Project 1 Feb 21 Bzhang

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```r
 #install.packages("xlsx")
 #install.packages("dplyr")
#install.packages("caret")
#install.packages("lattice")
# install.packages("caret")
library(caret)
```

```
## Loading required package: lattice
```

```
## Loading required package: ggplot2
```

```r
library("lattice")
library("ggplot2")
library("tidyverse")
```

```
## -- Attaching packages ------------------------------------------------------
-------------- tidyverse 1.2.1 --
```

```
## v tibble  2.0.1       v purrr   0.3.0
## v tidyr   0.8.2       v dplyr   0.8.0.1
## v readr   1.3.1       v stringr 1.4.0
## v tibble  2.0.1       v forcats 0.4.0
```

```
## -- Conflicts ---------------------------------------------------------------
-------- tidyverse_conflicts() --
## x dplyr::filter() masks stats::filter()
## x dplyr::lag()    masks stats::lag()
## x purrr::lift()   masks caret::lift()
```

```r
require(DAAG)
```

```
## Loading required package: DAAG
```

```r
 data_zhang <- read.csv("file:///L:/Students/JMiao/Zhang/ZhangReport.csv")
dataz <- data_zhang
names(dataz)
```

```
##  [1] "Gender"                          "Age"
##  [3] "EDV_Score"                       "cadm_type_score"
##  [5] "LOS_Score"                       "Charlson_Score"
##  [7] "ALC_Score"                       "Elective_adm_Score"
##  [9] "Urgent_adm_Score"                "Teach_Score"
## [11] "Male_Score"                      "Admit_DT"
## [13] "Discharge_DT"                    "los_days"
## [15] "ADMIT_SOURCE"                    "dis_from_base_class"
## [17] "loc_name"                        "DISCH_DISPOSITION"
## [19] "marital_status"                  "PAT_HOMELESS_YN"
## [21] "zip"                             "CMS_Readmission_unplanned_flag"
## [23] "Clarity.LACE..Score"
```

```
str(dataz)
```

```
## 'data.frame':    77000 obs. of  23 variables:
##  $ Gender                       : Factor w/ 6 levels "","Female","Male",..: 3 2 2
## 2 3 2 3 2 2 2 ...
##  $ Age                          : int  56 24 58 58 72 42 41 23 25 86 ...
##  $ EDV_Score                    : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ cadm_type_score              : int  15 15 0 0 15 15 15 15 15 15 ...
##  $ LOS_Score                    : Factor w/ 10 levels "","0","2","3",..: 2 2 2 2
## 2 2 2 2 2 3 ...
##  $ Charlson_Score               : int  6 0 2 2 0 0 0 0 0 0 ...
##  $ ALC_Score                    : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ Elective_adm_Score           : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ Urgent_adm_Score             : int  35 0 48 49 18 5 5 0 0 27 ...
##  $ Teach_Score                  : int  0 0 0 0 0 0 0 0 0 0 ...
##  $ Male_Score                   : int  3 0 0 0 3 0 3 0 0 0 ...
##  $ Admit_DT                     : Factor w/ 670 levels "","1/1/2017",..: 2 2 2 2
## 2 2 2 2 2 2 ...
##  $ Discharge_DT                 : Factor w/ 712 levels "","01/01/2017",..: 2 2 2
## 2 2 2 2 2 2 4 ...
##  $ los_days                     : Factor w/ 158 levels "","0","1","10",..: 2 2 2
## 2 2 2 2 2 2 3 ...
##  $ ADMIT_SOURCE                 : Factor w/ 23 levels "","Clinic","Home",..: 3 3
## 3 3 18 13 13 13 13 3 ...
##  $ dis_from_base_class          : Factor w/ 4 levels "","Inpatient",..: 4 4 4 4 2
## 2 2 2 2 4 ...
##  $ loc_name                     : Factor w/ 3 levels "","RONALD REAGAN UCLA MEDIC
## AL CENTER",..: 3 2 2 2 2 3 2 2 2 2 ...
##  $ DISCH_DISPOSITION            : Factor w/ 46 levels "","Acute Care Hosp (not Ch
## ildrens/Cancer/VA)",..: 3 24 24 24 24 24 24 24 24 24 ...
##  $ marital_status               : Factor w/ 14 levels "","Dissolved RDP",..: 12 1
## 2 12 12 8 12 7 12 3 14 ...
##  $ PAT_HOMELESS_YN              : Factor w/ 3 levels "","N","Y": 2 2 2 2 2 2 2 2
## 2 2 ...
##  $ zip                          : Factor w/ 2740 levels "","00000","00725",..: 13
## 44 1306 1573 1573 2727 1670 1805 594 2209 1306 ...
##  $ CMS_Readmission_unplanned_flag: Factor w/ 3 levels "","NO","Y": 2 2 2 2 2 2 2 2
## 2 2 ...
##  $ Clarity.LACE..Score          : Factor w/ 92 levels "","0","10","11",..: 64 8 5
## 4 54 48 38 41 36 36 44 ...
```

```
dataz <- dataz %>% as.data.frame()
```

```
head(dataz, 8)
```

```
##   Gender Age EDV_Score cadm_type_score LOS_Score Charlson_Score ALC_Score
## 1   Male  56         0              15         0              6         0
## 2 Female  24         0              15         0              0         0
## 3 Female  58         0               0         0              2         0
## 4 Female  58         0               0         0              2         0
```

```
## 5   Male   72          0                    15           0            0          0
## 6 Female   42          0                    15           0            0          0
## 7   Male   41          0                    15           0            0          0
## 8 Female   23          0                    15           0            0          0
##   Elective_adm_Score Urgent_adm_Score Teach_Score Male_Score Admit_DT
## 1                  0               35           0          3 1/1/2017
## 2                  0                0           0          0 1/1/2017
## 3                  0               48           0          0 1/1/2017
## 4                  0               49           0          0 1/1/2017
## 5                  0               18           0          3 1/1/2017
## 6                  0                5           0          0 1/1/2017
## 7                  0                5           0          3 1/1/2017
## 8                  0                0           0          0 1/1/2017
##   Discharge_DT los_days                                        ADMIT_SOURCE
## 1   01/01/2017        0                                                Home
## 2   01/01/2017        0                                                Home
## 3   01/01/2017        0                                                Home
## 4   01/01/2017        0                                                Home
## 5   01/01/2017        0 Transfer from Emergency Dept Non-UCLA Facility
## 6   01/01/2017        0     Transfer from Acute Care Non-UCLA Facility
## 7   01/01/2017        0     Transfer from Acute Care Non-UCLA Facility
## 8   01/01/2017        0     Transfer from Acute Care Non-UCLA Facility
##   dis_from_base_class                          loc_name
## 1         Observation  SANTA MONICA UCLA MEDICAL CENTER
## 2         Observation RONALD REAGAN UCLA MEDICAL CENTER
## 3         Observation RONALD REAGAN UCLA MEDICAL CENTER
## 4         Observation RONALD REAGAN UCLA MEDICAL CENTER
## 5           Inpatient RONALD REAGAN UCLA MEDICAL CENTER
## 6           Inpatient  SANTA MONICA UCLA MEDICAL CENTER
## 7           Inpatient RONALD REAGAN UCLA MEDICAL CENTER
## 8           Inpatient RONALD REAGAN UCLA MEDICAL CENTER
##                                                       DISCH_DISPOSITION
## 1 Acute Care Hosp (not Childrens/Cancer/VA) w/ planned Acute IP readmission
## 2                                                       Home or Self Care
## 3                                                       Home or Self Care
## 4                                                       Home or Self Care
## 5                                                       Home or Self Care
## 6                                                       Home or Self Care
## 7                                                       Home or Self Care
## 8                                                       Home or Self Care
##   marital_status PAT_HOMELESS_YN   zip CMS_Readmission_unplanned_flag
## 1         Single               N 90064                             NO
## 2         Single               N 90024                             NO
## 3         Single               N 91344                             NO
## 4         Single               N 91344                             NO
## 5           NULL               N  NULL                             NO
## 6         Single               N 91767                             NO
## 7        Married               N 92260                             NO
## 8         Single               N 50313                             NO
##   Clarity.LACE..Score
```

```
## 1                             66
## 2                             15
## 3                             57
## 4                             57
## 5                             51
## 6                             42
## 7                             45
## 8                             40
```

```
dataz_sample <- dataz[1:4000,] %>% as.data.frame()
colSums(is.na(dataz_sample))
```

```
##                          Gender                               Age
##                               0                                 0
##                       EDV_Score                   cadm_type_score
##                               0                                 0
##                       LOS_Score                    Charlson_Score
##                               0                                 0
##                       ALC_Score                Elective_adm_Score
##                               0                                 0
##                Urgent_adm_Score                       Teach_Score
##                               0                                 0
##                      Male_Score                          Admit_DT
##                               0                                 0
##                    Discharge_DT                          los_days
##                               0                                 0
##                    ADMIT_SOURCE               dis_from_base_class
##                               0                                 0
##                        loc_name                   DISCH_DISPOSITION
##                               0                                 0
##                  marital_status                   PAT_HOMELESS_YN
##                               0                                 0
##                             zip CMS_Readmission_unplanned_flag
##                               0                                 0
##              Clarity.LACE..Score
##                               0
```

```
is.null(dataz_sample)
```

```
## [1] FALSE
```

```
dim(dataz_sample)
```

```
## [1] 4000     23
```

```
write.csv(dataz_sample,file = "BZhang_sample.csv", row.names = FALSE)
```

```
dataz <- read.csv("Bzhang_sample.csv", header = T)
dataz$los_days <- as.integer(as.character(dataz$los_days))
```

```
## Warning: NAs introduced by coercion
```

```
dataz$LOS_Score <- dataz$LOS_Score %>% as.character() %>% as.integer()
```

```
## Warning in function_list[[k]](value): NAs introduced by coercion
```

```
which(is.na(dataz$LOS_Score))
```

```
## [1]    34 3620
```

```
dataz <- dataz[-which(is.na(dataz$LOS_Score)),]
colSums(is.na(dataz))
```

```
##                          Gender                             Age
##                               0                               0
##                       EDV_Score                 cadm_type_score
##                               0                               0
##                       LOS_Score                  Charlson_Score
##                               0                               0
##                       ALC_Score              Elective_adm_Score
##                               0                               0
##                 Urgent_adm_Score                     Teach_Score
##                               0                               0
##                      Male_Score                        Admit_DT
##                               0                               0
##                    Discharge_DT                        los_days
##                               0                               0
##                    ADMIT_SOURCE            dis_from_base_class
##                               0                               0
##                        loc_name               DISCH_DISPOSITION
##                               0                               0
##                  marital_status                 PAT_HOMELESS_YN
##                               0                               0
##                             zip CMS_Readmission_unplanned_flag
##                               0                               0
##               Clarity.LACE..Score
##                               0
```

```
dim(dataz)
```

```
## [1] 3998    23
```

```
glimpse(dataz)
```

```
## Observations: 3,998
## Variables: 23
## $ Gender                        <fct> Male, Female, Female, Female, M...
## $ Age                           <int> 56, 24, 58, 58, 72, 42, 41, 23,...
## $ EDV_Score                     <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...
## $ cadm_type_score               <int> 15, 15, 0, 0, 15, 15, 15, 15, 1...
## $ LOS_Score                     <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 2, 2...
## $ Charlson_Score                <int> 6, 0, 2, 2, 0, 0, 0, 0, 0, 0, 4...
## $ ALC_Score                     <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...
## $ Elective_adm_Score            <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...
## $ Urgent_adm_Score              <int> 35, 0, 48, 49, 18, 5, 5, 0, 0, ...
## $ Teach_Score                   <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0...
## $ Male_Score                    <int> 3, 0, 0, 0, 3, 0, 3, 0, 0, 0, 0...
## $ Admit_DT                      <fct> 1/1/2017, 1/1/2017, 1/1/2017, 1...
## $ Discharge_DT                  <fct> 01/01/2017, 01/01/2017, 01/01/2...
## $ los_days                      <int> 0, 0, 0, 0, 0, 0, 0, 0, 0, 1, 1...
## $ ADMIT_SOURCE                  <fct> "Home", "Home", "Home", "Home",...
## $ dis_from_base_class           <fct> Observation, Observation, Obser...
## $ loc_name                      <fct> SANTA MONICA UCLA MEDICAL CENTE...
## $ DISCH_DISPOSITION             <fct> Acute Care Hosp (not Childrens/...
## $ marital_status                <fct> Single, Single, Single, Single,...
## $ PAT_HOMELESS_YN               <fct> N, N, N, N, N, N, N, N, N, N, N...
## $ zip                           <fct> 90064, 90024, 91344, 91344, NUL...
## $ CMS_Readmission_unplanned_flag <fct> NO, NO, NO, NO, NO, NO, NO, NO,...
## $ Clarity.LACE..Score           <int> 66, 15, 57, 57, 51, 42, 45, 40,...
```

```
set.seed(123)
sample <- sample(c(TRUE,FALSE),nrow(dataz),replace = T, prob = c(0.7,0.3))
training <- dataz[sample,]
testing <- dataz[!sample,]

# rm(traing)
```

```
#age lace.score model1

model1 <- lm(Clarity.LACE..Score ~ Age , data = training)
summary(model1)
```

```
##
## Call:
## lm(formula = Clarity.LACE..Score ~ Age, data = training)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -40.382 -15.776   2.189  13.648  50.860
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) 13.91323    1.08209   12.86   <2e-16 ***
## Age          0.60100    0.01768   34.00   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 18.75 on 2791 degrees of freedom
## Multiple R-squared:  0.2929, Adjusted R-squared:  0.2926
## F-statistic:  1156 on 1 and 2791 DF,  p-value: < 2.2e-16
```

```
# while we add more on the model
training$LOS_Score <- as.character(training$LOS_Score) %>% as.integer()
model2 <- lm(Clarity.LACE..Score ~ Age+ cadm_type_score +LOS_Score+Charlson_Score, da
ta = training)
summary(model2)
```

```
##
## Call:
## lm(formula = Clarity.LACE..Score ~ Age + cadm_type_score + LOS_Score +
##     Charlson_Score, data = training)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -43.107  -6.012  -0.386   5.566  48.190
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)      0.83414    0.70445   1.184    0.236
## Age              0.29271    0.01079  27.119   <2e-16 ***
## cadm_type_score  1.78934    0.02975  60.148   <2e-16 ***
## LOS_Score        1.78613    0.08614  20.735   <2e-16 ***
## Charlson_Score   2.78112    0.08224  33.819   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 10.5 on 2788 degrees of freedom
## Multiple R-squared:  0.7784, Adjusted R-squared:  0.7781
## F-statistic:  2449 on 4 and 2788 DF,  p-value: < 2.2e-16
```

```
model3 <- lm(data = training, formula =  dataz$Clarity.LACE..Score ~ dataz$Age + data
z$EDV_Score + dataz$cadm_type_score + (dataz$LOS_Score) + dataz$Charlson_Score + data
z$ALC_Score + dataz$Elective_adm_Score + dataz$Urgent_adm_Score +dataz$Teach_Score +
dataz$Male_Score + dataz$los_days  )

summary(model3)
```

```
##
## Call:
## lm(formula = dataz$Clarity.LACE..Score ~ dataz$Age + dataz$EDV_Score +
##     dataz$cadm_type_score + (dataz$LOS_Score) + dataz$Charlson_Score +
##     dataz$ALC_Score + dataz$Elective_adm_Score + dataz$Urgent_adm_Score +
##     dataz$Teach_Score + dataz$Male_Score + dataz$los_days, data = training)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -49.595  -5.535   1.087   5.262  38.891
##
## Coefficients: (2 not defined because of singularities)
##                           Estimate Std. Error t value Pr(>|t|)
## (Intercept)                5.35741    0.54363   9.855  < 2e-16 ***
## dataz$Age                  0.05388    0.00992   5.432 5.91e-08 ***
## dataz$EDV_Score           -1.46405    0.13103 -11.174  < 2e-16 ***
## dataz$cadm_type_score      1.64210    0.02135  76.911  < 2e-16 ***
## dataz$LOS_Score            1.10166    0.11572   9.520  < 2e-16 ***
## dataz$Charlson_Score       0.87670    0.07601  11.534  < 2e-16 ***
## dataz$ALC_Score                 NA         NA      NA       NA
## dataz$Elective_adm_Score  -0.22245    0.14461  -1.538 0.124072
## dataz$Urgent_adm_Score     0.57369    0.01546  37.103  < 2e-16 ***
## dataz$Teach_Score               NA         NA      NA       NA
## dataz$Male_Score           1.71178    0.09402  18.206  < 2e-16 ***
## dataz$los_days             0.23039    0.06393   3.604 0.000317 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8.757 on 3988 degrees of freedom
## Multiple R-squared:  0.846,  Adjusted R-squared:  0.8457
## F-statistic:  2434 on 9 and 3988 DF,  p-value: < 2.2e-16
```

```
range(dataz$ALC_Score)
```

```
## [1] 0 0
```

```
range(dataz$Teach_Score)
```

```
## [1] 0 0
```

```r
mean(data_zhang$ALC_Score, na.rm = T)
```

```
## [1] 0
```

```r
range(data_zhang$ALC_Score, na.rm = T)
```

```
## [1] 0 0
```

```r
mean(data_zhang$Teach_Score, na.rm = T)
```

```
## [1] 0
```

```r
range(data_zhang$Teach_Score, na.rm = T)
```

```
## [1] 0 0
```

```r
attach(training)


model4 <- lm(data = training, formula =  Clarity.LACE..Score ~ Age + EDV_Score + cadm
_type_score + LOS_Score + Charlson_Score + Elective_adm_Score + Urgent_adm_Score + Ma
le_Score + los_days  )

summary(model4)
```

```
##
## Call:
## lm(formula = Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score +
##     LOS_Score + Charlson_Score + Elective_adm_Score + Urgent_adm_Score +
##     Male_Score + los_days, data = training)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -49.837  -5.441   1.021   5.112  38.648
##
## Coefficients:
##                    Estimate Std. Error t value Pr(>|t|)
## (Intercept)         5.70453    0.64915   8.788  < 2e-16 ***
## Age                 0.05087    0.01186   4.289 1.86e-05 ***
## EDV_Score          -1.62711    0.15832 -10.277  < 2e-16 ***
## cadm_type_score     1.64720    0.02514  65.528  < 2e-16 ***
## LOS_Score           1.06160    0.13908   7.633 3.13e-14 ***
## Charlson_Score      0.92700    0.09126  10.158  < 2e-16 ***
## Elective_adm_Score -0.18972    0.17751  -1.069  0.28528
## Urgent_adm_Score    0.56625    0.01856  30.509  < 2e-16 ***
## Male_Score          1.76429    0.11228  15.713  < 2e-16 ***
## los_days            0.26597    0.07772   3.422  0.00063 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8.7 on 2783 degrees of freedom
## Multiple R-squared:  0.8483, Adjusted R-squared:  0.8478
## F-statistic:  1728 on 9 and 2783 DF,  p-value: < 2.2e-16
```

```
detach(training)
```

```
attach(training, warn.conflicts = F)
step(model4,Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score + LOS_Score + Cha
rlson_Score + Elective_adm_Score + Urgent_adm_Score + Male_Score + los_days)
```

```
## Start:  AIC=12094.2
## Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score + LOS_Score +
##       Charlson_Score + Elective_adm_Score + Urgent_adm_Score +
##       Male_Score + los_days
##
##                        Df Sum of Sq    RSS    AIC
## - Elective_adm_Score  1        86 210724 12093
## <none>                            210637 12094
## - los_days            1       886 211524 12104
## - Age                 1      1392 212029 12111
## - LOS_Score           1      4410 215047 12150
## - Charlson_Score      1      7810 218448 12194
## - EDV_Score           1      7994 218632 12196
## - Male_Score          1     18687 229325 12330
## - Urgent_adm_Score    1     70448 281085 12898
## - cadm_type_score     1    324991 535628 14699
##
## Step:  AIC=12093.35
## Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score + LOS_Score +
##       Charlson_Score + Urgent_adm_Score + Male_Score + los_days
##
##                        Df Sum of Sq    RSS    AIC
## <none>                            210724 12093
## + Elective_adm_Score  1        86 210637 12094
## - los_days            1       889 211613 12103
## - Age                 1      1492 212215 12111
## - LOS_Score           1      4398 215122 12149
## - Charlson_Score      1      7930 218654 12194
## - EDV_Score           1      8041 218765 12196
## - Male_Score          1     18697 229421 12329
## - Urgent_adm_Score    1     70820 281544 12901
## - cadm_type_score     1    325038 535762 14698
```

```
##
## Call:
## lm(formula = Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score +
##       LOS_Score + Charlson_Score + Urgent_adm_Score + Male_Score +
##       los_days, data = training)
##
## Coefficients:
##      (Intercept)               Age          EDV_Score    cadm_type_score
##          5.64298           0.05232           -1.63135            1.64731
##        LOS_Score    Charlson_Score   Urgent_adm_Score         Male_Score
##          1.06017           0.93257            0.56397            1.76472
##         los_days
##          0.26634
```

```
# step(model4, direction = "backward")
# AIC(model4)
```

```
step(model4,Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score + LOS_Score + Cha
rlson_Score + Elective_adm_Score + Urgent_adm_Score + Male_Score + los_days, directio
n = "backward")
```

```
## Start:  AIC=12094.2
## Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score + LOS_Score +
##      Charlson_Score + Elective_adm_Score + Urgent_adm_Score +
##      Male_Score + los_days
##
##                        Df Sum of Sq    RSS    AIC
## - Elective_adm_Score   1        86 210724  12093
## <none>                           210637  12094
## - los_days             1       886 211524  12104
## - Age                  1      1392 212029  12111
## - LOS_Score            1      4410 215047  12150
## - Charlson_Score       1      7810 218448  12194
## - EDV_Score            1      7994 218632  12196
## - Male_Score           1     18687 229325  12330
## - Urgent_adm_Score     1     70448 281085  12898
## - cadm_type_score      1    324991 535628  14699
##
## Step:  AIC=12093.35
## Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score + LOS_Score +
##      Charlson_Score + Urgent_adm_Score + Male_Score + los_days
##
##                        Df Sum of Sq    RSS    AIC
## <none>                           210724  12093
## - los_days             1       889 211613  12103
## - Age                  1      1492 212215  12111
## - LOS_Score            1      4398 215122  12149
## - Charlson_Score       1      7930 218654  12194
## - EDV_Score            1      8041 218765  12196
## - Male_Score           1     18697 229421  12329
## - Urgent_adm_Score     1     70820 281544  12901
## - cadm_type_score      1    325038 535762  14698
```

```
##
## Call:
## lm(formula = Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score +
##     LOS_Score + Charlson_Score + Urgent_adm_Score + Male_Score +
##     los_days, data = training)
##
## Coefficients:
##       (Intercept)               Age         EDV_Score    cadm_type_score
##           5.64298           0.05232          -1.63135            1.64731
##         LOS_Score    Charlson_Score  Urgent_adm_Score         Male_Score
##           1.06017           0.93257           0.56397            1.76472
##          los_days
##           0.26634
```

```
detach(training)
```

```
attach(training,warn.conflicts = FALSE)
model5 <- lm(data= training, Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score
+ LOS_Score + Charlson_Score + Urgent_adm_Score + Male_Score + los_days)
model5 %>% summary()
```

```
##
## Call:
## lm(formula = Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score +
##     LOS_Score + Charlson_Score + Urgent_adm_Score + Male_Score +
##     los_days, data = training)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -50.916  -5.476   1.027   5.100  38.665
##
## Coefficients:
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)        5.64298    0.64661   8.727  < 2e-16 ***
## Age                0.05232    0.01179   4.439 9.38e-06 ***
## EDV_Score         -1.63135    0.15827 -10.307  < 2e-16 ***
## cadm_type_score    1.64731    0.02514  65.531  < 2e-16 ***
## LOS_Score          1.06017    0.13908   7.623 3.38e-14 ***
## Charlson_Score     0.93257    0.09111  10.236  < 2e-16 ***
## Urgent_adm_Score   0.56397    0.01844  30.588  < 2e-16 ***
## Male_Score         1.76472    0.11228  15.717  < 2e-16 ***
## los_days           0.26634    0.07772   3.427 0.000619 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 8.7 on 2784 degrees of freedom
## Multiple R-squared:  0.8482, Adjusted R-squared:  0.8478
## F-statistic:  1944 on 8 and 2784 DF,  p-value: < 2.2e-16
```

```
step(model5, Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score + LOS_Score + Ch
arlson_Score + Urgent_adm_Score + Male_Score + los_days)
```

```
## Start:  AIC=12093.35
## Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score + LOS_Score +
##     Charlson_Score + Urgent_adm_Score + Male_Score + los_days
##
##                    Df Sum of Sq    RSS   AIC
## <none>                          210724 12093
## - los_days          1       889 211613 12103
## - Age               1      1492 212215 12111
## - LOS_Score         1      4398 215122 12149
## - Charlson_Score    1      7930 218654 12194
## - EDV_Score         1      8041 218765 12196
## - Male_Score        1     18697 229421 12329
## - Urgent_adm_Score  1     70820 281544 12901
## - cadm_type_score   1    325038 535762 14698
```

```
##
## Call:
## lm(formula = Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score +
##     LOS_Score + Charlson_Score + Urgent_adm_Score + Male_Score +
##     los_days, data = training)
##
## Coefficients:
##      (Intercept)               Age         EDV_Score   cadm_type_score
##          5.64298           0.05232          -1.63135           1.64731
##        LOS_Score    Charlson_Score  Urgent_adm_Score        Male_Score
##          1.06017           0.93257           0.56397           1.76472
##         los_days
##          0.26634
```

```
anova(model5,model4)
```

```
## Analysis of Variance Table
##
## Model 1: Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score + LOS_Score +
##     Charlson_Score + Urgent_adm_Score + Male_Score + los_days
## Model 2: Clarity.LACE..Score ~ Age + EDV_Score + cadm_type_score + LOS_Score +
##     Charlson_Score + Elective_adm_Score + Urgent_adm_Score +
##     Male_Score + los_days
##   Res.Df    RSS Df Sum of Sq      F Pr(>F)
## 1   2784 210724
## 2   2783 210637  1    86.451 1.1422 0.2853
```

```
AIC(model4)
```

```
## [1] 20022.39
```

```
AIC(model5)
```

```
## [1] 20021.54
```

```
BIC(model4)
```

```
## [1] 20087.67
```

```
BIC(model5)
```

```
## [1] 20080.89
```

```
predicmodel5 <- predict(model5,testing)

predicmodel5_2 <- data.frame(cbind(actuals= testing$Clarity.LACE..Score, predicteds =
predicmodel5))


correlation_accuracy_model5 <- cor(predicmodel5_2) %>% print()
```

```
##              actuals predicteds
## actuals    1.0000000  0.9167119
## predicteds 0.9167119  1.0000000
```

```
mim_max_accuracy <- mean(apply(predicmodel5_2,MARGIN = 1,min)/apply(predicmodel5_2,MA
RGIN = 1,max)) %>% print()
```

```
## [1] 0.8283324
```

```
mape <- abs(predicmodel5_2$predicteds-predicmodel5_2$actuals)/predicmodel5_2$actuals

mape <- mape[!is.infinite(length(mape))]
mape <- mape[-162]
sum(is.infinite(mape))
```
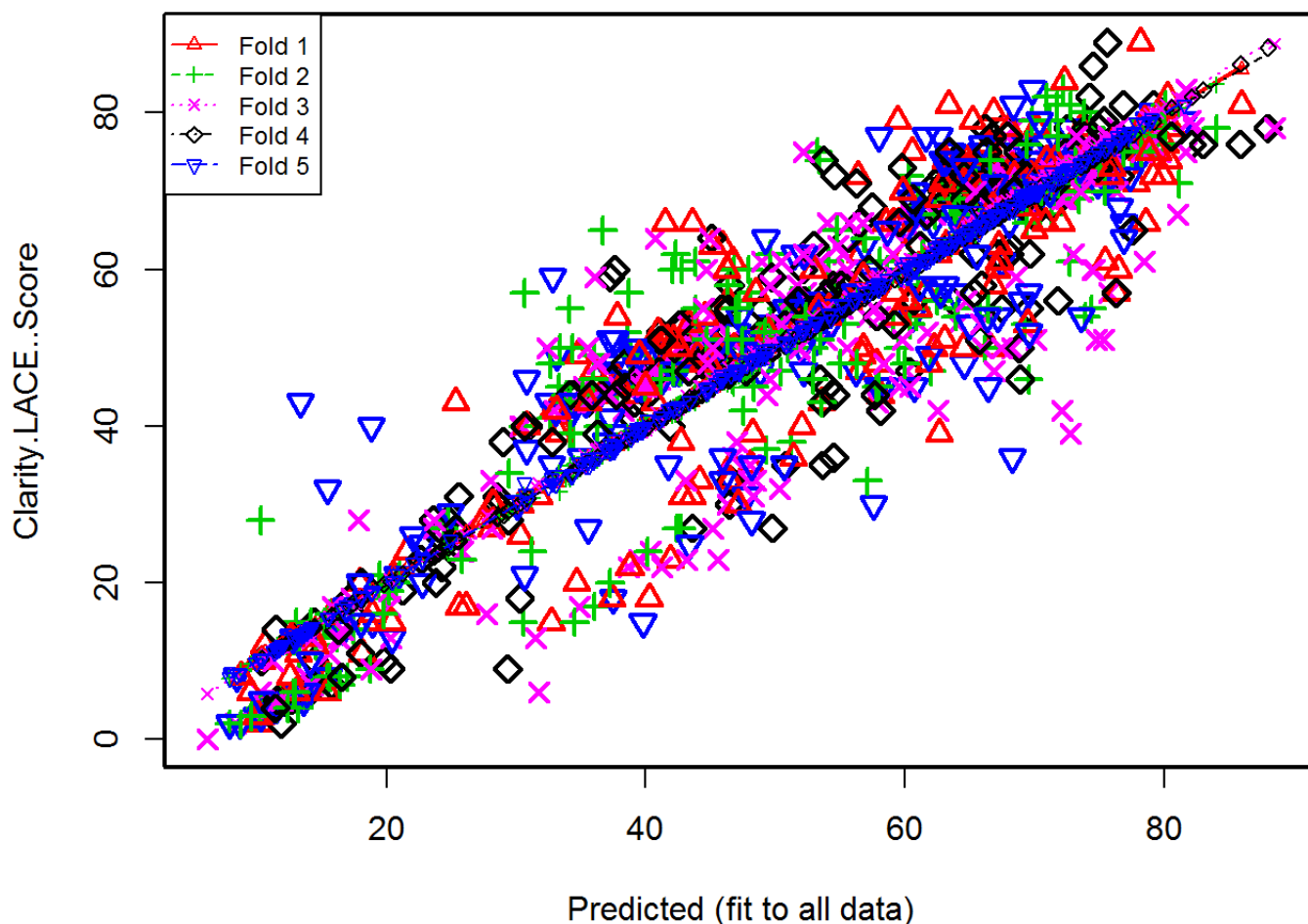
```
## [1] 0
```

```
mean(mape)
```

```
## [1] 0.2993076
```

```
library(DAAG)
set.seed(1)
cvmodel5 <- suppressWarnings(CVlm(data=testing,form.lm = Clarity.LACE..Score ~ Age +
EDV_Score + cadm_type_score + LOS_Score + Charlson_Score + Urgent_adm_Score + Male_Sc
ore + los_days,m=5,dots = FALSE))
```

```
## Analysis of Variance Table
##
## Response: Clarity.LACE..Score
##                  Df Sum Sq Mean Sq F value  Pr(>F)
## Age               1 190466  190466 2411.63  <2e-16 ***
## EDV_Score         1  14531   14531  183.98  <2e-16 ***
## cadm_type_score   1 174161  174161 2205.17  <2e-16 ***
## LOS_Score         1  30198   30198  382.36  <2e-16 ***
## Charlson_Score    1  49241   49241  623.48  <2e-16 ***
## Urgent_adm_Score  1  37130   37130  470.13  <2e-16 ***
## Male_Score        1   6723    6723   85.12  <2e-16 ***
## los_days          1    198     198    2.51    0.11
## Residuals      1196  94458      79
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```


Small symbols show cross-validation predicted values

```
##
## fold 1
## Observations in test set: 241
##                    5     31    32    35    51    54     69    85    88
## Predicted      48.99 44.81  43.4 65.78 56.81 59.52 63.254 43.64 63.75
## cvpred         49.57 45.36  43.7 65.62 57.08 59.39 63.499 43.91 63.57
```

```
## Clarity.LACE..Score 51.00 48.00 49.0 69.00 50.00 66.00 63.000 48.00 68.00
## CV residual            1.43  2.64  5.3  3.38 -7.08  6.61 -0.499  4.09  4.43
##                          89     90    108    133    175    184    231    239    249
## Predicted             55.247 58.1 59.58  46.6  48.1 17.95 35.57 73.63 77.88
## cvpred                55.889 58.3 59.94  46.8  48.3 18.24 35.98 73.34 77.13
## Clarity.LACE..Score 56.000  44.0 66.00  35.0  35.0 20.00 43.00 78.00 71.00
## CV residual           0.111 -14.3  6.06 -11.8 -13.3  1.76  7.02  4.66 -6.13
##                         263    272    295   302    314    325    328    341    348
## Predicted             45.9 64.73 65.88 56.5 27.403 39.60  53.6 74.732 34.8
## cvpred                45.5 65.15 65.95 56.5 27.687 40.09  53.7 74.711 34.8
## Clarity.LACE..Score 63.0 74.00 68.00 62.0 28.000 45.00  43.0 74.000 49.0
## CV residual         17.5  8.85  2.05  5.5  0.313  4.91 -10.7 -0.711 14.2
##                          367    374    381    385    394    473    481    539    549
## Predicted              38.8 74.80 43.07  32.7 30.30 37.79 10.26 56.47  66.6
## cvpred                 38.9 74.97 43.11  32.7 30.67 37.95 10.34 56.33  66.7
## Clarity.LACE..Score   22.0 73.00 51.00  15.0 26.00 45.00  3.00 47.00  50.0
## CV residual          -16.9 -1.97  7.89 -17.7 -4.67  7.05 -7.34 -9.33 -16.7
##                          555    597    622    632    633    644   653    657    715
## Predicted             26.15 73.590 46.7  62.2 72.149 48.63 15.4 66.74 15.721
## cvpred                26.42 73.399 46.5  62.2 71.972 48.55 15.5 66.81 15.892
## Clarity.LACE..Score 17.00 73.000 61.0  50.0 72.000 51.00  8.0 70.00 16.000
## CV residual         -9.42 -0.399 14.5 -12.2  0.028  2.45 -7.5  3.19  0.108
##                          724    725    735    751     792   816     838    858
## Predicted             51.36  78.6 21.52 56.68 55.3108 66.8 20.510 40.93
## cvpred                51.64  78.6 21.76 56.54 55.9576 66.4 21.197 40.76
## Clarity.LACE..Score 53.00  66.0 24.00 49.00 56.0000 80.0 21.000 47.00
## CV residual          1.36 -12.6  2.24 -7.54  0.0424 13.6 -0.197  6.24
##                          876    893 902   904    966    972   986   1005   1008
## Predicted             64.5  8.771  13 39.41 66.89  34.6 44.7 37.81  9.49
## cvpred                65.6  8.923  13 39.16 66.47  34.7 45.3 37.45  9.52
## Clarity.LACE..Score  50.0  8.000   6 44.00 71.00  20.0 48.0 46.00  6.00
## CV residual         -15.6 -0.923  -7  4.84  4.53 -14.7  2.7  8.55 -3.52
##                         1042   1051   1072   1075   1134   1137   1155   1203   1213
## Predicted             38.05 33.39 75.21 10.19   76.3 32.82 36.51 18.48 33.30
## cvpred                38.22 33.43 74.79 10.27   76.2 32.82 36.24 18.51 33.33
## Clarity.LACE..Score 45.00 40.00 73.00  2.00   57.0 42.00 44.00 15.00 39.00
## CV residual          6.78  6.57 -1.79 -8.27 -19.2  9.18  7.76 -3.51  5.67
##                         1240   1273   1316   1338   1340   1347 1397  1407   1422
## Predicted             62.597 64.78 78.14  44.1 72.17 11.30 72.3 59.5 79.34
## cvpred                62.974 64.85 77.84  44.6 71.91 11.28 72.2 59.3 79.19
## Clarity.LACE..Score 62.000 73.00 76.00  33.0 69.00  4.00 84.0 79.0 76.00
## CV residual         -0.974  8.15 -1.84 -11.6 -2.91 -7.28 11.8 19.7 -3.19
##                         1430   1434   1435   1459 1467 1491   1494    1498   1514
## Predicted             78.2  46.5 71.712 69.55 60.6 70.2 69.680 12.8018 10.33
## cvpred                78.3  46.7 72.193 69.42 60.2 69.9 69.221 13.0264 10.51
## Clarity.LACE..Score 89.0  33.0 72.000 70.00 75.0 78.0 70.000 13.0000 10.00
## CV residual         10.7 -13.7 -0.193  0.58 14.8  8.1  0.779 -0.0264 -0.51
##                         1522   1526   1571   1632   1636   1641 1684   1691 1695
## Predicted             56.4 44.40 41.35 11.69 67.41 30.299 45.2  43.6 61.0
## cvpred                56.5 44.86 41.22 11.79 67.25 30.498 44.9  43.8 61.2
```

```
## Clarity.LACE..Score 72.0 48.00 51.00  5.00 69.00 30.000 63.0  31.0 55.0
## CV residual         15.5  3.14  9.78 -6.79  1.75 -0.498 18.1 -12.8 -6.2
##                          1707 1715 1720  1749  1784   1799  1808  1822  1829
## Predicted            12.61 59.4 37.8  41.9 59.96 10.568 69.04 64.55 67.11
## cvpred               12.82 59.5 38.1  42.1 59.85 11.061 68.93 63.81 67.09
## Clarity.LACE..Score   5.00 54.0 54.0  23.0 62.00 12.000 70.00 69.00 60.00
## CV residual          -7.82 -5.5 15.9 -19.1  2.15  0.939  1.07  5.19 -7.09
##                          1850  1852  1887  1924  1947  1962 1973  1976 2037
## Predicted            63.84 14.28 45.03 11.88  46.4  61.9 59.1 80.57 41.0
## cvpred               63.45 14.21 45.03 11.99  46.5  61.9 58.9 80.21 41.1
## Clarity.LACE..Score 70.00 13.00 49.00  5.00  33.0  48.0 66.0 78.00 52.0
## CV residual          6.55 -1.21  3.97 -6.99 -13.5 -13.9  7.1 -2.21 10.9
##                          2041 2045  2063  2105  2126  2128  2139  2167  2181
## Predicted            67.33 43.6 25.54 18.87 60.26 69.35 79.69 13.05 69.17
## cvpred               67.08 43.1 25.57 18.93 60.12 68.87 79.62 13.07 68.62
## Clarity.LACE..Score 73.00 66.0 17.00 16.00 56.00 71.00 77.00  6.00 71.00
## CV residual          5.92 22.9 -8.57 -2.93 -4.12  2.13 -2.62 -7.07  2.38
##                           2186  2189  2245  2252  2278  2283  2293  2301  2372
## Predicted            72.810 48.22 14.46 11.95 41.73 62.93 30.79 68.26  37.4
## cvpred               72.639 48.42 14.65 12.06 41.46 62.66 31.06 68.94  37.5
## Clarity.LACE..Score 73.000 39.00 12.00  5.00 48.00 71.00 40.00 73.00  18.0
## CV residual          0.361 -9.42 -2.65 -7.06  6.54  8.34  8.94  4.06 -19.5
##                          2389   2396   2397  2412  2452   2456 2457  2491 2504
## Predicted            78.58 54.106 38.05  38.7 68.04 45.14 46.3 67.29 80.1
## cvpred               78.13 54.275 38.22  38.8 68.02 45.43 46.5 68.28 79.8
## Clarity.LACE..Score 76.00 55.000 45.00  22.0 78.00 49.00 56.0 61.00 76.0
## CV residual         -2.13  0.725  6.78 -16.8  9.98  3.57  9.5 -7.28 -3.8
##                          2522   2527  2531  2532  2540   2571 2581 2582  2599
## Predicted            28.13  42.8 78.29 13.17  51.4 62.60 25.3 65.3  52.0
## cvpred               28.51  42.7 78.05 13.44  51.7 62.53 25.6 65.4  52.2
## Clarity.LACE..Score 30.00  31.0 75.00 11.00  36.0 69.00 43.0 79.0  40.0
## CV residual          1.49 -11.7 -3.05 -2.44 -15.7  6.47 17.4 13.6 -12.2
##                          2622  2626  2633  2647   2664  2674  2689 2697 2708
## Predicted            66.44 10.26 18.12 69.75 68.825 73.33 11.63   36 80.0
## cvpred               66.86 10.34 18.11 69.62 68.943 73.12 11.72   36 80.4
## Clarity.LACE..Score 76.00  3.00 11.00 72.00 68.000 71.00  5.00   47 72.0
## CV residual          9.14 -7.34 -7.11  2.38 -0.943 -2.12 -6.72   11 -8.4
##                          2709  2760  2806  2814  2815  2828  2838   2845   2856
## Predicted            10.26 65.38 43.38 40.74 45.41 64.55 80.36 31.773 44.40
## cvpred               10.34 64.58 43.22 41.04 45.21 64.45 80.17 31.962 44.86
## Clarity.LACE..Score  3.00 73.00 53.00 43.00 50.00 71.00 74.00 31.000 48.00
## CV residual         -7.34  8.42  9.78  1.96  4.79  6.55 -6.17 -0.962  3.14
##                          2877  2893 2902  2904   2919  2957  2968   2972   2987
## Predicted            61.6 20.37 66.8 70.86 78.533 46.77 28.07  62.6 55.674
## cvpred               61.6 20.54 67.6 71.33 79.262 47.33 28.44  62.5 55.888
## Clarity.LACE..Score 57.0 15.00 58.0 66.00 79.000 50.00 27.00  39.0 56.000
## CV residual         -4.6 -5.54 -9.6 -5.33 -0.262  2.67 -1.44 -23.5  0.112
##                          2994  3003  3010  3023  3031   3032  3077   3108  3128
## Predicted            65.82 44.59 40.03 44.58 15.41   75.5 35.57 27.467  41.9
## cvpred               65.48 44.78 40.44 44.73 15.28   75.4 35.98 27.755  42.1
```

```
## Clarity.LACE..Score 70.00 49.00 45.00 54.00   6.00  61.0 43.00 28.000  23.0
## CV residual            4.52  4.22  4.56  9.27 -9.28 -14.4  7.02  0.245 -19.1
##                        3134  3152  3164  3195  3214 3216  3220  3227  3236
## Predicted             43.98 69.52  69.5 51.79 63.17 63.4 72.05 12.55 48.50
## cvpred                43.86 69.39  69.0 51.73 64.08 63.1 72.18 12.75 48.41
## Clarity.LACE..Score 49.00 68.00  53.0 53.00 74.00 81.0 66.00  8.00 57.00
## CV residual            5.14 -1.39 -16.0  1.27  9.92 17.9 -6.18 -4.75  8.59
##                        3267  3298  3318  3343  3344  3352  3368  3382  3408
## Predicted             57.83 68.000 67.23 86.00 80.25 56.75 42.17 71.61 75.82
## cvpred                57.44 68.052 67.23 85.51 79.99 57.01 42.26 71.41 75.43
## Clarity.LACE..Score 48.00 69.000 63.00 81.00 82.00 59.00 51.00 74.00 72.00
## CV residual           -9.44  0.948 -4.23 -4.51  2.01  1.99  8.74  2.59 -3.43
##                        3418  3431  3481 3489 3495  3497  3498 3529  3533
## Predicted             40.3 12.610 79.18 46.2 10.1 58.57 52.91 41.5 68.45
## cvpred                40.2 12.821 78.79 46.3 10.2 58.46 52.65 41.6 68.42
## Clarity.LACE..Score  18.0 13.000 72.00 60.0  3.0 66.00 60.00 66.0 72.00
## CV residual          -22.2  0.179 -6.79 13.7 -7.2  7.54  7.35 24.4  3.58
##                       3546  3557  3571  3582  3589  3599  3610  3653 3666
## Predicted             13  76.5 79.55 70.91  9.94 69.95 33.09 42.69 59.9
## cvpred                13  76.2 80.46 70.26 10.00 72.17 32.86 42.65 59.5
## Clarity.LACE..Score   6  60.0 75.00 74.00  3.00 65.00 42.00 38.00 70.0
## CV residual          -7 -16.2 -5.46  3.74 -7.00 -7.17  9.14 -4.65 10.5
##                       3673  3677  3711  3717  3726  3733  3741  3753  3774
## Predicted            49.47 42.55 39.97 59.17 73.612 41.64 39.52 44.88  47.2
## cvpred               49.85 42.44 40.37 59.11 73.271 41.43 39.77 45.43  47.5
## Clarity.LACE..Score 52.00 50.00 45.00 57.00 74.000 51.00 49.00 48.00  30.0
## CV residual           2.15  7.56  4.63 -2.11  0.729  9.57  9.23  2.57 -17.5
##                       3800  3809 3821  3827  3838  3841  3934 3976
## Predicted            28.26 66.80   63 53.289 54.063 39.97 78.82 76.0
## cvpred               28.65 66.95   63 54.005 54.217 40.37 79.12 77.1
## Clarity.LACE..Score 30.00 68.00   51 55.000 54.000 45.00 75.00 73.0
## CV residual           1.35  1.05  -12  0.995 -0.217  4.63 -4.12 -4.1
##
## Sum of squares = 18401    Mean square = 76.3     n = 241
##
## fold 2
## Observations in test set: 241
##                        2     4     60     72    107    152   182    196    203
## Predicted            30.5 38.7   42.4   42.5 61.08 81.13 53.4 51.24 39.41
## cvpred               31.2 38.0   42.8   42.9 61.09 80.56 53.4 51.48 39.92
## Clarity.LACE..Score  15.0 57.0   27.0   27.0 68.00 71.00 74.0 56.00 46.00
## CV residual         -16.2 19.0  -15.8  -15.9  6.91 -9.56 20.6  4.52  6.08
##                       217   223    250   296   305   317    378    383   387
## Predicted            50.45 43.8 68.69 47.9 34.4 11.75   36.0  69.3 42.8
## cvpred               50.77 43.0 68.47 47.1 33.6 11.73   36.7  69.5 41.9
## Clarity.LACE..Score 55.00 61.0 71.00 60.0 39.0  5.00   17.0  53.0 60.0
## CV residual           4.23 18.0  2.53 12.9  5.4 -6.73 -19.7 -16.5 18.1
##                       432    444    457   475  486   521   532   547    571
## Predicted            37.82 58.67 11.63 64.64 16.1  65.8 15.64 31.24 28.698
## cvpred               38.23 58.74 11.61 64.63 16.0  65.8 15.65 30.77 28.173
```

```
## Clarity.LACE..Score 44.00 60.00  5.00 70.00 13.0  54.0  8.00 24.00 29.000
## CV residual          5.77  1.26 -6.61  5.37 -3.0 -11.8 -7.65 -6.77  0.827
##                       577   583   590   615  619   635   639   648   702
## Predicted           44.69 63.04  74.4 61.08 49.6 12.610  66.2  42.4 56.89
## cvpred              44.84 62.87  74.1 61.09 48.8 12.502  66.1  42.8 56.96
## Clarity.LACE..Score 48.00 71.00  55.0 58.00 62.0 13.000  50.0  27.0 64.00
## CV residual          3.16  8.13 -19.1 -3.09 13.2  0.498 -16.1 -15.8  7.04
##                           705   728   733   739   742   759   775   807
## Predicted           14.0324 73.22 46.43 64.72  57.1 60.87 55.05 63.45
## cvpred              13.9235 72.42 46.68 64.86  57.1 60.96 55.37 63.23
## Clarity.LACE..Score 14.0000 70.00 50.00 73.00  33.0 55.00 58.00 72.00
## CV residual          0.0765 -2.42  3.32  8.14 -24.1 -5.96  2.63  8.77
##                         815   825   831   833   848   874   883   896
## Predicted           52.64 61.08 12.99 44.801 61.38 54.12 15.454  51.2
## cvpred              52.73 60.18 12.98 45.203 61.38 54.33 15.345  51.5
## Clarity.LACE..Score 56.00 69.00 15.00 45.000 62.00 61.00 15.000  38.0
## CV residual          3.27  8.82  2.02 -0.203  0.62  6.67 -0.345 -13.5
##                         897   901   910   917   936   939   940   957
## Predicted           14.53 50.958 40.71  62.0 71.21 24.65 64.09 78.514
## cvpred              14.41 49.844 41.19  62.1 71.02 24.25 64.16 78.289
## Clarity.LACE..Score 12.00 50.000 50.00  47.0 79.00 28.00 55.00 79.000
## CV residual         -2.41  0.156  8.81 -15.1  7.98  3.75 -9.16  0.711
##                          970   978   997  1026  1052  1067 1073 1074  1106
## Predicted           46.745 30.6 55.12 10.27 49.11 68.49 36.7 38.9 47.93
## cvpred              46.126 30.3 55.36 10.25 49.12 67.33 36.2 38.3 47.07
## Clarity.LACE..Score 46.000 57.0 57.00  4.00 51.00 70.00 65.0 49.0 56.00
## CV residual         -0.126 26.7  1.64 -6.25  1.88  2.67 28.8 10.7  8.93
##                         1109  1110  1136  1152  1217  1230 1239  1251  1278
## Predicted            72.2 59.11  73.9 32.67 12.86 60.87 36.1 66.91 71.34
## cvpred               72.1 59.23  73.7 33.26 12.86 61.06 36.7 66.83 70.27
## Clarity.LACE..Score  83.0 53.00  54.0 41.00  6.00 54.00 49.0 74.00 73.00
## CV residual          10.9 -6.23 -19.7  7.74 -6.86 -7.06 12.3  7.17  2.73
##                         1283   1314  1326 1359  1377  1384  1386  1412  1417
## Predicted           20.974 30.54  49.3 38.6 13.24 63.53 56.97 71.40 50.43
## cvpred              20.793 31.25  49.5 39.3 13.21 63.33 56.98 71.19 50.59
## Clarity.LACE..Score 21.000 40.00  37.0 52.0  6.00 67.00 64.00 73.00 47.00
## CV residual          0.207  8.75 -12.5 12.7 -7.21  3.67  7.02  1.81 -3.59
##                         1446  1447  1453  1479  1485  1503  1532  1534  1543
## Predicted           79.48 59.50 69.37 69.44 47.50 10.19 42.73  53.6 69.92
## cvpred              79.12 58.69 68.67 69.38 46.67 10.23 42.93  53.8 69.72
## Clarity.LACE..Score 76.00 50.00 70.00 73.00 42.00  3.00 47.00  43.0 72.00
## CV residual         -3.12 -8.69  1.33  3.62 -4.67 -7.23  4.07 -10.8  2.28
##                         1561  1574  1606 1608  1613 1615  1631  1649 1690
## Predicted           55.37 62.37 30.54   58  57.8 33.8 14.172 14.19 42.0
## cvpred              55.68 62.23 31.25   58  58.0 33.3 14.004 14.26 41.4
## Clarity.LACE..Score 53.00 67.00 40.00   45  45.0 44.0 15.000  6.00 60.0
## CV residual         -2.68  4.77  8.75  -13 -13.0 10.7  0.996 -8.26 18.6
##                         1696  1710  1748 1750 1761  1770  1788  1795  1830
## Predicted           60.45  72.7 20.705   71 55.1 74.34 43.75 54.74  64.0
## cvpred              60.52  72.0 20.257   71 55.4 74.33 44.21 55.11  64.2
```

```
## Clarity.LACE..Score 53.00  61.0 20.000    82 48.0 78.00 52.00 65.00  54.0
## CV residual        -7.52 -11.0 -0.257    11 -7.4  3.67  7.79  9.89 -10.2
##                      1831  1840  1909 1939  1941 1982  2022  2056  2077
## Predicted          71.77 72.77 58.11 46.1 19.92 47.7 71.39 15.45 65.45
## cvpred             71.69 72.76 58.21 45.7 19.64 48.1 71.35 15.48 65.31
## Clarity.LACE..Score 81.00 81.00 61.00 49.0 18.00 51.0 67.00  8.00 70.00
## CV residual         9.31  8.24  2.79  3.3 -1.64  2.9 -4.35 -7.48  4.69
##                      2084  2089  2097 2118  2121  2131  2151  2159  2176
## Predicted          70.83 34.14  7.86 10.3 48.82 63.77 12.99 13.30 69.21
## cvpred             70.68 33.33  7.80 10.3 49.15 63.79 12.98 13.16 68.82
## Clarity.LACE..Score 73.00 39.00  2.00 28.0 51.00 69.00  6.00 11.00 69.00
## CV residual         2.32  5.67 -5.80 17.7  1.85  5.21 -6.98 -2.16  0.18
##                      2202  2224  2226 2247  2249  2299  2310 2339  2345
## Predicted           60.4 13.11 17.45 77.58  42.7 15.199 12.79 33.3 51.723
## cvpred              60.2 13.09 17.14 77.13  41.8 15.117 12.81 34.0 50.812
## Clarity.LACE..Score 72.0  5.00 14.00 75.00  27.0 15.000  6.00 45.0 51.000
## CV residual         11.8 -8.09 -3.14 -2.13 -14.8 -0.117 -6.81 11.0  0.188
##                      2365  2423  2429 2484 2492  2496  2542  2556  2588
## Predicted          34.18 65.49 63.60 46.4 46.8 24.77 42.60 11.69 13.18
## cvpred             34.94 64.49 62.77 45.3 44.9 24.37 42.81 11.67 13.15
## Clarity.LACE..Score 43.00 71.00 69.00 58.0 60.0 28.00 47.00  5.00  4.00
## CV residual         8.06  6.51  6.23 12.7 15.1  3.63  4.19 -6.67 -9.15
##                      2612 2621  2652  2684  2707 2727  2728 2739  2768
## Predicted           42.3   64 52.75 44.88 79.94 75.2 48.13 34.1 18.71
## cvpred              41.5   64 52.81 45.14 79.75 74.8 47.28 33.5 18.81
## Clarity.LACE..Score 62.0   68 53.00 47.00 76.00 76.0 57.00 55.0  9.00
## CV residual         20.5    4  0.19  1.86 -3.75  1.2  9.72 21.5 -9.81
##                      2788  2791  2809  2819  2821 2825  2841  2852  2859
## Predicted          11.75 39.97 25.80 35.15  34.5 42.1 71.53 49.60 61.445
## cvpred             11.73 40.31 25.46 35.96  35.2 42.4 71.38 49.79 61.437
## Clarity.LACE..Score  5.00 45.00 23.00 44.00  15.0 47.0 70.00 53.00 62.000
## CV residual        -6.73  4.69 -2.46  8.04 -20.2  4.6 -1.38  3.21  0.563
##                      2862  2867  2876  2888  2929  2936  2943  2954  2978
## Predicted           64.2 73.26 73.88 69.86 14.172 24.41 35.93  8.77 47.20
## cvpred              64.1 72.98 73.83 69.98 14.004 24.13 36.61  8.80 46.41
## Clarity.LACE..Score 69.0 70.00 80.00 79.00 15.000 27.00 46.00  2.00 55.00
## CV residual          4.9 -2.98  6.17  9.02  0.996  2.87  9.39 -6.80  8.59
##                      2982  2996  3029  3036  3057  3061  3067  3072
## Predicted           34.4 65.812 68.45 56.29 75.767 15.594 69.132 16.41
## cvpred              34.1 65.707 68.33 56.74 75.639 15.425 69.189 16.19
## Clarity.LACE..Score 50.0 66.000 71.00 48.00 76.000 16.000 70.000  7.00
## CV residual         15.9  0.293  2.67 -8.74  0.361  0.575  0.811 -9.19
##                      3088  3092  3103  3117  3149 3183  3197  3218  3248
## Predicted           69.4 11.49 19.75 75.49 53.122 53.3  69.5 80.09 62.50
## cvpred              69.3 11.53 19.69 75.19 53.469 53.7  69.6 79.93 62.72
## Clarity.LACE..Score 66.0  4.00 16.00 70.00 53.000 75.0  46.0 78.00 56.00
## CV residual         -3.3 -7.53 -3.69 -5.19 -0.469 21.3 -23.6 -1.93 -6.72
##                      3256  3306 3313  3315  3322  3360 3379  3416  3438
## Predicted          15.56 48.82 11.5 29.46 75.03 36.30 43.8 71.80 47.44
## cvpred             15.59 48.05 11.5 29.04 74.89 35.68 44.4 71.73 47.82
```

```
## Clarity.LACE..Score  8.00 51.00   5.0 34.00 73.00 40.00 55.0 77.00 51.00
## CV residual          -7.59  2.95  -6.5  4.96 -1.89  4.32 10.6  5.27  3.18
##                       3462   3468  3474  3504  3511  3543  3549 3567  3575
## Predicted            69.42 76.91 50.50 46.97 80.08 49.75 73.238 84.0 12.34
## cvpred               69.23 76.74 50.79 47.17 79.93 49.95 73.114 83.6 12.44
## Clarity.LACE..Score 76.00 75.00 52.00 55.00 81.00 52.00 74.000 78.0  4.00
## CV residual          6.77 -1.74  1.21  7.83  1.07  2.05  0.886 -5.6 -8.44
##                       3576   3586 3645 3656  3657 3676  3679  3690  3705
## Predicted            12.92 52.98    60 33.4 19.49 32.6 73.47 44.72 63.89
## cvpred               12.92 53.44    60 31.5 19.11 33.4 73.05 44.04 63.85
## Clarity.LACE..Score  6.00 50.00    48 50.0 21.00 48.0 69.00 51.00 67.00
## CV residual          -6.92 -3.44   -12 18.5  1.89 14.6 -4.05  6.96  3.15
##                       3708   3723 3743  3748  3755  3764 3768  3791  3823
## Predicted            52.92 70.513 48.3 16.92 41.17  66.4 78.9  9.56 49.20
## cvpred               53.38 69.766 47.7 16.85 41.42  65.9 78.7  9.66 49.48
## Clarity.LACE..Score 46.00 70.000 45.0  8.00 46.00  55.0 77.0  3.00 52.00
## CV residual          -7.38  0.234 -2.7 -8.85  4.58 -10.9 -1.7 -6.66  2.52
##                       3848   3865  3874  3877  3882  3886  3887  3912
## Predicted            37.2 20.183 66.57 73.187 46.31 71.821 53.47  40.2
## cvpred               37.8 19.835 66.54 73.197 46.82 71.743 53.71  40.6
## Clarity.LACE..Score  20.0 19.000 74.00 74.000 51.00 71.000 51.00  24.0
## CV residual          -17.8 -0.835  7.46  0.803  4.18 -0.743 -2.71 -16.6
##                       3933   3935  3981
## Predicted            78.2 12.86 52.39
## cvpred               77.4 12.86 52.63
## Clarity.LACE..Score 75.0  6.00 54.00
## CV residual          -2.4 -6.86  1.37
##
## Sum of squares = 19705    Mean square = 81.8    n = 241
##
## fold 3
## Observations in test set: 241
##                          8     16     74    115    116    119    146    168    194
## Predicted            30.47   60.1 60.65 64.10   57.9 10.26   61.8 72.24   70.1
## cvpred               30.13   60.8 61.25 64.83   59.2 10.19   62.6 73.01   71.4
## Clarity.LACE..Score 40.00   47.0 65.00 68.00   43.0  6.00   52.0 76.00   51.0
## CV residual          9.87  -13.8  3.75  3.17  -16.2 -4.19 -10.6  2.99  -20.4
##                        276    357    361   364    401    426    431    446    483
## Predicted            31.7 54.0 43.29 49.0   68.3 54.55 70.733 73.80 58.11
## cvpred               32.8 55.2 43.48 50.3   69.0 54.52 71.504 74.66 58.42
## Clarity.LACE..Score  6.0 66.0 51.00 61.0   50.0 59.00 71.000 72.00 54.00
## CV residual          -26.8 10.8  7.52 10.7  -19.0  4.48 -0.504 -2.66 -4.42
##                        492    495   501    528    535    563    564    573
## Predicted            55.216  72.1  64.1  62.6 74.27  6.17 35.24 56.039
## cvpred               55.395  72.9  64.8  62.8 75.18  5.84 36.39 56.031
## Clarity.LACE..Score 55.000  42.0  53.0  42.0 73.00  0.00 45.00 57.000
## CV residual         -0.395 -30.9 -11.8 -20.8 -2.18 -5.84  8.61  0.969
##                        576    582   586    624    638   656    662    663    683
## Predicted            37.01 67.62 60.46 79.73 44.30  74.6  66.1 55.25 47.93
## cvpred               36.67 68.21 61.33 80.53 45.07  75.7  66.5 55.02 47.83
```

```
## Clarity.LACE..Score 44.00 74.00 67.00 75.00 53.00   60.0   50.0 62.00 51.00
## CV residual           7.33   5.79   5.67 -5.53   7.93 -15.7 -16.5   6.98   3.17
##                        684    686    720   727   773    781    783  810    853
## Predicted             41.80   59.6 45.86 38.3 67.9 52.39 51.00 57.1 70.062
## cvpred                41.97   60.2 45.44 38.2 68.8 52.45 51.89 57.5 70.756
## Clarity.LACE..Score 48.00   45.0 50.00 42.0 77.0 57.00 56.00 54.0 70.000
## CV residual           6.03 -15.2   4.56   3.8   8.2   4.55   4.11 -3.5 -0.756
##                               855    861    880   922    931    934    984  987
## Predicted             14.1600 52.62 12.86   48.1   81.1 74.14 53.802 55.6
## cvpred                14.0501 52.68 12.91   48.0   82.0 74.93 54.225 56.5
## Clarity.LACE..Score 14.0000 55.00   6.00   35.0   67.0 73.00 55.000 50.0
## CV residual         -0.0501   2.32 -6.91 -13.0 -15.0 -1.93   0.775 -6.5
##                        1006   1050   1053   1054 1061   1092   1096   1133   1154
## Predicted             13.84   8.39 34.94 49.11 40.8 69.65   39.5   75.8 44.31
## cvpred                13.81   8.39 34.74 48.74 41.8 69.86   39.4   77.1 44.01
## Clarity.LACE..Score  8.00   2.00 43.00 51.00 64.0 68.00   23.0   57.0 49.00
## CV residual         -5.81 -6.39   8.26   2.26 22.2 -1.86 -16.4 -20.1   4.99
##                        1171   1175   1185   1219   1225   1226   1271   1285   1305
## Predicted             52.87   45.6   34.9 10.52   46.7 42.18 14.34 38.51 37.92
## cvpred                54.02   46.7   34.7 10.37   46.6 41.71 14.42 38.63 37.87
## Clarity.LACE..Score 62.00   23.0   17.0   4.00   36.0 47.00   7.00 46.00 45.00
## CV residual           7.98 -23.7 -17.7 -6.37 -10.6   5.29 -7.42   7.37   7.13
##                         1318   1339   1364 1379   1392   1413 1420   1425   1454
## Predicted             64.9984 37.54 32.95 82.3 11.56 53.99 53.4 67.90 59.206
## cvpred                65.9489 37.58 32.88 82.7 11.54 54.08 53.3 68.74 59.278
## Clarity.LACE..Score 66.0000 45.00 42.00 78.0   5.00 51.00 61.0 71.00 59.000
## CV residual           0.0511   7.42   9.12 -4.7 -6.54 -3.08   7.7   2.26 -0.278
##                        1460   1463   1472   1480   1481   1482   1497 1513   1540
## Predicted             62.37 67.41 14.34   74.8   75.4 50.19 15.57 36.4 76.38
## cvpred                62.89 68.47 14.42   76.1   76.7 50.34 15.74 37.2 77.01
## Clarity.LACE..Score 67.00 71.00   7.00   51.0   51.0 53.00 11.00 48.0 70.00
## CV residual           4.11   2.53 -7.42 -25.1 -25.7   2.66 -4.74 10.8 -7.01
##                        1586   1592   1600   1625   1627   1637   1648   1659   1662
## Predicted             31.5 70.88   38.7 70.33 45.71 69.180   50.4 42.54 40.97
## cvpred                32.4 71.97   38.5 71.23 46.43 69.635   50.4 42.12 40.58
## Clarity.LACE..Score  13.0 74.00   22.0 73.00 53.00 69.000   32.0 47.00 46.00
## CV residual         -19.4   2.03 -16.5   1.77   6.57 -0.635 -18.4   4.88   5.42
##                        1705   1706   1735   1739   1743   1753   1827   1832   1858
## Predicted             64.9 75.94 67.99 72.140 73.84 68.46 76.409 41.09   67.5
## cvpred                65.2 76.66 67.68 73.108 74.38 69.23 77.421 41.02   68.6
## Clarity.LACE..Score 67.0 72.00 72.00 74.000 71.00 78.00 78.000 46.00   50.0
## CV residual           1.8 -4.66   4.32   0.892 -3.38   8.77   0.579   4.98 -18.6
##                        1865   1877   1899 1905   1950   1953   1980   1994   2040
## Predicted             54.86 11.10 39.60 30.3 12.86 11.50   68.6   72.8   45.2
## cvpred                55.28 11.22 39.17 30.0 12.91 11.49   69.5   73.7   45.0
## Clarity.LACE..Score 63.00   4.00 45.00 40.0   6.00   5.00   59.0   39.0   27.0
## CV residual           7.72 -7.22   5.83 10.0 -6.91 -6.49 -10.5 -34.7 -18.0
##                         2054   2059   2071   2080   2110   2112   2140   2165
## Predicted             57.691 55.57 41.99   47.9 57.720 72.19 44.47 46.57
## cvpred                58.177 55.85 41.57   47.9 57.768 72.83 44.32 46.51
```

```
## Clarity.LACE..Score 59.000 60.00 49.00   33.0 58.000 74.00 49.00 51.00
## CV residual           0.823   4.15   7.43 -14.9  0.232   1.17   4.68   4.49
##                        2170   2191   2195   2196 2209   2232   2246     2263   2277
## Predicted             40.4 48.65 11.82 72.48 36.1 12.78 34.50 71.342 49.63
## cvpred                40.1 48.55 11.73 72.94 37.0 12.87 34.43 72.168 50.81
## Clarity.LACE..Score   24.0 51.00   5.00 69.00 59.0   5.00 43.00 73.000 46.00
## CV residual           -16.1   2.45 -6.73 -3.94 22.0 -7.87   8.57   0.832 -4.81
##                        2306   2317   2335   2341   2353 2363   2370     2381   2402
## Predicted             74.51 78.70 44.14 25.87 68.592 43.2 16.60 17.282 47.03
## cvpred                75.11 79.49 45.11 25.93 69.503 43.9 16.58 17.139 46.95
## Clarity.LACE..Score 72.00 76.00 51.00 24.00 70.000 53.0 14.00 18.000 38.00
## CV residual           -3.11 -3.49   5.89 -1.93   0.497   9.1 -2.58   0.861 -8.95
##                        2432   2441   2447   2455   2509   2524   2536 2539   2547
## Predicted             23.61   48.5   66.9 48.454 81.39 26.109 10.72 20.3 81.69
## cvpred                23.56   48.5   68.5 48.409 81.93 26.147 10.94 20.3 81.67
## Clarity.LACE..Score 27.00   33.0   47.0 48.000 80.00 27.000   4.00 13.0 75.00
## CV residual            3.44 -15.5 -21.5 -0.409 -1.93   0.853 -6.94 -7.3 -6.67
##                        2589   2597 2638   2643   2646 2679   2685   2717   2726
## Predicted             16.33 41.05 72.1 43.34 40.14 44.7   43.1 51.70 72.57
## cvpred                16.41 41.08 73.7 43.42 39.84 44.6   44.0 52.19 73.33
## Clarity.LACE..Score 13.00 47.00 69.0 49.00 47.00 60.0   33.0 58.00 72.00
## CV residual           -3.41   5.92 -4.7   5.58   7.16 15.4 -11.0   5.81 -1.33
##                        2733   2734   2736 2741   2770   2786   2790   2796   2816
## Predicted             82.04 78.88 66.96 73.8   46.3 25.81 20.23 50.50 79.53
## cvpred                82.71 79.92 67.64 74.7   47.5 25.89 20.49 51.17 79.97
## Clarity.LACE..Score 79.00 78.00 73.00 76.0   30.0 24.00 17.00 61.00 77.00
## CV residual           -3.71 -1.92   5.36   1.3 -17.5 -1.89 -3.49   9.83 -2.97
##                        2848   2869   2908   2911   2916   2928   2959   3018   3026
## Predicted             48.3 56.75 12.01 12.92 59.86 47.598 35.57 14.22   27.8
## cvpred                49.5 57.55 11.88 12.96 60.58 47.602 35.22 14.32   28.6
## Clarity.LACE..Score 31.0 66.00   5.00   6.00 51.00 47.000 43.00   7.00   16.0
## CV residual          -18.5   8.45 -6.88 -6.96 -9.58 -0.602   7.78 -7.32 -12.6
##                        3060   3073   3082   3110   3119   3124   3181   3191   3200
## Predicted             35.5 59.01 80.19 74.72 49.42 28.09 15.80 20.18 37.20
## cvpred                35.6 59.61 81.01 75.67 49.64 28.16 15.63 20.21 36.81
## Clarity.LACE..Score 50.0 65.00 79.00 72.00 44.00 33.00 17.00 19.00 44.00
## CV residual           14.4   5.39 -2.01 -3.67 -5.64   4.84   1.37 -1.21   7.19
##                        3224   3244 3245   3246   3260   3288   3290   3308   3334
## Predicted             74.19 14.22 45.0 75.694   65.9 75.95 11.23 50.12 40.03
## cvpred                75.03 14.32 46.1 76.452   66.7 76.98 11.32 50.29 39.54
## Clarity.LACE..Score 72.00 13.00 64.0 77.000   53.0 75.00 10.00 53.00 45.00
## CV residual           -3.03 -1.32 17.9   0.548 -13.7 -1.98 -1.32   2.71   5.46
##                        3340   3349   3377 3388   3397   3420   3424   3439   3443
## Predicted             75.81 48.426   78.5 17.8   60.4 11.56   58.4 44.84 66.771
## cvpred                76.71 48.609   79.5 17.7   61.4 11.54   59.1 44.92 67.498
## Clarity.LACE..Score 76.00 48.000   61.0 28.0   45.0   5.00   48.0 50.00 68.000
## CV residual           -0.71 -0.609 -18.5 10.3 -16.4 -6.54 -11.1   5.08   0.502
##                        3491   3512   3520   3530   3551 3552   3554   3572   3585
## Predicted             73.89 68.00 71.03   41.2 11.88 81.8 64.79 57.69 50.55
## cvpred                74.66 68.37 71.33   41.1 11.78 82.0 65.45 58.86 50.19
```

```
## Clarity.LACE..Score 73.00 72.00 73.00  22.0  5.00 83.0 56.00 55.00 53.00
## CV residual          -1.66  3.63  1.67 -19.1 -6.78  1.0 -9.45 -3.86  2.81
##                       3608  3622  3664  3672  3707  3715  3739  3745  3761
## Predicted            66.630 39.67 64.87 49.60  88.6 65.51 15.80 73.27 79.16
## cvpred               67.248 39.22 64.91 50.51  88.9 66.36 15.63 73.71 80.09
## Clarity.LACE..Score 68.000 45.00 66.00 58.00  78.0 70.00 17.00 77.00 76.00
## CV residual           0.752  5.78  1.09  7.49 -10.9  3.64  1.37  3.29 -4.09
##                       3770 3775  3796 3798  3801  3803 3814  3845 3852 3866
## Predicted            28.1 52.2  74.5    73 39.96 18.78 78.3  43.2 32.4 55.7
## cvpred               28.2 52.3  75.5    74 39.84 18.94 78.8  43.1 32.7 56.6
## Clarity.LACE..Score 27.0 62.0  60.0    62 46.00  9.00 75.0  23.0 50.0 66.0
## CV residual         -1.2  9.7 -15.5   -12  6.16 -9.94 -3.8 -20.1 17.3  9.4
##                       3870 3871  3872 3883  3942 3949  3950  3974  3996
## Predicted            36.2 52.2 23.75 45.2 59.08 44.5 73.60 51.87 44.81
## cvpred               37.1 49.0 23.65 45.2 59.18 44.3 75.11 52.15 44.39
## Clarity.LACE..Score 48.0 75.0 28.00 50.0 62.00 55.0 70.00 50.00 48.00
## CV residual         10.9 26.0  4.35  4.8  2.82 10.7 -5.11 -2.15  3.61
##
## Sum of squares = 23288    Mean square = 96.6    n = 241
##
## fold 4
## Observations in test set: 241
##                         11    20    21    38    59    68    70    98   112
## Predicted            60.70 63.69 47.0 54.04 66.13 43.0  69.6 69.98 43.86
## cvpred               60.42 63.19 46.7 53.51 65.54 42.7  69.1 69.42 43.53
## Clarity.LACE..Score 67.00 56.00 50.0 45.00 68.00 53.0  55.0 75.00 51.00
## CV residual          6.58 -7.19  3.3 -8.51  2.46 10.3 -14.1  5.58  7.47
##                        127   135  139   140   174   191  224   241   247
## Predicted            37.82 39.01 46.5 69.263 63.8 44.30 43.7 68.10 14.08
## cvpred               37.58 38.85 46.1 69.221 63.3 43.99 43.6 67.71 14.03
## Clarity.LACE..Score 44.00 41.00 58.0 69.000 74.0 49.00 51.0 63.00  6.00
## CV residual          6.42  2.15 11.9 -0.221 10.7  5.01  7.4 -4.71 -8.03
##                        262   278   298   301   318  335   377   395   402
## Predicted            76.56 68.34 41.46 14.41 10.332 52.6 66.93 34.78  68.9
## cvpred               76.51 67.73 41.18 14.34 10.301 52.1 66.49 34.59  69.0
## Clarity.LACE..Score 72.00 71.00 48.00 10.00 10.000 55.0 71.00 44.00  50.0
## CV residual         -4.51  3.27  6.82 -4.34 -0.301  2.9  4.51  9.41 -19.0
##                        404   459  462   471   537   542  544   546  569
## Predicted            67.68  49.8 41.1 54.13 11.75 75.51 67.6 53.99 57.5
## cvpred               67.07  49.2 40.9 53.84 11.71 75.01 67.8 53.62 57.1
## Clarity.LACE..Score 69.00  27.0 52.0 57.00  5.00 73.00 78.0 55.00 68.0
## CV residual          1.93 -22.2 11.1  3.16 -6.71 -2.01 10.2  1.38 10.9
##                        584   594   600   609   620   623   665   723   730
## Predicted            56.86 65.10 72.59 69.66 18.07 66.77 12.40 50.77  46.6
## cvpred               56.35 64.81 72.13 69.32 17.89 66.78 12.37 50.19  46.2
## Clarity.LACE..Score 59.00 72.00 78.00 62.00 20.00 67.00  5.00 53.00  33.0
## CV residual          2.65  7.19  5.87 -7.32  2.11  0.22 -7.37  2.81 -13.2
##                        772   786   826   835   843   887  908   909   925
## Predicted            45.1 19.81 62.89 34.40 73.61 46.42 53.0 40.10 35.57
## cvpred               44.8 19.85 62.45 34.11 73.14 45.79 52.6 39.83 35.53
```

```
## Clarity.LACE..Score 64.0 10.00 70.00 44.00 75.00 52.00 63.0 44.00 43.00
## CV residual          19.2 -9.85  7.55  9.89  1.86  6.21 10.4  4.17  7.47
##                        942  1000  1017  1023  1097  1105  1113  1128  1145
## Predicted            58.2 79.21  20.3 55.59  50.8 65.78 70.04  30.3 23.98
## cvpred               57.6 78.83  20.2 55.66  51.2 65.36 69.82  30.2 23.73
## Clarity.LACE..Score  42.0 81.00   9.0 64.00  35.0 69.00 72.00  18.0 26.00
## CV residual         -15.6  2.17 -11.2  8.34 -16.2  3.64  2.18 -12.2  2.27
##                       1186  1195  1202  1205 1207  1260  1266  1269 1276
## Predicted            38.40 63.05 68.07 21.21 37.3 25.444  43.6 11.69 66.2
## cvpred               38.18 63.15 67.55 21.16 36.9 25.293  43.3 11.65 65.8
## Clarity.LACE..Score 48.00 71.00 62.00 19.00 59.0 25.000  27.0  5.00 78.0
## CV residual          9.82  7.85 -5.55 -2.16 22.1 -0.293 -16.3 -6.65 12.2
##                       1288  1292  1299  1322  1389  1409  1411  1429 1432
## Predicted            46.4  53.6  60.3  65.8 39.15 42.41 44.40 67.25 67.3
## cvpred               46.1  53.3  60.1  65.4 39.06 42.01 44.03 66.93 66.8
## Clarity.LACE..Score  30.0  43.0  47.0  51.0 43.00 48.00 48.00 72.00 70.0
## CV residual         -16.1 -10.3 -13.1 -14.4  3.94  5.99  3.97  5.07  3.2
##                       1457  1462  1464  1468  1474  1484  1488  1524
## Predicted            24.26 62.12 67.15  67.5 22.664 68.01 65.70 76.545
## cvpred               24.16 61.77 66.64  67.0 22.537 67.83 65.78 76.059
## Clarity.LACE..Score 22.00 68.00 62.00  55.0 23.000 70.00 71.00 77.000
## CV residual         -2.16  6.23 -4.64 -12.0  0.463  2.17  5.22  0.941
##                       1551  1562  1564 1577  1593  1616  1643  1645  1653
## Predicted            25.58 52.25  77.6 64.7 69.90 40.99 49.73 46.77 39.21
## cvpred               25.35 51.98  77.2 64.4 70.26 40.74 49.47 46.51 39.12
## Clarity.LACE..Score 31.00 56.00  65.0 68.0 67.00 47.00 59.00 50.00 46.00
## CV residual          5.65  4.02 -12.2  3.6 -3.26  6.26  9.53  3.49  6.88
##                       1666  1675  1702 1717  1722  1732  1740  1754  1758
## Predicted            64.8 11.88 67.701  71.8 29.44 11.69 73.98 71.73 54.49
## cvpred               64.4 11.84 67.341  71.3 29.28 11.65 73.42 71.18 54.05
## Clarity.LACE..Score 71.0  5.00 68.000  56.0 28.00  5.00 78.00 70.00 58.00
## CV residual          6.6 -6.84  0.659 -15.3 -1.28 -6.65  4.58 -1.18  3.95
##                       1771  1791  1810  1814  1834  1845  1869 1873  1882
## Predicted            17.39 55.23 52.16 29.02 64.48 30.92 68.46 37.6 60.70
## cvpred               17.37 54.93 51.84 28.62 64.04 30.82 68.05 37.3 60.31
## Clarity.LACE..Score 16.00 58.00 60.00 38.00 67.00 40.00 73.00 60.0 56.00
## CV residual         -1.37  3.07  8.16  9.38  2.96  9.18  4.95 22.7 -4.31
##                       1895  1896 1920  1922  1931 1959  1997  1999  2012
## Predicted            57.7 43.30 62.4 49.77  85.9 41.0 65.94 55.80 70.43
## cvpred               57.5 43.16 61.9 49.37  86.2 40.9 65.47 55.52 70.46
## Clarity.LACE..Score  44.0 49.00 71.0 52.00  76.0 47.0 58.00 58.00 71.00
## CV residual         -13.5  5.84  9.1  2.63 -10.2  6.1 -7.47  2.48  0.54
##                       2048  2060 2107  2111  2142  2153  2169  2179  2182
## Predicted            13.05 65.99 56.3 28.53 49.00 62.87 15.76  54.5 23.62
## cvpred               12.99 65.78 55.9 28.28 48.78 62.67 15.79  54.2 23.32
## Clarity.LACE..Score  6.00 73.00 71.0 31.00 52.00 72.00  7.00  36.0 28.00
## CV residual         -6.99  7.22 15.1  2.72  3.22  9.33 -8.79 -18.2  4.68
##                       2188  2197  2204  2238  2255  2261  2269 2276
## Predicted            71.37 12.74 74.506 68.26 70.134 53.47 17.155 65.3
## cvpred               71.11 12.66 74.692 67.74 69.682 53.59 17.006 64.7
```

```
## Clarity.LACE..Score 68.00 13.00 75.000 69.00 70.000 46.00 18.000 62.0
## CV residual         -3.11  0.34  0.308  1.26  0.318 -7.59  0.994 -2.7
##                      2336   2340   2344   2352   2355   2378   2401 2410 2431
## Predicted           24.77 55.10 61.73 11.75 12.65 11.50 82.17 34.1 44.7
## cvpred              24.49 54.81 61.36 11.71 12.62 11.46 82.02 33.9 44.3
## Clarity.LACE..Score 28.00 58.00 67.00  5.00  5.00 14.00 76.00 44.0 49.0
## CV residual          3.51  3.19  5.64 -6.71 -7.62  2.54 -6.02 10.1  4.7
##                      2435   2495 2497 2498 2510   2541   2544   2545   2563
## Predicted           39.89 69.42 41.1 64.6 54.6 56.56 57.25 44.61 74.28
## cvpred              39.65 69.41 40.8 64.1 54.4 56.25 56.92 44.42 73.98
## Clarity.LACE..Score 46.00 69.00 51.0 70.0 72.0 66.00 60.00 49.00 82.00
## CV residual          6.35 -0.41 10.2  5.9 17.6  9.75  3.08  4.58  8.02
##                      2567   2593 2605   2648   2653 2654   2699   2701   2746
## Predicted           59.8 41.91 37.4 46.90 52.81 41.0 46.04 48.98 55.674
## cvpred              59.2 42.21 37.2 46.63 52.29 40.9 45.82 49.08 55.272
## Clarity.LACE..Score 73.0 40.00 46.0 50.00 55.00 47.0 49.00 55.00 56.000
## CV residual         13.8 -2.21  8.8  3.37  2.71  6.1  3.18  5.92  0.728
##                      2747 2752 2759   2777   2783 2785   2801 2811   2840
## Predicted           67.09 55.31 17.97 75.09 76.423 45.87  88.0 75.6 46.37
## cvpred              66.58 54.88 17.87 74.72 75.916 45.61  88.3 75.2 46.05
## Clarity.LACE..Score 68.00 56.00 11.00 73.00 75.000 55.00  78.0 89.0 55.00
## CV residual          1.42  1.12 -6.87 -1.72 -0.916  9.39 -10.3 13.8  8.95
##                      2881 2891 2906   2918 2921   2962 2964   2980   2988
## Predicted           23.82 42.6 14.28 14.427 74.5  53.7 61.2 71.743 60.65
## cvpred              23.71 42.3 14.22 14.317 74.0  53.3 60.6 71.289 60.21
## Clarity.LACE..Score 20.00 53.0  7.00 15.000 86.0  35.0 63.0 71.000 69.00
## CV residual         -3.71 10.7 -7.22  0.683 12.0 -18.3  2.4 -0.289  8.79
##                      3020   3028 3041 3051   3054   3062   3080 3105   3125
## Predicted           71.6 68.75 66.7 24.1 67.22 72.42 28.58 44.7 11.88
## cvpred              71.0 68.87 66.3 23.9 66.61 72.17 28.47 44.3 11.84
## Clarity.LACE..Score 72.0 75.00 77.0 27.0 70.00 75.00 30.00 49.0  2.00
## CV residual          1.0  6.13 10.7  3.1  3.39  2.83  1.53  4.7 -9.84
##                      3131   3153   3180   3238   3247   3251   3259   3301   3326
## Predicted           16.28 32.78 75.40 75.01 38.46 53.41 25.35 64.63 51.78
## cvpred              16.29 33.11 75.48 74.83 38.24 53.23 25.28 64.43 51.54
## Clarity.LACE..Score 14.00 38.00 79.00 78.00 45.00 55.00 27.00 69.00 56.00
## CV residual         -2.29  4.89  3.52  3.17  6.76  1.77  1.72  4.57  4.46
##                      3329   3364   3372 3375   3415   3428   3467   3475   3488
## Predicted           30.67 42.25 59.21 66.8 11.56 66.96  29.3 74.91 57.87
## cvpred              30.57 41.94 58.68 66.7 11.52 66.85  29.1 74.52 57.57
## Clarity.LACE..Score 40.00 50.00 53.00 70.0  5.00 73.00   9.0 73.00 54.00
## CV residual          9.43  8.06 -5.68  3.3 -6.52  6.15 -20.1 -1.52 -3.57
##                      3490   3531 3538   3555   3628   3637   3648   3691   3766
## Predicted           50.72 36.27 53.8 65.39 45.10  54.6 73.86 64.58 69.45
## cvpred              50.23 36.06 53.5 64.84 44.76  54.2 73.66 64.19 68.95
## Clarity.LACE..Score 53.00 39.00 74.0 57.00 49.00  44.0 77.00 72.00 72.00
## CV residual          2.77  2.94 20.5 -7.84  4.24 -10.2  3.34  7.81  3.05
##                      3773   3782   3785   3787   3824 3853   3867   3893   3910
## Predicted           47.75 80.61 83.04 68.42 66.36 35.9  68.9 65.89 76.90
## cvpred              47.59 80.65 82.93 68.13 66.33 35.7  68.7 65.62 76.95
```

```
## Clarity.LACE..Score 47.00 77.00 76.00 70.00 75.00 44.0  46.0 68.00 81.00
## CV residual          -0.59 -3.65 -6.93  1.87  8.67  8.3 -22.7  2.38  4.05
##                       3911  3938 3943  3953  3954 3965  3971  3985  3988
## Predicted            63.5 67.97 11.4 59.58  76.3 41.2 43.33 16.54 37.75
## cvpred               62.8 67.94 11.4 59.26  75.8 40.9 43.62 16.54 37.52
## Clarity.LACE..Score 75.0 77.00  4.0 66.00  57.0 51.0 47.00  8.00 44.00
## CV residual          12.2  9.06 -7.4  6.74 -18.8 10.1  3.38 -8.54  6.48
##
## Sum of squares = 16103    Mean square = 66.8    n = 241
##
## fold 5
## Observations in test set: 241
##                        24    26    66   105   138   151   180   190   207
## Predicted            69.6 39.74 47.03 65.06  57.6 51.104 35.93 42.2 11.5
## cvpred               70.6 39.37 47.17 64.64  57.8 50.589 35.48 42.4 11.4
## Clarity.LACE..Score 74.0 46.00 50.00 72.00  30.0 51.000 44.00 47.0  4.0
## CV residual           3.4  6.63  2.83  7.36 -27.8  0.411  8.52  4.6 -7.4
##                       220   221   251   257   261   265   277   282   297
## Predicted            69.2 34.25  76.9 66.5 65.91  8.452 65.39 36.93 62.18
## cvpred               68.8 33.71  77.3 66.1 65.57  8.209 65.29 36.98 61.75
## Clarity.LACE..Score 76.0 42.00  66.0 71.0 75.00  8.000 71.00 38.00 66.00
## CV residual           7.2  8.29 -11.3  4.9  9.43 -0.209  5.71  1.02  4.25
##                       304   321   322   331   334   353   392   408   413
## Predicted            36.31  64.6  58.4 72.57 46.9 67.7 62.6 37.5  46.6
## cvpred               35.98  64.4  58.0 72.72 47.0 67.7 62.2 36.9  46.6
## Clarity.LACE..Score 44.00  48.0  45.0 78.00 50.0 75.0 77.0 48.0  33.0
## CV residual          8.02 -16.4 -13.0  5.28  3.0  7.3 14.8 11.1 -13.6
##                       418   435   447   448   458   491   497   510   514
## Predicted            68.03 60.6 18.92 59.7 34.37 38.8 37.2 73.07 60.44
## cvpred               67.49 59.9 18.86 59.0 33.83 38.5 36.9 72.87 59.76
## Clarity.LACE..Score 66.00 54.0 15.00 66.0 42.00 49.0 47.0 74.00 69.00
## CV residual         -1.49 -5.9 -3.86  7.0  8.17 10.5 10.1  1.13  9.24
##                       516   519   530   550   607   617   618   629   640   643
## Predicted            63.13 55.25 64.79 37.2 56.89 13.3  57.9 38.9 69.9 11.5
## cvpred               62.95 55.56 64.62 36.8 56.97 13.0  58.0 39.1 69.8 11.4
## Clarity.LACE..Score 58.00 56.00 71.00 51.0 63.00 43.0  45.0 50.0 83.0  4.0
## CV residual         -4.95  0.44  6.38 14.2  6.03 30.0 -13.0 10.9 13.2 -7.4
##                       652   658   668   678   682   685   738   748
## Predicted            72.1427 35.60  9.94 32.5 77.49 54.19 58.008 13.05
## cvpred               72.0517 35.05  9.76 32.3 77.53 54.35 58.169 13.05
## Clarity.LACE..Score 72.0000 44.00  3.00 43.0 76.00 56.00 59.000  6.00
## CV residual         -0.0517  8.95 -6.76 10.7 -1.53  1.65  0.831 -7.05
##                       791   796   842   854   886   914   932   954   974
## Predicted            42.12 67.17 65.81 69.25 47.01 44.81 78.873 75.63 44.66
## cvpred               42.23 67.02 65.64 69.22 47.13 44.86 78.887 75.62 44.73
## Clarity.LACE..Score 47.00 72.00 70.00 78.00 52.00 48.00 79.000 71.00 52.00
## CV residual          4.77  4.98  4.36  8.78  4.87  3.14  0.113 -4.62  7.27
##                       983  1043  1062  1070  1086  1090  1098  1102  1103
## Predicted            53.21 63.05  39.8 78.46 39.77 14.160 49.60  8.64 40.18
## cvpred               53.25 62.87  39.8 78.55 39.76 14.308 49.83  8.46 40.74
```

```
## Clarity.LACE..Score 55.00 68.00  15.0 75.00 47.00 14.000 53.00  2.00 46.00
## CV residual          1.75  5.13 -24.8 -3.55  7.24 -0.308  3.17 -6.46  5.26
##                      1119  1124 1142  1159  1178   1189   1198  1200  1210
## Predicted            14.2 48.78 51.5 67.47 41.03 70.315 37.614 75.44 11.63
## cvpred               14.1 48.65 51.7 67.77 40.67 69.749 38.283 75.35 11.58
## Clarity.LACE..Score  7.0 47.00 62.0 61.00 50.00 69.000 39.000 74.00  5.00
## CV residual         -7.1 -1.65 10.3 -6.77  9.33 -0.749  0.717 -1.35 -6.58
##                      1221  1246  1252 1257  1295  1298  1300  1306  1324
## Predicted            15.4 61.56 33.03 12.9 59.96 69.22 53.26  37.5 77.36
## cvpred               15.5 61.23 32.61 12.8 60.26 69.12 53.33  36.8 77.36
## Clarity.LACE..Score 32.0 67.00 42.00  6.0 65.00 72.00 55.00  18.0 72.00
## CV residual         16.5  5.77  9.39 -6.8  4.74  2.88  1.67 -18.8 -5.36
##                      1439 1477  1486  1495  1502  1552  1569  1605  1644
## Predicted           69.75 56.0 56.21 13.05 81.55 71.91 13.05 58.632 70.95
## cvpred              69.56 55.9 56.18 13.05 81.02 71.82 13.05 58.781 70.21
## Clarity.LACE..Score 72.00 57.0 47.00  6.00 79.00 76.00  6.00 59.000 76.00
## CV residual          2.44  1.1 -9.18 -7.05 -2.02  4.18 -7.05  0.219  5.79
##                      1647  1661  1668 1697 1698  1727  1736  1741
## Predicted           39.67 55.119 77.417 63.3 57.25 72.231 22.75 63.88
## cvpred              39.51 55.392 77.494 63.0 57.14 72.499 23.19 63.59
## Clarity.LACE..Score 45.00 56.000 77.000 75.0 60.00 72.000 25.00 57.00
## CV residual          5.49  0.608 -0.494 12.0  2.86 -0.499  1.81 -6.59
##                       1752 1756  1767 1768  1803  1825  1841  1853  1861
## Predicted           70.159 37.7 35.35 33.2 73.92 32.75  73.6 11.75  69.0
## cvpred              69.703 37.1 34.95 33.7 73.89 33.27  73.5 11.75  69.1
## Clarity.LACE..Score 70.000 51.0 43.00 49.0 72.00 35.00  54.0  5.00  56.0
## CV residual          0.297 13.9  8.05 15.3 -1.89  1.73 -19.5 -6.75 -13.1
##                       1880  1893 1970  2016 2018  2024  2031 2039  2046
## Predicted           15.51 41.23 58.0 69.02 35.5 60.77 52.16 18.8  60.7
## cvpred              15.48 41.16 57.5 69.51 35.8 60.04 52.77 18.7  60.5
## Clarity.LACE..Score  8.00 46.00 77.0 73.00 27.0 70.00 47.00 40.0  45.0
## CV residual         -7.48  4.84 19.5  3.49 -8.8  9.96 -5.77 21.3 -15.5
##                       2047  2065 2070  2073  2098  2120 2122  2162  2203
## Predicted           76.190  68.3 53.1 39.35 42.54 11.69 69.1 48.54 76.46
## cvpred              75.555  68.2 53.3 39.09 42.47 11.66 68.7 48.64 76.98
## Clarity.LACE..Score 75.000  36.0 55.0 45.00 47.00  5.00 73.0 51.00 75.00
## CV residual         -0.555 -32.2  1.7  5.91  4.53 -6.66  4.3  2.36 -1.98
##                       2230  2233 2241  2253  2296  2303  2384  2386  2391
## Predicted           16.60 77.89 11.5 13.55 65.84 72.77 22.75 69.19 44.87
## cvpred              16.61 78.73 11.4 13.41 65.65 72.81 22.91 68.78 44.72
## Clarity.LACE..Score 14.00 75.00  4.0  5.00 72.00 74.00 20.00 73.00 49.00
## CV residual         -2.61 -3.73 -7.4 -8.41  6.35  1.19 -2.91  4.22  4.28
##                       2405  2406  2416 2464   2478  2480  2486  2502 2516
## Predicted            67.2 74.517 37.27   46 12.8018 75.84 60.84 37.56 61.6
## cvpred               67.0 74.476 37.71   46 12.9224 76.09 60.31 37.46 61.0
## Clarity.LACE..Score  54.0 75.000 41.00   33 13.0000 72.00 68.00 46.00 77.0
## CV residual         -13.0  0.524  3.29  -13  0.0776 -4.09  7.69  8.54 16.0
##                       2549  2584  2600  2617  2659  2687 2691  2703  2710
## Predicted           78.46 71.36 54.274  45.9 42.12 52.70 11.5 63.6 11.30
## cvpred              78.55 72.37 53.556  46.4 42.23 52.57 11.4 63.0 11.15
```

```
## Clarity.LACE..Score 76.00 73.00 53.000  36.0 47.00 56.00   4.0 75.0   4.00
## CV residual         -2.55  0.63 -0.556 -10.4  4.77  3.43  -7.4 12.0  -7.15
##                      2712  2722   2725 2778  2812  2824   2835 2844   2847
## Predicted           30.8 49.11 79.079 11.9 30.78 65.71 60.217 76.5   47.7
## cvpred              30.4 49.31 79.219 12.0 31.32 64.62 60.828 76.4   47.9
## Clarity.LACE..Score 46.0 51.00 80.000   5.0 37.00 66.00 60.000 68.0   31.0
## CV residual         15.6  1.69  0.781  -7.0  5.68  1.38 -0.828 -8.4  -16.9
##                      2861  2884   2887  2898  2914   2924  2947 2998   3008
## Predicted           74.87 20.40   7.86  69.6 71.15 30.056 44.72 49.3 50.81
## cvpred              74.97 20.17   7.86  69.5 71.16 30.482 44.33 49.6 50.48
## Clarity.LACE..Score 71.00 13.00   2.00  57.0 70.00 30.000 50.00 64.0 55.00
## CV residual         -3.97 -7.17  -5.86 -12.5 -1.16 -0.482  5.67 14.4  4.52
##                      3011  3012   3027  3047  3059   3069  3093  3096  3120
## Predicted           47.16  65.0 13.82 14.09 10.26 34.24 24.91 49.12 22.06
## cvpred              47.12  64.9 13.67 14.02 10.18 33.66 25.42 48.87 22.47
## Clarity.LACE..Score 50.00  53.0  6.00 10.00  3.00 43.00 29.00 50.00 26.00
## CV residual          2.88 -11.9 -7.67 -4.02 -7.18  9.34  3.58  1.13  3.53
##                      3127  3142  3167   3175  3178 3196  3204   3222  3268
## Predicted           70.08  61.9 53.15 34.989 13.30 48.3 72.39 64.391 47.20
## cvpred              70.05  61.2 53.09 35.354 13.39 48.3 72.16 64.088 46.84
## Clarity.LACE..Score 74.00  49.0 51.00 36.000  6.00 51.0 74.00 65.000 54.00
## CV residual          3.95 -12.2 -2.09  0.646 -7.39  2.7  1.84  0.912  7.16
##                      3274  3276 3277 3286  3336  3347  3350  3354 3365
## Predicted           62.9 70.35 68.4 65.9 41.76 45.82 11.50  69.6 39.3
## cvpred              63.4 70.08 67.6 65.6 42.08 45.87 11.41  69.6 39.7
## Clarity.LACE..Score 74.0 79.00 81.0 76.0 35.00 50.00  5.00  52.0 50.0
## CV residual         10.6  8.92 13.4 10.4 -7.08  4.13 -6.41 -17.6 10.3
##                      3410 3536  3547  3569   3577   3597   3607   3652
## Predicted           18.02 66.9 67.04  48.2 54.125 73.543 16.8881 52.16
## cvpred              18.08 66.7 66.94  48.4 54.266 73.404 17.0911 52.15
## Clarity.LACE..Score 15.00 71.0 68.00  35.0 55.000 73.000 17.0000 62.00
## CV residual         -3.08  4.3  1.06 -13.4  0.734 -0.404 -0.0911  9.85
##                      3661  3684  3686  3689  3700  3720   3738  3751
## Predicted           62.37 45.47 10.33  43.4  76.9 39.52 12.8018 68.85
## cvpred              62.78 45.41 10.28  43.2  77.0 39.43 12.9224 68.83
## Clarity.LACE..Score 58.00 50.00  5.00  25.0  64.0 49.00 13.0000 70.00
## CV residual         -4.78  4.59 -5.28 -18.2 -13.0  9.57  0.0776  1.17
##                      3767  3778  3779   3808  3828 3833   3859  3862
## Predicted           61.16 65.56  50.7 20.8469  66.4 32.8 56.141 17.95
## cvpred              60.91 67.41  50.7 21.0917  66.9 32.7 56.375 18.28
## Clarity.LACE..Score 58.00 62.00  35.0 21.0000  54.0 59.0 57.000 20.00
## CV residual         -2.91 -5.41 -15.7 -0.0917 -12.9 26.3  0.625  1.72
##                      3880 3901 3921  3922  3925  3929   3932  3961  3977
## Predicted           48.1 63.2 70.1 62.72  66.4 64.54 71.399 52.03  30.6
## cvpred              48.2 62.9 69.9 63.06  66.4 64.42 71.103 51.99  32.7
## Clarity.LACE..Score 28.0 74.0 71.0 57.00  45.0 73.00 71.000 50.00  21.0
## CV residual         -20.2 11.1  1.1 -6.06 -21.4  8.58 -0.103 -1.99 -11.7
##                      3980  3999
## Predicted           63.89 58.63
## cvpred              64.19 58.78
```

```
## Clarity.LACE..Score 67.00 65.00
## CV residual           2.81  6.22
##
## Sum of squares = 19085     Mean square = 79.2     n = 241
##
## Overall (Sum over all 241 folds)
##    ms
## 80.2
```

```
attr(cvmodel5,'ms')
```

```
## [1] 80.2
```

```
par(mfrow=c(2,2))
plot(model5)
```