876  -0.143
## Restaurant.Category.1chinese       -0.1605305   0.4719472  -0.340
## Restaurant.Category.1cocktailbars   0.4806084   0.5933879   0.810
## Restaurant.Category.1coffee        0.4858786   0.5006993   0.970
## Restaurant.Category.1comfortfood   -0.0631599   0.6802662  -0.093
## Restaurant.Category.1convenience    1.6669118   0.9107938   1.830
## Restaurant.Category.1delis         -0.6873660   0.6759018  -1.017
## Restaurant.Category.1desserts       0.6335097   0.6062297   1.045
## Restaurant.Category.1dimsum         0.4305029   0.8579337   0.502
## Restaurant.Category.1dinnertheater  0.5221086   0.8577325   0.609
## Restaurant.Category.1donuts         0.0987697   0.8674409   0.114
## Restaurant.Category.1filipino      -1.0446223   0.9523671  -1.097
## Restaurant.Category.1fishnchips    -0.2832974   0.8527039  -0.332
## Restaurant.Category.1fooddeliveryservices -2.3300767   0.5676619  -4.105
## Restaurant.Category.1foodtrucks     0.8852995   0.5570339   1.589
```

## Restaurant.Category.1french	0.3747521	0.7010650	0.535
## Restaurant.Category.1gluten_free	0.8538509	0.8526626	1.001
## Restaurant.Category.1golf	-1.0768284	0.8594223	-1.253
## Restaurant.Category.1greek	0.5013286	0.6683595	0.750
## Restaurant.Category.1grocery	-0.0606769	0.8667927	-0.070
## Restaurant.Category.1halal	0.5927134	0.5695786	1.041
## Restaurant.Category.1hawaiian	0.7707090	0.5724630	1.346
## Restaurant.Category.1hotdog	0.4891497	0.5992206	0.816
## Restaurant.Category.1hotdogs	-0.2350204	0.4669243	-0.503
## Restaurant.Category.1hotpot	1.3335821	0.8618251	1.547
## Restaurant.Category.1icecream	1.2457772	0.8445860	1.475
## Restaurant.Category.1indpak	-0.0733050	0.4668510	-0.157
## Restaurant.Category.1intlgrocery	1.5598663	0.8545370	1.825
## Restaurant.Category.1italian	0.0883712	0.4830515	0.183
## Restaurant.Category.1japanese	0.3940849	0.4943036	0.797
## Restaurant.Category.1juicebars	0.4286984	0.5482505	0.782
## Restaurant.Category.1korean	0.7748805	0.6169981	1.256
## Restaurant.Category.1laotian	0.2433157	0.8395386	0.290
## Restaurant.Category.1latin	-0.0069552	0.8471896	-0.008
## Restaurant.Category.1meats	2.4374998	1.0159750	2.399
## Restaurant.Category.1mediterranean	0.4182436	0.4900800	0.853
## Restaurant.Category.1mexican	0.0934520	0.4692443	0.199
## Restaurant.Category.1mideastern	1.0226180	0.8662653	1.180
## Restaurant.Category.1mongolian	-1.0330070	0.8351579	-1.237
## Restaurant.Category.1newamerican	0.2316189	0.4890059	0.474
## Restaurant.Category.1noodles	0.2627327	0.8552604	0.307
## Restaurant.Category.1pakistani	-0.1601671	0.8560498	-0.187
## Restaurant.Category.1persian	0.7087566	0.8419581	0.842
## Restaurant.Category.1pizza	0.0190683	0.4524549	0.042
## Restaurant.Category.1poke	-0.5947792	0.8358672	-0.712
## Restaurant.Category.1portuguese	0.0297459	0.8528653	0.035
## Restaurant.Category.1pubs	0.9467859	0.7363353	1.286
## Restaurant.Category.1ramen	1.0270004	0.8351960	1.230
## Restaurant.Category.1salad	-0.1990605	0.4905053	-0.406
## Restaurant.Category.1salvadoran	0.3187397	0.8551870	0.373
## Restaurant.Category.1sandwiches	-0.4399377	0.4702632	-0.936
## Restaurant.Category.1scandinavian	0.7607286	0.9460638	0.804
## Restaurant.Category.1seafood	0.1395313	0.5903751	0.236
## Restaurant.Category.1servicestations	2.0258540	0.6692874	3.027
## Restaurant.Category.1soulfood	0.6801063	0.8759765	0.776
## Restaurant.Category.1southern	0.2885880	0.5406875	0.534
## Restaurant.Category.1sportsbars	0.1970881	0.5067689	0.389
## Restaurant.Category.1steak	-0.1860209	0.5304778	-0.351
## Restaurant.Category.1sushi	0.1847490	0.5086879	0.363
## Restaurant.Category.1tacos	-0.1405609	0.5247697	-0.268
## Restaurant.Category.1taiwanese	0.4991468	0.6789523	0.735
## Restaurant.Category.1tex-mex	0.0340318	0.4936189	0.069
## Restaurant.Category.1thai	0.2045040	0.5006325	0.408
## Restaurant.Category.1tradamerican	-0.0238435	0.4772320	-0.050
## Restaurant.Category.1turkish	0.4477933	0.8491191	0.527
## Restaurant.Category.1vegan	0.3811288	0.8673593	0.439
## Restaurant.Category.1vegetarian	-0.1841231	0.6696476	-0.275
## Restaurant.Category.1venues	1.9153986	0.9046970	2.117
## Restaurant.Category.1vietnamese	0.0664995	0.6761589	0.098

## Restaurant.Category.1wine_bars	0.4408805	0.6125843	0.720
## Pickup.Available	-0.0379803	0.0832171	-0.456
## Delivery.Available	-0.2059394	0.1056515	-1.949
## Reservation.Available	-0.6044344	0.7342487	-0.823
## Price.LevelHigh	0.2001512	0.3894509	0.514
## Price.LevelLow	-0.2473635	0.1065293	-2.322
## Price.LevelMedium	-0.0996625	0.0999325	-0.997
## Price.LevelVery High	0.4482161	0.8056501	0.556
## number.of.photos	0.4542765	0.1668255	2.723
## Opening.Time1000	0.6500510	0.3677256	1.768
## Opening.Time1030	0.4775728	0.3774043	1.265
## Opening.Time1045	0.0613256	0.4318016	0.142
## Opening.Time1100	0.6092665	0.3673982	1.658
## Opening.Time1115	0.5884643	0.8334452	0.706
## Opening.Time1130	0.3853926	0.4289197	0.899
## Opening.Time1200	0.8129463	0.4828222	1.684
## Opening.Time1300	0.5410783	0.6110567	0.885
## Opening.Time1400	0.5216343	0.6685662	0.780
## Opening.Time1500	0.9151720	0.4495830	2.036
## Opening.Time1600	0.9385038	0.4456432	2.106
## Opening.Time1630	1.0093551	0.6436372	1.568
## Opening.Time1700	0.4848471	0.4768616	1.017
## Opening.Time1730	1.4181453	0.8613859	1.646
## Opening.Time1900	0.0782368	0.9577765	0.082
## Opening.Time430	1.9927461	0.8089010	2.464
## Opening.Time500	0.3420857	0.4214258	0.812
## Opening.Time530	-1.4058984	1.3581501	-1.035
## Opening.Time600	0.2906599	0.3802622	0.764
## Opening.Time630	0.3185413	0.4334449	0.735
## Opening.Time700	0.5346667	0.3887799	1.375
## Opening.Time730	1.2928358	0.6101471	2.119
## Opening.Time800	0.2147914	0.3854696	0.557
## Opening.Time830	1.5013212	0.9044934	1.660
## Opening.Time900	0.1084171	0.4263620	0.254
## Opening.Time930	-0.3731301	0.5434923	-0.687
## Closing.Time100	-0.2520875	0.3590667	-0.702
## Closing.Time1000	1.7990993	0.7605629	2.365
## Closing.Time1030	0.6972094	0.7818414	0.892
## Closing.Time1100	-0.2193641	0.8692165	-0.252
## Closing.Time1230	NA	NA	NA
## Closing.Time1330	1.5966636	0.5990276	2.665
## Closing.Time1400	0.8178868	0.3351927	2.440
## Closing.Time1430	0.7995997	0.2362264	3.385
## Closing.Time1500	0.9556445	0.2394528	3.991
## Closing.Time1530	1.5522002	0.5082505	3.054
## Closing.Time1600	1.4245234	0.5827232	2.445
## Closing.Time1630	NA	NA	NA
## Closing.Time1700	0.8225968	0.4214717	1.952
## Closing.Time1800	0.9979379	0.4808091	2.076
## Closing.Time1830	NA	NA	NA
## Closing.Time1900	0.8910098	0.2887638	3.086
## Closing.Time200	-0.1981022	0.2488741	-0.796
## Closing.Time2000	0.7893474	0.2023987	3.900
## Closing.Time2030	0.7964434	0.3612527	2.205

## Closing.Time2045	0.7607131	0.8023675	0.948
## Closing.Time2100	0.7145571	0.1623796	4.401
## Closing.Time2130	0.8454994	0.2220718	3.807
## Closing.Time2200	0.4131366	0.1605349	2.573
## Closing.Time2230	0.8395485	0.4774562	1.758
## Closing.Time2245	-1.9745219	1.0446376	-1.890
## Closing.Time2300	0.1615848	0.1886228	0.857
## Closing.Time2330	1.3139431	0.7793974	1.686
## Closing.Time300	1.0314827	0.7301951	1.413
## Has.Messaging	0.1703373	0.0834626	2.041
##	Pr(> t)		
## (Intercept)	0.158669		
## review_count	0.000166	***	
## Restaurant.Category.1asianfusion	0.316622		
## Restaurant.Category.1bagels	0.932281		
## Restaurant.Category.1bakeries	0.947131		
## Restaurant.Category.1bars	0.752083		
## Restaurant.Category.1bbq	0.820886		
## Restaurant.Category.1bowling	0.912502		
## Restaurant.Category.1brazilian	0.979412		
## Restaurant.Category.1breakfast_brunch	0.300428		
## Restaurant.Category.1buffets	0.681829		
## Restaurant.Category.1burgers	0.872835		
## Restaurant.Category.1cafes	0.288256		
## Restaurant.Category.1cajun	0.715182		
## Restaurant.Category.1cakeshop	0.131489		
## Restaurant.Category.1cheesesteaks	0.184340		
## Restaurant.Category.1chicken_wings	0.435274		
## Restaurant.Category.1chickenshop	0.886490		
## Restaurant.Category.1chinese	0.733914		
## Restaurant.Category.1cocktailbars	0.418424		
## Restaurant.Category.1coffee	0.332394		
## Restaurant.Category.1comfortfood	0.926069		
## Restaurant.Category.1convenience	0.067917		
## Restaurant.Category.1delis	0.309745		
## Restaurant.Category.1desserts	0.296612		
## Restaurant.Category.1dimsum	0.616072		
## Restaurant.Category.1dinnertheater	0.543040		
## Restaurant.Category.1donuts	0.909399		
## Restaurant.Category.1filipino	0.273314		
## Restaurant.Category.1fishnchips	0.739875		
## Restaurant.Category.1fooddeliveryservices	4.85e-05	***	
## Restaurant.Category.1foodtrucks	0.112727		
## Restaurant.Category.1french	0.593240		
## Restaurant.Category.1gluten_free	0.317201		
## Restaurant.Category.1golf	0.210900		
## Restaurant.Category.1greek	0.453613		
## Restaurant.Category.1grocery	0.944225		
## Restaurant.Category.1halal	0.298639		
## Restaurant.Category.1hawaiian	0.178916		
## Restaurant.Category.1hotdog	0.414776		
## Restaurant.Category.1hotdogs	0.614986		
## Restaurant.Category.1hotpot	0.122506		
## Restaurant.Category.1icecream	0.140942		

## Restaurant.Category.1indpak	0.875303
## Restaurant.Category.1intlgrocery	0.068637 .
## Restaurant.Category.1italian	0.854929
## Restaurant.Category.1japanese	0.425745
## Restaurant.Category.1juicebars	0.434682
## Restaurant.Category.1korean	0.209840
## Restaurant.Category.1laotian	0.772093
## Restaurant.Category.1latin	0.993453
## Restaurant.Category.1meats	0.016858 *
## Restaurant.Category.1mediterranean	0.393903
## Restaurant.Category.1mexican	0.842236
## Restaurant.Category.1mideastern	0.238459
## Restaurant.Category.1mongolian	0.216801
## Restaurant.Category.1newamerican	0.635989
## Restaurant.Category.1noodles	0.758843
## Restaurant.Category.1pakistani	0.851670
## Restaurant.Category.1persian	0.400371
## Restaurant.Category.1pizza	0.966403
## Restaurant.Category.1poke	0.477117
## Restaurant.Category.1portuguese	0.972194
## Restaurant.Category.1pubs	0.199204
## Restaurant.Category.1ramen	0.219501
## Restaurant.Category.1salad	0.685072
## Restaurant.Category.1salvadoran	0.709546
## Restaurant.Category.1sandwiches	0.350050
## Restaurant.Category.1scandinavian	0.421785
## Restaurant.Category.1seafood	0.813279
## Restaurant.Category.1servicestations	0.002620 **
## Restaurant.Category.1soulfood	0.437942
## Restaurant.Category.1southern	0.593796
## Restaurant.Category.1sportsbars	0.697535
## Restaurant.Category.1steak	0.726011
## Restaurant.Category.1sushi	0.716644
## Restaurant.Category.1tacos	0.788942
## Restaurant.Category.1taiwanese	0.462636
## Restaurant.Category.1tex-mex	0.945067
## Restaurant.Category.1thai	0.683117
## Restaurant.Category.1tradamerican	0.960176
## Restaurant.Category.1turkish	0.598215
## Restaurant.Category.1vegan	0.660584
## Restaurant.Category.1vegetarian	0.783483
## Restaurant.Category.1venues	0.034820 *
## Restaurant.Category.1vietnamese	0.921701
## Restaurant.Category.1wine_bars	0.472098
## Pickup.Available	0.648333
## Delivery.Available	0.051919 .
## Reservation.Available	0.410851
## Price.LevelHigh	0.607564
## Price.LevelLow	0.020699 *
## Price.LevelMedium	0.319182
## Price.LevelVery High	0.578268
## number.of.photos	0.006732 **
## Opening.Time1000	0.077812 .
## Opening.Time1030	0.206410

```

## Opening.Time1045      0.887129
## Opening.Time1100      0.097982 .
## Opening.Time1115      0.480533
## Opening.Time1130      0.369413
## Opening.Time1200      0.092960 .
## Opening.Time1300      0.376394
## Opening.Time1400      0.435687
## Opening.Time1500      0.042404 *
## Opening.Time1600      0.035789 *
## Opening.Time1630      0.117571
## Opening.Time1700      0.309847
## Opening.Time1730      0.100423
## Opening.Time1900      0.934935
## Opening.Time430       0.014149 *
## Opening.Time500       0.417394
## Opening.Time530       0.301179
## Opening.Time600       0.445069
## Opening.Time630       0.462798
## Opening.Time700       0.169774
## Opening.Time730       0.034674 *
## Opening.Time800       0.577668
## Opening.Time830       0.097676 .
## Opening.Time900       0.799398
## Opening.Time930       0.492742
## Closing.Time100       0.483020
## Closing.Time1000      0.018450 *
## Closing.Time1030      0.373025
## Closing.Time1100      0.800876
## Closing.Time1230      NA
## Closing.Time1330      0.007979 **
## Closing.Time1400      0.015089 *
## Closing.Time1430      0.000778 ***
## Closing.Time1500      7.74e-05 ***
## Closing.Time1530      0.002399 **
## Closing.Time1600      0.014903 *
## Closing.Time1630      NA
## Closing.Time1700      0.051621 .
## Closing.Time1800      0.038532 *
## Closing.Time1830      NA
## Closing.Time1900      0.002163 **
## Closing.Time200       0.426476
## Closing.Time2000      0.000112 ***
## Closing.Time2030      0.028007 *
## Closing.Time2045      0.343620
## Closing.Time2100      1.36e-05 ***
## Closing.Time2130      0.000161 ***
## Closing.Time2200      0.010402 *
## Closing.Time2230      0.079396 .
## Closing.Time2245      0.059412 .
## Closing.Time2300      0.392114
## Closing.Time2330      0.092553 .
## Closing.Time300       0.158495
## Has.Messaging         0.041874 *
## ---

```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.7043 on 429 degrees of freedom
## (37 observations deleted due to missingness)
## Multiple R-squared:  0.5605, Adjusted R-squared:  0.4109
## F-statistic: 3.747 on 146 and 429 DF,  p-value: < 2.2e-16
```