Session 14

Description

Predict the number of comments in a blog using available features

Data

Dataset used here is the BlogFeedback Data Set by Krisztian Buza, it can be found on UC

Irvine Machine Learning Repository. There are 60 test files and one training file in the

dataset.

In total, 281 attributes are available for each observation. Our goal is to predict the

number of comments in the next 24 hours. Certain variables are removed in

prepossessing due to lack of variations.

The models are fitted on the log-transformed responses. Model performances are meas

ured by mean squared error

Problem- prediction of the number of comments in the upcoming 24 hours on

those blogs, The train data was generated from different base times that may

temporally overlap. Therefore, if you simply split the train into disjoint

partitions, the underlying time intervals may overlap. Therefore, the you

should use the provided, temporally disjoint train and test splits to ensure

that the evaluation is fair.

a. Read the dataset and identify the right features

b. Clean dataset, impute missing values and perform exploratory data

analysis.

c. Visualize the dataset and make inferences from that

d. Perform any 3 hypothesis tests using columns of your choice, make

conclusions

e. Create a linear regression model to predict the number of comments

in the next 24 hours (relative to basetime)

f. Fine tune the model and represent important features

g. Interpret the summary of the linear model

h. Report the test accuracy vs. the training accuracy

i. Interpret the final model coefficients

j. Plot the model result and compare it with assumptions of the model

### Data Preprocessing ###

library(data.table)

library(foreach)

library(readr)

# [1] "C:/Users/Downloads/New folder (2)"

setwd("C:/Users/seshan/Desktop/BlogFeedback")

# [1] "C:/Users/seshan/Downloads/New folder (2)"

blogData\_train <- read\_csv("C:/Users/Seshan/Desktop/BlogFeedback/blogData\_tra

in.csv")

## Warning: Duplicated column names deduplicated: '0.0' => '0.0\_1' [8],

## '0.0' => '0.0\_2' [13], '377.0' => '377.0\_1' [14], '0.0' => '0.0\_3' [18],

## '377.0' => '377.0\_2' [24], '0.0' => '0.0\_4' [25], '0.0' => '0.0\_5' [28],

## '0.0' => '0.0\_6' [30], '0.0' => '0.0\_7' [33], '0.0' => '0.0\_8' [35], '0.0'

## => '0.0\_9' [38], '9.0' => '9.0\_1' [39], '0.0' => '0.0\_10' [40], '0.0'

## => '0.0\_11' [43], '0.0' => '0.0\_12' [45], '9.0' => '9.0\_2' [49], '0.0'

## => '0.0\_13' [50], '2.0' => '2.0\_1' [51], '2.0' => '2.0\_2' [52], '0.0'

## => '0.0\_14' [53], '2.0' => '2.0\_3' [54], '2.0' => '2.0\_4' [55], '0.0' =>

## '0.0\_15' [56], '0.0' => '0.0\_16' [57], '0.0' => '0.0\_17' [58], '0.0' =>

## '0.0\_18' [59], '0.0' => '0.0\_19' [60], '10.0' => '10.0\_1' [61], '0.0' =>

## '0.0\_20' [62], '0.0' => '0.0\_21' [63], '0.0' => '0.0\_22' [64], '0.0' =>

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## '0.0\_189' [231], '0.0' => '0.0\_190' [232], '0.0' => '0.0\_191' [233], '0.0'

## => '0.0\_192' [234], '0.0' => '0.0\_193' [235], '0.0' => '0.0\_194' [236],

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## => '0.0\_200' [242], '0.0' => '0.0\_201' [243], '0.0' => '0.0\_202' [244],

## '0.0' => '0.0\_203' [245], '0.0' => '0.0\_204' [246], '0.0' =>

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## => '0.0\_224' [266], '0.0' => '0.0\_225' [268], '0.0' => '0.0\_226' [269],

## '0.0' => '0.0\_227' [270], '0.0' => '0.0\_228' [271], '0.0' =>

## '0.0\_229' [272], '1.0' => '1.0\_1' [273], '0.0' => '0.0\_230' [274], '0.0' =

>

## '0.0\_231' [275], '0.0' => '0.0\_232' [276], '0.0' => '0.0\_233' [277], '0.0'

## => '0.0\_234' [278], '0.0' => '0.0\_235' [279], '0.0' => '0.0\_236' [280],

## '1.0' => '1.0\_2' [281]

## Parsed with column specification:

## cols(

## .default = col\_double()

## )

## See spec(...) for full column specifications.

View(blogData\_train)

# retrieve filenames of test sets

test\_filenames = list.files(pattern = "blogData\_test")

# load and combine dataset

train = fread("blogData\_train.csv")

test = foreach(i = 1:length(test\_filenames), .combine = rbind) %do% {

temp = fread(test\_filenames[i], header = F)

}

# log-transform

train[, V281 := log(1 + V281)]

test[, V281 := log(1 + V281)]

# drop continous variables without variation

drop = c(8, 13, 28, 33, 38, 40, 43, 50, 278)

train[, (drop) := NULL]

test[, (drop) := NULL]

# write to files

write.csv(train, "BlogFeedback-Train.csv", row.names = F)

write.csv(test, "BlogFeedback-Test.csv", row.names = F)

train

## V1 V2 V3 V4 V5 V6 V7 V9 V10 V11

## 1: 40.30467 53.84566 0 401 15 15.52416 32.44188 377 3 14.04423

## 2: 40.30467 53.84566 0 401 15 15.52416 32.44188 377 3 14.04423

## 3: 40.30467 53.84566 0 401 15 15.52416 32.44188 377 3 14.04423

## 4: 40.30467 53.84566 0 401 15 15.52416 32.44188 377 3 14.04423

## 5: 40.30467 53.84566 0 401 15 15.52416 32.44188 377 3 14.04423

## ---

## 52393: 33.00000 0.00000 33 33 33 11.00000 15.55635 33 0 11.00000

## 52394: 33.00000 0.00000 33 33 33 11.00000 15.55635 33 0 11.00000

## 52395: 0.00000 0.00000 0 0 0 0.00000 0.00000 0 0 0.00000

## 52396: 0.00000 0.00000 0 0 0 0.00000 0.00000 0 0 0.00000

## 52397: 0.00000 0.00000 0 0 0 0.00000 0.00000 0 0 0.00000

## V12 V14 V15 V16 V17 V18 V19 V20 V21 V22

## 1: 32.61542 377 2 34.56757 48.47518 0 378 12 1.479934 46.18691

## 2: 32.61542 377 2 34.56757 48.47518 0 378 12 1.479934 46.18691

## 3: 32.61542 377 2 34.56757 48.47518 0 378 12 1.479934 46.18691

## 4: 32.61542 377 2 34.56757 48.47518 0 378 12 1.479934 46.18691

## 5: 32.61542 377 2 34.56757 48.47518 0 378 12 1.479934 46.18691

## ---

## 52393: 15.55635 33 0 33.00000 0.00000 33 33 33 0.000000 26.94439

## 52394: 15.55635 33 0 33.00000 0.00000 33 33 33 0.000000 26.94439

## 52395: 0.00000 0 0 0.00000 0.00000 0 0 0 0.000000 0.00000

## 52396: 0.00000 0 0 0.00000 0.00000 0 0 0 0.000000 0.00000

## 52397: 0.00000 0 0 0.00000 0.00000 0 0 0 0.000000 0.00000

## V23 V24 V25 V26 V27 V29 V30 V31 V32 V34 V35

## 1: -356 377 0 1.076167 1.795416 11 0 0.4004914 1.0780969 9 0

## 2: -356 377 0 1.076167 1.795416 11 0 0.4004914 1.0780969 9 0

## 3: -356 377 0 1.076167 1.795416 11 0 0.4004914 1.0780969 9 0

## 4: -356 377 0 1.076167 1.795416 11 0 0.4004914 1.0780969 9 0

## 5: -356 377 0 1.076167 1.795416 11 0 0.4004914 1.0780969 9 0

## ---

## 52393: -33 33 0 0.000000 0.000000 0 0 0.0000000 0.0000000 0 0

## 52394: -33 33 0 0.000000 0.000000 0 0 0.0000000 0.0000000 0 0

## 52395: 0 0 0 2.000000 0.000000 2 2 0.6666667 0.9428091 2 0

## 52396: 0 0 0 2.000000 0.000000 2 2 0.6666667 0.9428091 2 0

## 52397: 0 0 0 2.000000 0.000000 2 2 0.6666667 0.9428091 2 0

## V36 V37 V39 V41 V42 V44 V45 V46

## 1: 0.3775594 1.0742100 9 0.972973 1.704671 10 0 0.02293202

## 2: 0.3775594 1.0742100 9 0.972973 1.704671 10 0 0.02293202

## 3: 0.3775594 1.0742100 9 0.972973 1.704671 10 0 0.02293202

## 4: 0.3775594 1.0742100 9 0.972973 1.704671 10 0 0.02293202

## 5: 0.3775594 1.0742100 9 0.972973 1.704671 10 0 0.02293202

## ---

## 52393: 0.0000000 0.0000000 0 0.000000 0.000000 0 0 0.00000000

## 52394: 0.0000000 0.0000000 0 0.000000 0.000000 0 0 0.00000000

## 52395: 0.6666667 0.9428091 2 2.000000 0.000000 2 2 0.00000000

## 52396: 0.6666667 0.9428091 2 2.000000 0.000000 2 2 0.00000000

## 52397: 0.6666667 0.9428091 2 2.000000 0.000000 2 2 0.00000000

## V47 V48 V49 V51 V52 V53 V54 V55 V56 V57 V58 V59 V60 V61 V62

## 1: 1.521174 -8 9 2 2 0 2 2 0 0 0 0 0 10 0

## 2: 1.521174 -8 9 6 2 4 5 -2 0 0 0 0 0 35 0

## 3: 1.521174 -8 9 6 2 4 5 -2 0 0 0 0 0 35 0

## 4: 1.521174 -8 9 2 2 0 2 2 0 0 0 0 0 10 0

## 5: 1.521174 -8 9 3 1 2 2 -1 0 0 0 0 0 34 0

## ---

## 52393: 0.000000 0 0 33 0 33 33 -33 0 0 0 0 0 38 3137

## 52394: 0.000000 0 0 33 0 0 33 0 0 0 0 0 0 62 3137

## 52395: 1.632993 -2 2 0 0 0 0 0 2 2 0 2 2 13 0

## 52396: 1.632993 -2 2 0 0 0 0 0 2 0 2 2 -2 37 0

## 52397: 1.632993 -2 2 0 0 0 0 0 2 0 0 2 0 61 0

## V63 V64 V65 V66 V67 V68 V69 V70 V71 V72 V73 V74 V75 V76 V77 V78 V79

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0

## 52394: 0 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## V80 V81 V82 V83 V84 V85 V86 V87 V88 V89 V90 V91 V92 V93 V94 V95 V96

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52394: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## V97 V98 V99 V100 V101 V102 V103 V104 V105 V106 V107 V108 V109 V110

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 1 0 0 0 0 0 0 0 0 0

## 52394: 0 0 0 0 1 0 0 0 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## V111 V112 V113 V114 V115 V116 V117 V118 V119 V120 V121 V122 V123

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 0 0 0 0 0 0 0 1 0

## 52394: 0 0 0 0 0 0 0 0 0 0 0 1 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V124 V125 V126 V127 V128 V129 V130 V131 V132 V133 V134 V135 V136

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52394: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V137 V138 V139 V140 V141 V142 V143 V144 V145 V146 V147 V148 V149

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 1 0 0 0 0 1 0 0 0 0 0 0

## 52394: 0 1 0 0 0 0 1 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V150 V151 V152 V153 V154 V155 V156 V157 V158 V159 V160 V161 V162

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52394: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V163 V164 V165 V166 V167 V168 V169 V170 V171 V172 V173 V174 V175

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52394: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V176 V177 V178 V179 V180 V181 V182 V183 V184 V185 V186 V187 V188

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 0 1 0 0 0 0 0 0 0

## 52394: 0 0 0 0 0 1 0 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V189 V190 V191 V192 V193 V194 V195 V196 V197 V198 V199 V200 V201

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52394: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V202 V203 V204 V205 V206 V207 V208 V209 V210 V211 V212 V213 V214

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 0 0 0 0 0 0 0 1 0

## 52394: 0 0 0 0 0 0 0 0 0 0 0 1 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V215 V216 V217 V218 V219 V220 V221 V222 V223 V224 V225 V226 V227

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52394: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V228 V229 V230 V231 V232 V233 V234 V235 V236 V237 V238 V239 V240

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 1 0 0 0 1 0 0 0 0 0 0 0 0

## 52394: 1 0 0 0 1 0 0 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V241 V242 V243 V244 V245 V246 V247 V248 V249 V250 V251 V252 V253

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 0 1 0 0 0 0 0 0 0

## 52394: 0 0 0 0 0 1 0 0 0 0 0 0 0

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V254 V255 V256 V257 V258 V259 V260 V261 V262 V263 V264 V265 V266

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 52393: 0 0 0 0 0 0 0 0 0 0 0 1 0

## 52394: 0 0 0 0 0 0 0 0 0 0 0 0 1

## 52395: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52396: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 52397: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V267 V268 V269 V270 V271 V272 V273 V274 V275 V276 V277 V279 V280

## 1: 1 0 0 0 0 0 1 0 0 0 0 0 0

## 2: 1 0 0 0 0 1 0 0 0 0 0 0 0

## 3: 1 0 0 0 0 1 0 0 0 0 0 0 0

## 4: 1 0 0 0 0 0 1 0 0 0 0 0 0

## 5: 0 1 0 0 0 0 1 0 0 0 0 0 0

## ---

## 52393: 0 0 0 1 0 0 0 0 0 0 0 0 0

## 52394: 0 0 0 1 0 0 0 0 0 0 0 0 0

## 52395: 1 0 0 0 0 0 1 0 0 0 0 0 0

## 52396: 0 1 0 0 0 0 1 0 0 0 0 0 0

## 52397: 0 0 1 0 0 0 1 0 0 0 0 0 0

## V281

## 1: 0.6931472

## 2: 0.0000000

## 3: 0.0000000

## 4: 0.6931472

## 5: 3.3322045

## ---

## 52393: 0.0000000

## 52394: 0.0000000

## 52395: 0.0000000

## 52396: 0.0000000

## 52397: 0.0000000

test

## V1 V2 V3 V4 V5 V6 V7 V9 V10

## 1: 10.630660 17.882992 1 259 5.0 4.0182760 10.39679 235 1.0

## 2: 43.435825 75.590485 0 634 20.0 15.9985895 44.56087 473 2.0

## 3: 1.733333 3.043390 0 9 0.0 0.7333333 1.52607 5 0.0

## 4: 27.230215 45.970950 0 371 14.0 10.7841730 24.20994 228 4.0

## 5: 4.500000 6.677075 0 18 0.5 3.0000000 4.00000 10 0.5

## ---

## 7620: 0.000000 0.000000 0 0 0.0 0.0000000 0.00000 0 0.0

## 7621: 56.512093 77.442830 0 438 32.0 19.2965300 49.22134 432 0.0

## 7622: 49.442368 112.620125 1 849 9.0 20.4454820 62.61939 506 2.0

## 7623: 16.593575 19.671364 1 144 10.0 6.5124497 11.05121 111 2.0

## 7624: 0.000000 0.000000 0 0 0.0 0.0000000 0.00000 0 0.0

## V11 V12 V14 V15 V16 V17 V18 V19 V20

## 1: 3.8172395 10.297346 235 1 9.776869 16.073494 1 192 5.0

## 2: 15.4696760 44.685085 473 1 40.971790 70.307840 0 479 18.0

## 3: 0.6666667 1.534782 5 0 1.133333 1.820867 0 5 0.0

## 4: 9.9976015 24.400290 228 2 22.563549 39.761290 0 337 10.0

## 5: 1.3333334 2.560382 7 0 2.833333 3.670453 0 8 0.5

## ---

## 7620: 0.0000000 0.000000 0 0 0.000000 0.000000 0 0 0.0

## 7621: 18.9663500 49.304424 432 0 55.904312 76.864080 0 438 31.0

## 7622: 19.2211840 62.536453 506 1 38.274143 85.508520 1 574 7.0

## 7623: 5.8257027 11.001102 111 1 13.765462 15.641400 1 112 9.0

## 7624: 0.0000000 0.000000 0 0 0.000000 0.000000 0 0 0.0

## V21 V22 V23 V24 V25 V26 V27 V29 V30

## 1: 0.20103656 13.948867 -229 217 0.0 0.25177306 0.9038038 14 0

## 2: 0.52891400 62.134968 -461 473 0.0 0.19322990 0.4576994 2 0

## 3: 0.06666667 1.730767 -5 4 0.0 0.33333334 0.6992059 2 0

## 4: 0.78657070 30.358133 -156 228 0.0 0.11031175 0.3562584 2 0

## 5: 1.66666660 2.211083 0 6 0.5 0.00000000 0.0000000 0 0

## ---

## 7620: 0.00000000 0.000000 0 0 0.0 0.00000000 0.0000000 0 0

## 7621: 0.33017877 72.227750 -426 432 0.0 0.00000000 0.0000000 0 0

## 7622: 1.22429910 78.975365 -474 506 0.0 1.07476640 2.2341206 16 0

## 7623: 0.68674700 14.777326 -104 111 0.0 0.01526104 0.1350592 2 0

## 7624: 0.00000000 0.000000 0 0 0.0 0.00000000 0.0000000 0 0

## V31 V32 V34 V35 V36 V37 V39 V41

## 1: 0.09438080 0.50673160 12 0 0.09192581 0.50421600 12 0.23349700

## 2: 0.07334273 0.28647503 2 0 0.06770099 0.27788836 2 0.17630465

## 3: 0.13333334 0.33993465 1 0 0.13333334 0.33993465 1 0.20000000

## 4: 0.04316547 0.21470532 2 0 0.04076739 0.20952702 2 0.09832134

## 5: 0.00000000 0.00000000 0 0 0.00000000 0.00000000 0 0.00000000

## ---

## 7620: 0.00000000 0.00000000 0 0 0.00000000 0.00000000 0 0.00000000

## 7621: 0.00000000 0.00000000 0 0 0.00000000 0.00000000 0 0.00000000

## 7622: 0.42679128 1.34016500 13 0 0.40809968 1.33201530 13 0.95015574

## 7623: 0.00562249 0.08483692 2 0 0.00562249 0.08483692 2 0.01526104

## 7624: 0.00000000 0.00000000 0 0 0.00000000 0.00000000 0 0.00000000

## V42 V44 V45 V46 V47 V48 V49 V51 V52 V53 V54 V55

## 1: 0.8547111 13 0 0.002454992 0.6747285 -10 12 35 35 0 35 35

## 2: 0.4297832 2 0 0.005641749 0.4044489 -2 2 21 0 2 21 -2

## 3: 0.4000000 1 0 0.000000000 0.3651484 -1 1 2 2 0 2 2

## 4: 0.3210027 2 0 0.002398082 0.2897018 -2 2 3 3 0 3 3

## 5: 0.0000000 0 0 0.000000000 0.0000000 0 0 0 0 0 0 0

## ---

## 7620: 0.0000000 0 0 0.000000000 0.0000000 0 0 1 1 0 0 1

## 7621: 0.0000000 0 0 0.000000000 0.0000000 0 0 2 1 1 1 0

## 7622: 1.9263725 14 0 0.018691588 1.7894533 -11 13 3 1 0 2 1

## 7623: 0.1350592 2 0 0.000000000 0.1202407 -2 2 8 8 0 8 8

## 7624: 0.0000000 0 0 0.000000000 0.0000000 0 0 1 1 0 1 1

## V56 V57 V58 V59 V60 V61 V62 V63 V64 V65 V66 V67 V68 V69 V70 V71 V72

## 1: 0 0 0 0 0 9 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 62 696 0 0 0 0 0 1 0 0 0 0

## 3: 2 2 0 2 2 13 8361 0 1 0 0 1 1 1 0 0 0

## 4: 0 0 0 0 0 9 2751 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 5 187 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 64 1478 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 0 47 4196 0 0 0 0 0 0 0 0 0 0

## 7622: 0 0 0 0 0 63 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 14 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 9 0 0 0 0 0 0 0 0 0 0 0

## V73 V74 V75 V76 V77 V78 V79 V80 V81 V82 V83 V84 V85 V86 V87 V88 V89

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## V90 V91 V92 V93 V94 V95 V96 V97 V98 V99 V100 V101 V102 V103 V104

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0

## 3: 0 0 0 0 0 0 1 0 0 0 0 1 1 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 0 0 0 0 0 0 0 0 0 1 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0

## V105 V106 V107 V108 V109 V110 V111 V112 V113 V114 V115 V116 V117

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V118 V119 V120 V121 V122 V123 V124 V125 V126 V127 V128 V129 V130

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 1 0 1 0 0 0 0 0 0 0 0

## 4: 0 1 0 0 1 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 1 0 0 0 0 0 0 0 0 0 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V131 V132 V133 V134 V135 V136 V137 V138 V139 V140 V141 V142 V143

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 1 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 0 1

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 1

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 1

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 0 0 0 0 1 0 0 0 1

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V144 V145 V146 V147 V148 V149 V150 V151 V152 V153 V154 V155 V156

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 1 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 1 0 1 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V157 V158 V159 V160 V161 V162 V163 V164 V165 V166 V167 V168 V169

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 1 1 0 0 0 0 0 0 0 0 0 0

## 4: 0 1 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 1 0 0 0 0 0 0 0 0 0 0 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V170 V171 V172 V173 V174 V175 V176 V177 V178 V179 V180 V181 V182

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 1 0 0 0 0 0 0 0 0 0 1 1 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V183 V184 V185 V186 V187 V188 V189 V190 V191 V192 V193 V194 V195

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 0 0 1 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 0 0 0 0 0 0 1 1 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V196 V197 V198 V199 V200 V201 V202 V203 V204 V205 V206 V207 V208

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 0 0 1 0 0 0 0 1 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 1 0 0 0 0 1 0 0 0 0 0 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V209 V210 V211 V212 V213 V214 V215 V216 V217 V218 V219 V220 V221

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 0 1 0 0 1 0 0 0 0 0 0 0 0

## 4: 0 0 0 0 1 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 1 0 0 0 0 0 0 0 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V222 V223 V224 V225 V226 V227 V228 V229 V230 V231 V232 V233 V234

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 1 0 0 0 0 0 1 0 0

## 3: 0 0 0 0 1 0 1 0 0 0 1 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 0 0 0 0 1 0 1 0 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V235 V236 V237 V238 V239 V240 V241 V242 V243 V244 V245 V246 V247

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 1 0

## 3: 0 0 0 0 0 0 0 0 0 0 0 1 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 1 1

## 5: 0 0 0 0 0 0 0 0 0 0 0 1 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 0 0 0 0 0 0 0 1 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V248 V249 V250 V251 V252 V253 V254 V255 V256 V257 V258 V259 V260

## 1: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 2: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 3: 1 0 0 0 0 0 1 0 0 0 0 0 0

## 4: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 5: 0 0 0 0 0 0 0 0 0 0 0 0 0

## ---

## 7620: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7621: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7622: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7623: 0 0 0 0 0 0 0 0 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 0 0 0 0 0 0

## V261 V262 V263 V264 V265 V266 V267 V268 V269 V270 V271 V272 V273

## 1: 0 0 0 0 1 0 0 0 0 0 1 0 0

## 2: 0 0 0 0 1 0 0 0 0 0 0 0 0

## 3: 0 0 0 0 1 0 0 0 0 0 1 0 0

## 4: 0 0 0 0 1 0 0 0 0 0 1 0 0

## 5: 0 0 0 0 1 0 0 0 0 0 1 0 0

## ---

## 7620: 0 0 0 0 0 0 0 1 0 0 0 1 0

## 7621: 0 0 0 0 0 0 0 1 0 0 0 0 1

## 7622: 0 0 0 0 0 0 0 1 0 0 0 1 0

## 7623: 0 0 0 0 0 0 0 1 0 0 0 0 0

## 7624: 0 0 0 0 0 0 0 1 0 0 0 0 0

## V274 V275 V276 V277 V279 V280 V281

## 1: 0 0 0 0 0 0 1.6094379

## 2: 0 0 1 0 0 0 0.0000000

## 3: 0 0 0 0 0 0 0.6931472

## 4: 0 0 0 0 0 0 1.7917595

## 5: 0 0 0 0 0 0 0.0000000

## ---

## 7620: 0 0 0 0 0 0 0.0000000

## 7621: 0 0 0 0 0 0 0.0000000

## 7622: 0 0 0 0 0 0 0.0000000

## 7623: 1 0 0 0 0 0 1.3862944

## 7624: 1 0 0 0 0 0 0.0000000

### Basic Models ###

library(data.table)

library(MatrixModels)

library(e1071)

library(FNN)

library(glmnet)

## Loading required package: Matrix

## Loaded glmnet 2.0-16

library(ranger)

library(xgboost)

# load and combine dataset

train = fread("BlogFeedback-Train.csv")

test = fread("BlogFeedback-Test.csv")

# error measure

mse = function(y\_hat, y) {

mse = mean((y - y\_hat)^2)

return(mse)

}

# create design matrices

train\_x = model.Matrix(V281 ~ . - 1, data = train, sparse = F)

train\_x\_sparse = model.Matrix(V281 ~ . - 1, data = train, sparse = T)

train\_y = train$V281

test\_x = model.Matrix(V281 ~ . - 1, data = test, sparse = F)

test\_y = test$V281

train\_xgb = xgb.DMatrix(data = as.matrix(train\_x), label = train\_y)

test\_xgb = xgb.DMatrix(data = as.matrix(test\_x), label = test\_y)

# try kNN

pred\_knn = knn.reg(train\_x, test\_x, train\_y, k = 19)$pred

mse(pred\_knn, test\_y)

## [1] 0.6383154

# try LASSO

mdl\_lasso = cv.glmnet(train\_x\_sparse, train\_y, family = "gaussian", alpha = 1

)

pred\_lasso = predict(mdl\_lasso, newx = test\_x)

mse(pred\_lasso, test\_y)

## [1] 0.6365795

# try random forest

mdl\_rf = ranger(V281 ~ ., data = train, num.trees = 1000, mtry = 120, write.f

orest = T)

## Growing trees.. Progress: 3%. Estimated remaining time: 21 minutes, 27 sec

onds.

## Growing trees.. Progress: 5%. Estimated remaining time: 19 minutes, 39 sec

onds.

## Growing trees.. Progress: 8%. Estimated remaining time: 18 minutes, 54 sec

onds.

## Growing trees.. Progress: 11%. Estimated remaining time: 18 minutes, 7 sec

onds.

## Growing trees.. Progress: 14%. Estimated remaining time: 17 minutes, 19 se

conds.

## Growing trees.. Progress: 17%. Estimated remaining time: 16 minutes, 36 se

conds.

## Growing trees.. Progress: 19%. Estimated remaining time: 16 minutes, 1 sec

onds.

## Growing trees.. Progress: 22%. Estimated remaining time: 15 minutes, 27 se

conds.

## Growing trees.. Progress: 25%. Estimated remaining time: 14 minutes, 51 se

conds.

## Growing trees.. Progress: 28%. Estimated remaining time: 14 minutes, 17 se

conds.

## Growing trees.. Progress: 30%. Estimated remaining time: 13 minutes, 41 se

conds.

## Growing trees.. Progress: 33%. Estimated remaining time: 13 minutes, 8 sec

onds.

## Growing trees.. Progress: 36%. Estimated remaining time: 12 minutes, 35 se

conds.

## Growing trees.. Progress: 39%. Estimated remaining time: 12 minutes, 2 sec

onds.

## Growing trees.. Progress: 42%. Estimated remaining time: 11 minutes, 29 se

conds.

## Growing trees.. Progress: 44%. Estimated remaining time: 10 minutes, 57 se

conds.

## Growing trees.. Progress: 47%. Estimated remaining time: 10 minutes, 25 se

conds.

## Growing trees.. Progress: 49%. Estimated remaining time: 10 minutes, 4 sec

onds.

## Growing trees.. Progress: 52%. Estimated remaining time: 9 minutes, 45 sec

onds.

## Growing trees.. Progress: 54%. Estimated remaining time: 9 minutes, 19 sec

onds.

## Growing trees.. Progress: 57%. Estimated remaining time: 8 minutes, 44 sec

onds.

## Growing trees.. Progress: 59%. Estimated remaining time: 8 minutes, 11 sec

onds.

## Growing trees.. Progress: 62%. Estimated remaining time: 7 minutes, 41 sec

onds.

## Growing trees.. Progress: 65%. Estimated remaining time: 7 minutes, 7 seco

nds.

## Growing trees.. Progress: 67%. Estimated remaining time: 6 minutes, 39 sec

onds.

## Growing trees.. Progress: 70%. Estimated remaining time: 6 minutes, 11 sec

onds.

## Growing trees.. Progress: 72%. Estimated remaining time: 5 minutes, 38 sec

onds.

## Growing trees.. Progress: 75%. Estimated remaining time: 5 minutes, 3 seco

nds.

## Growing trees.. Progress: 78%. Estimated remaining time: 4 minutes, 29 sec

onds.

## Growing trees.. Progress: 80%. Estimated remaining time: 3 minutes, 59 sec

onds.

## Growing trees.. Progress: 83%. Estimated remaining time: 3 minutes, 26 sec

onds.

## Growing trees.. Progress: 86%. Estimated remaining time: 2 minutes, 52 sec

onds.

## Growing trees.. Progress: 89%. Estimated remaining time: 2 minutes, 18 sec

onds.

## Growing trees.. Progress: 91%. Estimated remaining time: 1 minute, 44 seco

nds.

## Growing trees.. Progress: 94%. Estimated remaining time: 1 minute, 10 seco

nds.

## Growing trees.. Progress: 97%. Estimated remaining time: 36 seconds.

## Growing trees.. Progress: 100%. Estimated remaining time: 2 seconds.

pred\_rf = predict(mdl\_rf, test)

mse(pred\_rf$predictions, test\_y)

## [1] 0.397223

# try SVM

mdl\_svm = svm(V281 ~ V52 + V55 + V61 + V51 + V54 + V21 + V6 + V10, data = tra

in, kernel = "radial", cost = 2, gamma = 0.25)

pred\_svm = predict(mdl\_svm, test)

mse(pred\_svm, test\_y)

## [1] 0.4454636

# try XGboost

mdl\_xgb = xgboost(data = train\_xgb, nround = 750, nthread = 4, max\_depth = 6,

eta = 0.025, subsample = 0.7, gamma = 3)

## [1] train-rmse:1.123211

## [2] train-rmse:1.105587

## [3] train-rmse:1.088751

## [4] train-rmse:1.072364

## [5] train-rmse:1.056541

## [6] train-rmse:1.041299

## [7] train-rmse:1.026474

## [8] train-rmse:1.012151

## [9] train-rmse:0.998236

## [10] train-rmse:0.984944

## [11] train-rmse:0.972046

## [12] train-rmse:0.959660

## [13] train-rmse:0.947695

## [14] train-rmse:0.936049

## [15] train-rmse:0.924799

## [16] train-rmse:0.913825

## [17] train-rmse:0.903303

## [18] train-rmse:0.893156

## [19] train-rmse:0.883414

## [20] train-rmse:0.874059

## [21] train-rmse:0.865047

## [22] train-rmse:0.856306

## [23] train-rmse:0.848055

## [24] train-rmse:0.840064

## [25] train-rmse:0.832164

## [26] train-rmse:0.824686

## [27] train-rmse:0.817432

## [28] train-rmse:0.810481

## [29] train-rmse:0.803617

## [30] train-rmse:0.797115

## [31] train-rmse:0.790814

## [32] train-rmse:0.784595

## [33] train-rmse:0.778755

## [34] train-rmse:0.773094

## [35] train-rmse:0.767748

## [36] train-rmse:0.762395

## [37] train-rmse:0.757345

## [38] train-rmse:0.752488

## [39] train-rmse:0.747817

## [40] train-rmse:0.743399

## [41] train-rmse:0.739041

## [42] train-rmse:0.734814

## [43] train-rmse:0.730827

## [44] train-rmse:0.726892

## [45] train-rmse:0.723121

## [46] train-rmse:0.719583

## [47] train-rmse:0.716088

## [48] train-rmse:0.712764

## [49] train-rmse:0.709580

## [50] train-rmse:0.706472

## [51] train-rmse:0.703511

## [52] train-rmse:0.700691

## [53] train-rmse:0.697894

## [54] train-rmse:0.695273

## [55] train-rmse:0.692620

## [56] train-rmse:0.690116

## [57] train-rmse:0.687650

## [58] train-rmse:0.685264

## [59] train-rmse:0.683066

## [60] train-rmse:0.680842

## [61] train-rmse:0.678713

## [62] train-rmse:0.676759

## [63] train-rmse:0.674839

## [64] train-rmse:0.672873

## [65] train-rmse:0.671013

## [66] train-rmse:0.669334

## [67] train-rmse:0.667636

## [68] train-rmse:0.665990

## [69] train-rmse:0.664497

## [70] train-rmse:0.662978

## [71] train-rmse:0.661438

## [72] train-rmse:0.659984

## [73] train-rmse:0.658645

## [74] train-rmse:0.657361

## [75] train-rmse:0.656081

## [76] train-rmse:0.654839

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## [82] train-rmse:0.647973

## [83] train-rmse:0.646989

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## [85] train-rmse:0.644910

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## [87] train-rmse:0.642963

## [88] train-rmse:0.642045

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## [103] train-rmse:0.630874

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## [120] train-rmse:0.621988

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## [453] train-rmse:0.572868

## [454] train-rmse:0.572804

## [455] train-rmse:0.572663

## [456] train-rmse:0.572548

## [457] train-rmse:0.572497

## [458] train-rmse:0.572488

## [459] train-rmse:0.572454

## [460] train-rmse:0.572387

## [461] train-rmse:0.572279

## [462] train-rmse:0.572225

## [463] train-rmse:0.572164

## [464] train-rmse:0.572049

## [465] train-rmse:0.571998

## [466] train-rmse:0.571910

## [467] train-rmse:0.571850

## [468] train-rmse:0.571795

## [469] train-rmse:0.571724

## [470] train-rmse:0.571706

## [471] train-rmse:0.571653

## [472] train-rmse:0.571525

## [473] train-rmse:0.571452

## [474] train-rmse:0.571361

## [475] train-rmse:0.571296

## [476] train-rmse:0.571231

## [477] train-rmse:0.571131

## [478] train-rmse:0.571033

## [479] train-rmse:0.570871

## [480] train-rmse:0.570778

## [481] train-rmse:0.570702

## [482] train-rmse:0.570683

## [483] train-rmse:0.570646

## [484] train-rmse:0.570574

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## [486] train-rmse:0.570464

## [487] train-rmse:0.570412

## [488] train-rmse:0.570293

## [489] train-rmse:0.570253

## [490] train-rmse:0.570198

## [491] train-rmse:0.570159

## [492] train-rmse:0.569999

## [493] train-rmse:0.569918

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## [495] train-rmse:0.569785

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## [745] train-rmse:0.553554

## [746] train-rmse:0.553521

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## [748] train-rmse:0.553420

## [749] train-rmse:0.553361

## [750] train-rmse:0.553349

pred\_xgb = predict(mdl\_xgb, test\_xgb)

mse(pred\_xgb, test\_y)

## [1] 0.3820247

### Stacked Generalization ###

library(data.table)

library(foreach)

library(MatrixModels)

library(e1071)

library(FNN)

library(glmnet)

library(ranger)

library(xgboost)

# load and combine dataset

train = fread("BlogFeedback-Train.csv")

test = fread("BlogFeedback-Test.csv")

# error measure

mse = function(y\_hat, y) {

mse = mean((y - y\_hat)^2)

return(mse)

}

# create design matrices

test\_x = model.Matrix(V281 ~ . - 1, data = test, sparse = F)

test\_x\_sparse = model.Matrix(V281 ~ . - 1, data = test, sparse = T)

#test\_xgb = xgb.DMatrix(data = as.matrix(test\_x), label = test\_y)

train\_y = train$V281

test\_y = test$V281

# divide training set into k folds

k = 5

cv\_index = 1:nrow(train)

cv\_index\_split = split(cv\_index, cut(seq\_along(cv\_index), k, labels = FALSE))

# meta features from kNN

meta\_knn\_test = rep(0, nrow(test))

meta\_knn\_train = foreach(i = 1:k, .combine = c) %do% {

# split the raining set into two disjoint sets

train\_index = setdiff(1:nrow(train), cv\_index\_split[[i]])

train\_set1 = model.Matrix(V281 ~ . - 1, data = train[train\_index], sparse =

T)

train\_set2 = model.Matrix(V281 ~ . - 1, data = train[cv\_index\_split[[i]]],

sparse = T)

# level 0 prediction

meta\_pred = knn.reg(train\_set1, train\_set2, train[train\_index]$V281, k = 19

)$pred

meta\_knn\_test = meta\_knn\_test + knn.reg(train\_set1, test\_x\_sparse, train[tr

ain\_index]$V281, k = 19)$pred / k

return(meta\_pred)

}

# meta features from LASSO

meta\_glm\_test = rep(0, nrow(test))

meta\_glm\_train = foreach(i = 1:k, .combine = c) %do% {

# split the raining set into two disjoint sets

train\_index = setdiff(1:nrow(train), cv\_index\_split[[i]])

train\_set1 = model.Matrix(V281 ~ . - 1, data = train[train\_index], sparse =

T)

train\_set2 = model.Matrix(V281 ~ . - 1, data = train[cv\_index\_split[[i]]],

sparse = T)

# level 0 prediction

temp\_glm = cv.glmnet(train\_set1, train[train\_index]$V281, family = "gaussia

n", alpha = 1)

meta\_pred = predict(temp\_glm, newx = train\_set2)

meta\_glm\_test = meta\_glm\_test + predict(temp\_glm, newx = test\_x\_sparse) / k

return(meta\_pred)

}

# meta features from SVM

meta\_svm\_test = rep(0, nrow(test))

meta\_svm\_train = foreach(i = 1:k, .combine = c) %do% {

# split the raining set into two disjoint sets

train\_index = setdiff(1:nrow(train), cv\_index\_split[[i]])

train\_set1 = train[train\_index]

train\_set2 = train[cv\_index\_split[[i]]]

# level 0 prediction

temp\_svm = svm(V281 ~ V52 + V55 + V61 + V51 + V54 + V21 + V6 + V10, data =

train\_set1,

kernel = "radial", cost = 2, gamma = 0.25)

meta\_pred = predict(temp\_svm, train\_set2)

meta\_svm\_test = meta\_svm\_test + predict(temp\_svm, test) / k

return(meta\_pred)

}

# meta features from random forest

meta\_rf\_test = rep(0, nrow(test))

meta\_rf\_train = foreach(i = 1:k, .combine = c) %do% {

# split the raining set into two disjoint sets

train\_index = setdiff(1:nrow(train), cv\_index\_split[[i]])

train\_set1 = train[train\_index]

train\_set2 = train[cv\_index\_split[[i]]]

# level 0 prediction

temp\_rf = ranger(V281 ~ ., data = train\_set1, num.trees = 500, mtry = 120,

write.forest = T)

meta\_pred = predict(temp\_rf, train\_set2)$predictions

meta\_rf\_test = meta\_rf\_test + predict(temp\_rf, test)$predictions / k

return(meta\_pred)

}

## Growing trees.. Progress: 7%. Estimated remaining time: 7 minutes, 18 seco

nds.

## Growing trees.. Progress: 14%. Estimated remaining time: 6 minutes, 33 sec

onds.

## Growing trees.. Progress: 21%. Estimated remaining time: 5 minutes, 57 sec

onds.

## Growing trees.. Progress: 28%. Estimated remaining time: 5 minutes, 25 sec

onds.

## Growing trees.. Progress: 35%. Estimated remaining time: 4 minutes, 51 sec

onds.

## Growing trees.. Progress: 43%. Estimated remaining time: 4 minutes, 18 sec

onds.

## Growing trees.. Progress: 50%. Estimated remaining time: 3 minutes, 45 sec

onds.

## Growing trees.. Progress: 57%. Estimated remaining time: 3 minutes, 13 sec

onds.

## Growing trees.. Progress: 64%. Estimated remaining time: 2 minutes, 40 sec

onds.

## Growing trees.. Progress: 71%. Estimated remaining time: 2 minutes, 8 seco

nds.

## Growing trees.. Progress: 79%. Estimated remaining time: 1 minute, 36 seco

nds.

## Growing trees.. Progress: 86%. Estimated remaining time: 1 minute, 3 secon

ds.

## Growing trees.. Progress: 93%. Estimated remaining time: 31 seconds.

## Growing trees.. Progress: 7%. Estimated remaining time: 7 minutes, 18 seco

nds.

## Growing trees.. Progress: 14%. Estimated remaining time: 6 minutes, 33 sec

onds.

## Growing trees.. Progress: 21%. Estimated remaining time: 5 minutes, 57 sec

onds.

## Growing trees.. Progress: 28%. Estimated remaining time: 5 minutes, 26 sec

onds.

## Growing trees.. Progress: 35%. Estimated remaining time: 4 minutes, 56 sec

onds.

## Growing trees.. Progress: 41%. Estimated remaining time: 4 minutes, 31 sec

onds.

## Growing trees.. Progress: 48%. Estimated remaining time: 3 minutes, 58 sec

onds.

## Growing trees.. Progress: 55%. Estimated remaining time: 3 minutes, 24 sec

onds.

## Growing trees.. Progress: 62%. Estimated remaining time: 2 minutes, 51 sec

onds.

## Growing trees.. Progress: 70%. Estimated remaining time: 2 minutes, 18 sec

onds.

## Growing trees.. Progress: 77%. Estimated remaining time: 1 minute, 46 seco

nds.

## Growing trees.. Progress: 84%. Estimated remaining time: 1 minute, 13 seco

nds.

## Growing trees.. Progress: 91%. Estimated remaining time: 40 seconds.

## Growing trees.. Progress: 98%. Estimated remaining time: 8 seconds.

## Growing trees.. Progress: 7%. Estimated remaining time: 6 minutes, 51 seco

nds.

## Growing trees.. Progress: 14%. Estimated remaining time: 6 minutes, 20 sec

onds.

## Growing trees.. Progress: 21%. Estimated remaining time: 5 minutes, 45 sec

onds.

## Growing trees.. Progress: 29%. Estimated remaining time: 5 minutes, 9 seco

nds.

## Growing trees.. Progress: 36%. Estimated remaining time: 4 minutes, 39 sec

onds.

## Growing trees.. Progress: 43%. Estimated remaining time: 4 minutes, 8 seco

nds.

## Growing trees.. Progress: 51%. Estimated remaining time: 3 minutes, 34 sec

onds.

## Growing trees.. Progress: 58%. Estimated remaining time: 3 minutes, 3 seco

nds.

## Growing trees.. Progress: 65%. Estimated remaining time: 2 minutes, 33 sec

onds.

## Growing trees.. Progress: 71%. Estimated remaining time: 2 minutes, 5 seco

nds.

## Growing trees.. Progress: 78%. Estimated remaining time: 1 minute, 35 seco

nds.

## Growing trees.. Progress: 86%. Estimated remaining time: 1 minute, 2 secon

ds.

## Growing trees.. Progress: 93%. Estimated remaining time: 31 seconds.

## Growing trees.. Progress: 100%. Estimated remaining time: 0 seconds.

## Growing trees.. Progress: 7%. Estimated remaining time: 7 minutes, 32 seco

nds.

## Growing trees.. Progress: 14%. Estimated remaining time: 6 minutes, 46 sec

onds.

## Growing trees.. Progress: 21%. Estimated remaining time: 6 minutes, 4 seco

nds.

## Growing trees.. Progress: 28%. Estimated remaining time: 5 minutes, 33 sec

onds.

## Growing trees.. Progress: 35%. Estimated remaining time: 4 minutes, 57 sec

onds.

## Growing trees.. Progress: 43%. Estimated remaining time: 4 minutes, 22 sec

onds.

## Growing trees.. Progress: 50%. Estimated remaining time: 3 minutes, 51 sec

onds.

## Growing trees.. Progress: 57%. Estimated remaining time: 3 minutes, 18 sec

onds.

## Growing trees.. Progress: 63%. Estimated remaining time: 2 minutes, 47 sec

onds.

## Growing trees.. Progress: 70%. Estimated remaining time: 2 minutes, 15 sec

onds.

## Growing trees.. Progress: 77%. Estimated remaining time: 1 minute, 44 seco

nds.

## Growing trees.. Progress: 84%. Estimated remaining time: 1 minute, 14 seco

nds.

## Growing trees.. Progress: 91%. Estimated remaining time: 43 seconds.

## Growing trees.. Progress: 98%. Estimated remaining time: 11 seconds.

## Growing trees.. Progress: 7%. Estimated remaining time: 7 minutes, 32 seco

nds.

## Growing trees.. Progress: 14%. Estimated remaining time: 6 minutes, 46 sec

onds.

## Growing trees.. Progress: 20%. Estimated remaining time: 6 minutes, 19 sec

onds.

## Growing trees.. Progress: 27%. Estimated remaining time: 5 minutes, 39 sec

onds.

## Growing trees.. Progress: 34%. Estimated remaining time: 5 minutes, 7 seco

nds.

## Growing trees.. Progress: 41%. Estimated remaining time: 4 minutes, 36 sec

onds.

## Growing trees.. Progress: 48%. Estimated remaining time: 4 minutes, 1 seco

nds.

## Growing trees.. Progress: 55%. Estimated remaining time: 3 minutes, 28 sec

onds.

## Growing trees.. Progress: 62%. Estimated remaining time: 2 minutes, 54 sec

onds.

## Growing trees.. Progress: 69%. Estimated remaining time: 2 minutes, 23 sec

onds.

## Growing trees.. Progress: 76%. Estimated remaining time: 1 minute, 52 seco

nds.

## Growing trees.. Progress: 83%. Estimated remaining time: 1 minute, 18 seco

nds.

## Growing trees.. Progress: 90%. Estimated remaining time: 46 seconds.

## Growing trees.. Progress: 97%. Estimated remaining time: 14 seconds.

# meta features from XGBoost

meta\_xgb\_test = rep(0, nrow(test))

meta\_xgb\_train = foreach(i = 1:k, .combine = c) %do% {

# split the raining set into two disjoint sets

train\_index = setdiff(1:nrow(train), cv\_index\_split[[i]])

train\_set1 = model.Matrix(V281 ~ . - 1, data = train[train\_index], sparse =

F)

train\_set2 = model.Matrix(V281 ~ . - 1, data = train[cv\_index\_split[[i]]],

sparse = F)

# xgb data

train\_set1\_xgb = xgb.DMatrix(data = as.matrix(train\_set1), label = train[tr

ain\_index]$V281)

train\_set2\_xgb = xgb.DMatrix(data = as.matrix(train\_set2), label = train[cv

\_index\_split[[i]]]$V281)

# level 0 prediction

temp\_xgb = xgboost(data = train\_set1\_xgb, nround = 750, nthread = 4, max\_de

pth = 6, eta = 0.025, subsample = 0.7, gamma = 3)

meta\_pred = predict(temp\_xgb, train\_set2\_xgb)

meta\_xgb\_test = meta\_xgb\_test + predict(temp\_xgb, test\_xgb) / k

return(meta\_pred)

}

## [1] train-rmse:1.041304

## [2] train-rmse:1.025138

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# combine meta features

sg\_col = c("meta\_knn", "meta\_glm", "meta\_svm", "meta\_rf", "meta\_xgb", "y")

train\_sg = data.frame(meta\_knn\_train, meta\_glm\_train, meta\_svm\_train, meta\_rf

\_train, meta\_xgb\_train, train\_y)

test\_sg = data.frame(meta\_knn\_test, meta\_glm\_test, meta\_svm\_test, meta\_rf\_tes

t, meta\_xgb\_test, test\_y)

colnames(train\_sg) = sg\_col

colnames(test\_sg) = sg\_col

# ensemble with elastic-net regression

train\_sg\_sparse = model.Matrix(y ~ . - 1, data = train\_sg, sparse = T)

test\_sg\_sparse = model.Matrix(y ~ . - 1, data = test\_sg, sparse = T)

mdl\_glm = cv.glmnet(train\_sg\_sparse, train\_y, family = "gaussian", alpha = 0.

2)

pred\_glm = predict(mdl\_glm, newx = test\_sg\_sparse, s = "lambda.min")

mse(pred\_glm, test\_y)

## [1] 0.3840147

library(data.table)

library(foreach)

library(MatrixModels)

library(xgboost)

library(ranger)

# load and combine dataset

train = fread("BlogFeedback-Train.csv")

test = fread("BlogFeedback-Test.csv")

# error measure

mse = function(y\_hat, y) { mse = mean((y - y\_hat)^2)

return(mse)}

# create design matrices

train\_x = model.Matrix(V281 ~ . - 1, data = train, sparse = F)

train\_y = train$V281

test\_x = model.Matrix(V281 ~ . - 1, data = test, sparse = F)

test\_y = test$V281

train\_xgb = xgb.DMatrix(data = as.matrix(train\_x), label = train\_y)

test\_xgb = xgb.DMatrix(data = as.matrix(test\_x), label = test\_y)

# number of models

n = 5

# fit XGBoost

pred\_xgb = foreach(i = 1:n, .combine = cbind) %do% { mdl\_xgb = xgboost(data

= train\_xgb, nround = 750, nthread = 4, max\_depth = 6, eta = 0.025, subsample

= 0.7, gamma = 3)

return(predict(mdl\_xgb, test\_xgb))}

# fit random forest

pred\_rf = foreach(i = 1:n, .combine = cbind) %do% { mdl\_rf = ranger(V281 ~ .,

data = train, num.trees = 1000, mtry = 120, write.forest = T)

return(predict(mdl\_rf, test)$predictions)}

# weighted average

mse(rowMeans(pred\_rf) \* 0.25 + rowMeans(pred\_xgb) \* 0.75, test\_y)

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[720] train-rmse:0.554411

[721] train-rmse:0.554411

[722] train-rmse:0.554404

[723] train-rmse:0.554394

[724] train-rmse:0.554267

[725] train-rmse:0.554242

[726] train-rmse:0.554147

[727] train-rmse:0.554110

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[730] train-rmse:0.554006

[731] train-rmse:0.553936

[732] train-rmse:0.553853

[733] train-rmse:0.553817

[734] train-rmse:0.553679

[735] train-rmse:0.553603

[736] train-rmse:0.553502

[737] train-rmse:0.553451

[738] train-rmse:0.553324

[739] train-rmse:0.553319

[740] train-rmse:0.553248

[741] train-rmse:0.553129

[742] train-rmse:0.553102

[743] train-rmse:0.552974

[744] train-rmse:0.552942

[745] train-rmse:0.552909

[746] train-rmse:0.552863

[747] train-rmse:0.552789

[748] train-rmse:0.552741

[749] train-rmse:0.552729

[750] train-rmse:0.552696

Growing trees.. Progress: 1%. Estimated remaining time: 48 minutes, 5

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Growing trees.. Progress: 3%. Estimated remaining time: 42 minutes, 2

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Growing trees.. Progress: 13%. Estimated remaining time: 36 minutes, 11

seconds.

Growing trees.. Progress: 15%. Estimated remaining time: 35 minutes, 30

seconds.

Growing trees.. Progress: 16%. Estimated remaining time: 34 minutes, 44

seconds.

Growing trees.. Progress: 18%. Estimated remaining time: 34 minutes, 5

seconds.

Growing trees.. Progress: 19%. Estimated remaining time: 33 minutes, 36

seconds.

Growing trees.. Progress: 20%. Estimated remaining time: 32 minutes, 50

seconds.

Growing trees.. Progress: 22%. Estimated remaining time: 32 minutes, 17

seconds.

Growing trees.. Progress: 23%. Estimated remaining time: 31 minutes, 44

seconds.

Growing trees.. Progress: 24%. Estimated remaining time: 31 minutes, 5

seconds.

Growing trees.. Progress: 26%. Estimated remaining time: 30 minutes, 32

seconds.

Growing trees.. Progress: 27%. Estimated remaining time: 30 minutes, 0

seconds.

Growing trees.. Progress: 28%. Estimated remaining time: 29 minutes, 22

seconds.

Growing trees.. Progress: 30%. Estimated remaining time: 28 minutes, 52

seconds.

Growing trees.. Progress: 31%. Estimated remaining time: 28 minutes, 10

seconds.

Growing trees.. Progress: 32%. Estimated remaining time: 27 minutes, 40

seconds.

Growing trees.. Progress: 34%. Estimated remaining time: 27 minutes, 8

seconds.

Growing trees.. Progress: 35%. Estimated remaining time: 26 minutes, 30

seconds.

Growing trees.. Progress: 37%. Estimated remaining time: 26 minutes, 0

seconds.

Growing trees.. Progress: 38%. Estimated remaining time: 25 minutes, 23

seconds.

Growing trees.. Progress: 39%. Estimated remaining time: 24 minutes, 53

seconds.

Growing trees.. Progress: 41%. Estimated remaining time: 24 minutes, 15

seconds.

Growing trees.. Progress: 42%. Estimated remaining time: 23 minutes, 43

seconds.

Growing trees.. Progress: 44%. Estimated remaining time: 23 minutes, 5

seconds.

Growing trees.. Progress: 45%. Estimated remaining time: 22 minutes, 36

seconds.

Growing trees.. Progress: 46%. Estimated remaining time: 21 minutes, 59

seconds.

Growing trees.. Progress: 48%. Estimated remaining time: 21 minutes, 27

seconds.

Growing trees.. Progress: 49%. Estimated remaining time: 20 minutes, 46

seconds.

Growing trees.. Progress: 50%. Estimated remaining time: 20 minutes, 16

seconds.

Growing trees.. Progress: 52%. Estimated remaining time: 19 minutes, 39

seconds.

Growing trees.. Progress: 53%. Estimated remaining time: 19 minutes, 7

seconds.

Growing trees.. Progress: 54%. Estimated remaining time: 18 minutes, 36

seconds.

Growing trees.. Progress: 56%. Estimated remaining time: 18 minutes, 4

seconds.

Growing trees.. Progress: 57%. Estimated remaining time: 17 minutes, 32

seconds.

Growing trees.. Progress: 58%. Estimated remaining time: 16 minutes, 59

seconds.

Growing trees.. Progress: 60%. Estimated remaining time: 16 minutes, 22

seconds.

Growing trees.. Progress: 61%. Estimated remaining time: 15 minutes, 50

seconds.

Growing trees.. Progress: 63%. Estimated remaining time: 15 minutes, 11

seconds.

Growing trees.. Progress: 64%. Estimated remaining time: 14 minutes, 42

seconds.

Growing trees.. Progress: 65%. Estimated remaining time: 14 minutes, 6

seconds.

Growing trees.. Progress: 67%. Estimated remaining time: 13 minutes, 32

seconds.

Growing trees.. Progress: 68%. Estimated remaining time: 12 minutes, 58

seconds.

Growing trees.. Progress: 70%. Estimated remaining time: 12 minutes, 24

seconds.

Growing trees.. Progress: 71%. Estimated remaining time: 11 minutes, 50

seconds.

Growing trees.. Progress: 72%. Estimated remaining time: 11 minutes, 18

seconds.

Growing trees.. Progress: 74%. Estimated remaining time: 10 minutes, 46

seconds.

Growing trees.. Progress: 75%. Estimated remaining time: 10 minutes, 14

seconds.

Growing trees.. Progress: 76%. Estimated remaining time: 9 minutes, 39

seconds.

Growing trees.. Progress: 78%. Estimated remaining time: 9 minutes, 8

seconds.

Growing trees.. Progress: 79%. Estimated remaining time: 8 minutes, 36

seconds.

Growing trees.. Progress: 80%. Estimated remaining time: 8 minutes, 4

seconds.

Growing trees.. Progress: 82%. Estimated remaining time: 7 minutes, 30

seconds.

Growing trees.. Progress: 83%. Estimated remaining time: 6 minutes, 58

seconds.

Growing trees.. Progress: 84%. Estimated remaining time: 6 minutes, 24

seconds.

Growing trees.. Progress: 86%. Estimated remaining time: 5 minutes, 52

seconds.

Growing trees.. Progress: 87%. Estimated remaining time: 5 minutes, 20

seconds.

Growing trees.. Progress: 88%. Estimated remaining time: 4 minutes, 43

seconds.

Growing trees.. Progress: 90%. Estimated remaining time: 4 minutes, 12

seconds.

Growing trees.. Progress: 91%. Estimated remaining time: 3 minutes, 35

seconds.

Growing trees.. Progress: 93%. Estimated remaining time: 3 minutes, 3

seconds.

Growing trees.. Progress: 94%. Estimated remaining time: 2 minutes, 26

seconds.

Growing trees.. Progress: 95%. Estimated remaining time: 1 minute, 55

seconds.

Growing trees.. Progress: 97%. Estimated remaining time: 1 minute, 20

seconds.

Growing trees.. Progress: 98%. Estimated remaining time: 48 seconds.

Growing trees.. Progress: 99%. Estimated remaining time: 17 seconds.

[1] 0.3810031

Basic testing model

Model Error

k-NN 0.638315

LASSO 0.635483

SVM 0.445464

Random

Forest 0.396741

Boosting 0.382399

Weighted Average

Model Error

Best RF 0.396415

Best BST 0.382642

Mean RF 0.396803

Mean BST 0.382934

Best RF + BST 0.380572

Mean RF + BST 0.381167

Stacked Generalization

1. Split the training dataset in to k folds.

2. For i-th fold of training data, train models with each of the level-0 learners on the

rest of the training data.

3. Make predictions using the models we trained:

 make predictions on i-th fold of data.

 make predictions on the test set.

4. Repeat 2. and 3. until we used all k folds of training data.

5. Generate the level-1 data using predictions we obtained:

 generate level-1 training data by concatenating the predictions we made on each

fold of the training data.

 generate level-1 test data by averaging the predictions we made on the test set.

6. Train a level-1 generalizer using the level-1 data and the correct responses, make

predictions.

Model Error

LV-1 k-NN 0.631110

LV-1

LASSO 0.624957

LV-1 SVM 0.443895

LV-1 RF 0.393018

LV-1 BST 0.379804

Stacked 0.382274

R Markdown

This is an R Markdown document. Markdown is a simple formatting syntax for authoring

HTML, PDF, and MS Word documents. For more details on using R Markdown see

http://rmarkdown.rstudio.com.

When you click the Knit button a document will be generated that includes both content as

well as the output of any embedded R code chunks within the document. You can embed an

R code chunk like this:

summary(cars)

## speed dist

## Min. : 4.0 Min. : 2.00

## 1st Qu.:12.0 1st Qu.: 26.00

## Median :15.0 Median : 36.00

## Mean :15.4 Mean : 42.98

## 3rd Qu.:19.0 3rd Qu.: 56.00

## Max. :25.0 Max. :120.00

Including Plots

You can also embed plots, for example:

Note that the echo = FALSE parameter was added to the code chunk to prevent printing of

the R code that generated the plot.