ACADGILD

SESSION 13: Decision Tree Based Models

Assignment 2

Data Analytics

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1. Problem Statement

Use the given link below:
https://archive.ics.uci.edu/ml/machine-learning-databases/00304/

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) Create a linear regression model to predict the number of comments in the next 24 hours (relative to base time).
b) Fine tune the model and represent important features Visualize the dataset and make inferences from that.
c) Interpret the summary of the linear model.
d) Report the test accuracy vs. the training accuracy

2. Solution

a) Create a linear regression model to predict the number of comments in the next 24 hours (relative to base time).

The R-script for the given problem is as follows:

```
library(data.table)
library(foreach)
library(readr)
library(dplyr)
library(corrplot);library(car); library(MASS); library(ggplot2)
library(reshape2); library(forecast)

setwd("F:/ACADGILD - Online Course/1. DATA SETS/BlogFeedback ")
getwd()

blogData_train <- read_csv("F:/ACADGILD - Online Course/1. DATA
SETS/BlogFeedback/blogData_train.csv")

# retrieve filenames of test sets
test_filenames = list.files(pattern = "blogData_test")
```

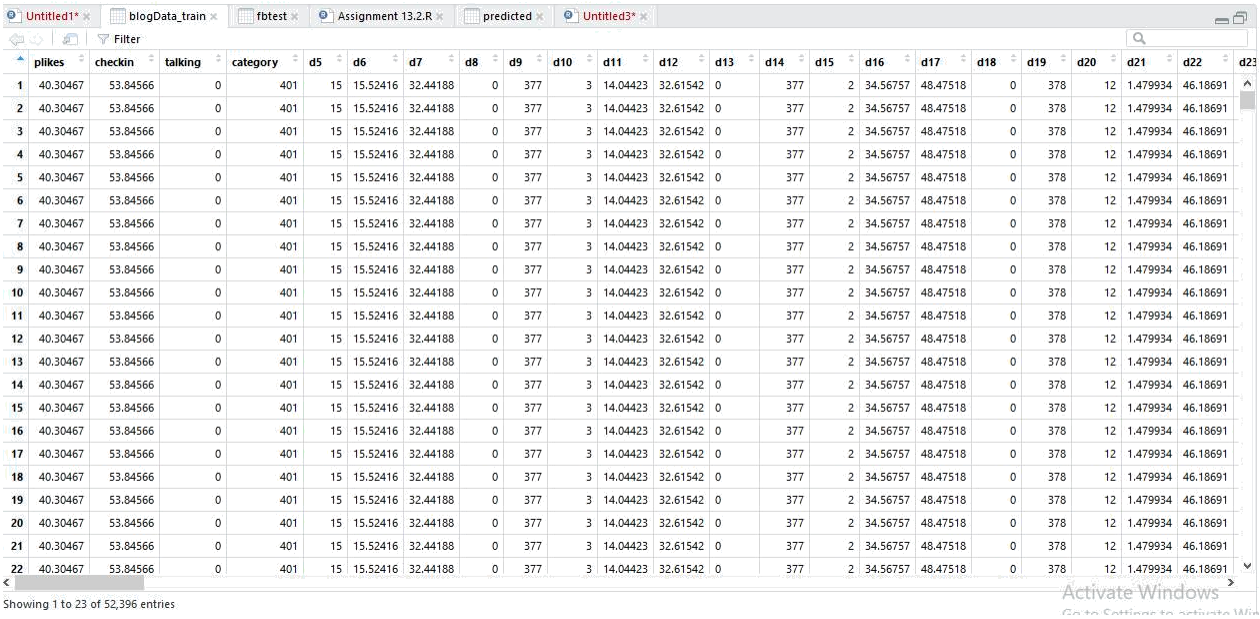
```
# load and combine dataset
train = fread("blogData_train.csv")
fbtest = foreach(i = 1:length(test_filenames), .combine = rbind) %do%
  { temp = fread(test_filenames[i], header = FALSE)
}
# Assign variable names to the train and test data set colnames(blogData_train) <-

c("plikes","checkin","talking","category","d5","d6","d7","d8","d9","d10","d11","d12",

"d13","d14","d15","d16","d17","d18","d19","d20","d21","d22","d23","d24","d25","d26",

"d27","d28","d29","cc1","cc2","cc3","cc4","cc5","basetime","postlength","postshre",

"postpromo","Hhrs","sun","mon","tue","wed","thu","fri","sat","basesun","basemon",
                  "basetue","basewed","basethu","basefri","basesat","target")
colnames(fbtest) <-
c("plikes","checkin","talking","category","d5","d6","d7","d8","d9","d10","d11","d12",

"d13","d14","d15","d16","d17","d18","d19","d20","d21","d22","d23","d24","d25","d26",

"d27","d28","d29","cc1","cc2","cc3","cc4","cc5","basetime","postlength","postshre",

"postpromo","Hhrs","sun","mon","tue","wed","thu","fri","sat","basesun","basemon",

"basetue","basewed","basethu","basefri","basesat","target","V55","V56","V57","V58",
                  "V55","V56","V57","V58","V55","V56","V57","V58",

"V55","V56","V57","V58","V55","V56","V57","V58","V55","V56","V57","V58","V55
","V56",

"V57","V58","V55","V56","V57","V58","V55","V56","V57","V58","V55","V56","V57
","V58",

"V55","V56","V57","V58","V55","V56","V57","V58","V55","V56","V57","V58","V55
"V55","V56","V57","V58","V55","V56","V57","V58","V55","V56","V57",
                  "V58","V55","V56","V57","V58")

dim(blogData_train)
dim(fbtest)
View(blogData_train)
View(fbtest)
str(blogData_train)
```

```
str(fbtest)

train <- blogData_train; test <- fbtest
head(train); head(test)

# making the data tidy by constructing single collumn for post publish day
train$pubday<- ifelse(train$sun ==1, 1, ifelse(train$mon ==1, 2, ifelse(train$tue ==1,
                                                3, ifelse(train$wed ==1, 4, ifelse(train$thu
==1, 5, ifelse(train$fri ==1, 6,

ifelse(train$sat ==1, 7, NA)))))))
# making the data tidy by constructing single collumn for base day
train$baseday<- ifelse(train$basesun ==1, 1, ifelse(train$basemon ==1,
2, ifelse(train$basetue ==1, 3,
                                                    ifelse(train$basewed ==1, 4,
ifelse(train$basethu ==1, 5,

ifelse(train$basefri ==1, 6, ifelse(train$basesat ==1, 7, NA)))))))

# a. Create a linear regression model to predict the number of comments in the next
24 hours
# (relative to basetime)
#install.packages(MASS)
library(MASS)

final_model <- lm(target ~ checkin + talking + d5 + d6 + d7 + d8 + d9 + d10 + d11 +
                  d12 + d13 + d16 + d17 + d19 + d20 + d21 + d22 + d23 + d24 +
                  cc1 + cc2 + cc3 + cc4 + basetime + postshre + Hhrs + wed +
                  thu + fri + basemon + basewed, data = train)
summary(final_model)
```

The output of the R-Script (from Console window) is given as follows:

```
> library(data.table)
> library(foreach)
> library(readr)
> library(dplyr)
> library(corrplot);library(car); library(MASS); library(ggplot2)
> library(reshape2); library(forecast)
>
> setwd("F:/ACADGILD - Online Course/1. DATA
SETS/BlogFeedback")
> getwd()
[1] " F:/ACADGILD - Online Course/1. DATA
SETS/BlogFeedback"
>
> blogData_train <- read_csv("F:/ACADGILD - Online Course/1.
DATA SETS/BlogFeedback/blogData_train.csv")

Parsed with column specification:
cols(
  .default = col_double()
)
See spec(...) for full column specifications.
|=================================================================================
==========================================================| 100%   62 MB
>
```

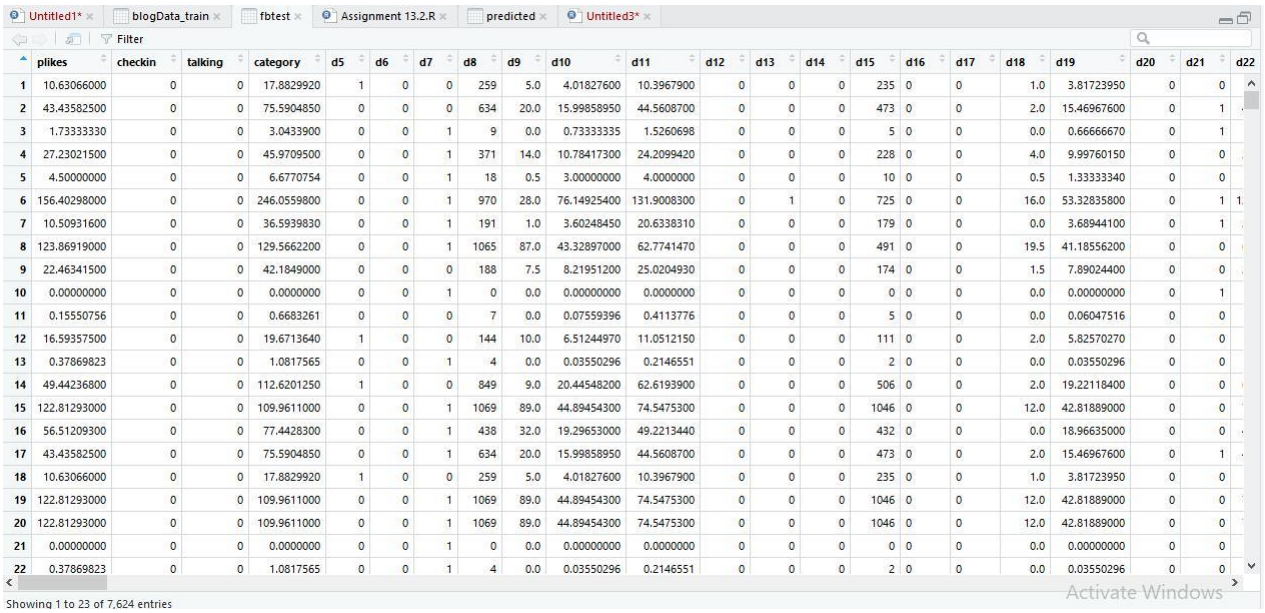
```
> # retrieve filenames of test sets
> test_filenames = list.files(pattern = "blogData_test")
>
> # load and combine dataset
> train = fread("blogData_train.csv")
> fbtest = foreach(i = 1:length(test_filenames), .combine = rbind) %do% {
+ temp = fread(test_filenames[i], header = FALSE)
+ }
>
>
> # Assign variable names to the train and test data set
> colnames(blogData_train) <-
c("plikes","checkin","talking","category","d5","d6","d7","d8","d9","d10","d11
","d12",
+
"d13","d14","d15","d16","d17","d18","d19","d20","d21","d22","d23","d24","d25"
,"d26",
+
"d27","d28","d29","cc1","cc2","cc3","cc4","cc5","basetime","postlength","post
shre",
+
"postpromo","Hhrs","sun","mon","tue","wed","thu","fri","sat","basesun","basem
on",
+
"basetue","basewed","basethu","basefri","basesat","target")
> colnames(fbtest) <-
c("plikes","checkin","talking","category","d5","d6","d7","d8","d9","d10","d11
","d12",
+
"d13","d14","d15","d16","d17","d18","d19","d20","d21","d22","d23","d24","d25"
,"d26",
+
"d27","d28","d29","cc1","cc2","cc3","cc4","cc5","basetime","postlength","post
shre",
+
"postpromo","Hhrs","sun","mon","tue","wed","thu","fri","sat","basesun","basem
on",
+
"basetue","basewed","basethu","basefri","basesat","target","V55","V56","V57",
"V58",
+                         "V55","V56","V57","V58","V55","V56","V57","V58",
+
"V55","V56","V57","V58","V55","V56","V57","V58","V55","V56","V57","V58","V55"
,"V56",
+
"V57","V58","V55","V56","V57","V58","V55","V56","V57","V58","V55","V56","V57"
,"V58",
+
"V55","V56","V57","V58","V55","V56","V57","V58","V55","V56","V57","V58","V55"
,"V56","V58","V55","V56","V57","V58")
>
> dim(blogData_train)
[1] 52396   281
> dim(fbtest)
[1] 7624 281
> View(blogData_train)
```



	plikes	checkin	talking	category	d5	d6	d7	d8	d9	d10	d11	d12	d13	d14	d15	d16	d17	d18	d19	d20	d21	d22	d23
1	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
2	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
3	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
4	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
5	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
6	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
7	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
8	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
9	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
10	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
11	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
12	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
13	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
14	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
15	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
16	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
17	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
18	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
19	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
20	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
21	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	
22	40.30467	53.84566	0	401	15	15.52416	32.44188	0	377	3	14.04423	32.61542	0	377	2	34.56757	48.47518	0	378	12	1.479934	46.18691	

Showing 1 to 23 of 52,396 entries


```
> View(fbtest)
```



	plikes	checkin	talking	category	d5	d6	d7	d8	d9	d10	d11	d12	d13	d14	d15	d16	d17	d18	d19	d20	d21	d22
1	10.63066000	0	0	17.8829920	1	0	0	259	5.0	4.01827600	10.3967900	0	0	0	235	0	0	1.0	3.81723950	0	0	
2	43.43582500	0	0	75.5904850	0	0	0	634	20.0	15.99858950	44.5608700	0	0	0	473	0	0	2.0	15.46967600	0	1	
3	1.73333330	0	0	3.0433900	0	0	1	9	0.0	0.73333335	1.5260698	0	0	0	5	0	0	0.0	0.66666670	0	1	
4	27.23021500	0	0	45.9709500	0	0	1	371	14.0	10.78417300	24.2099420	0	0	0	228	0	0	4.0	9.99760150	0	0	
5	4.50000000	0	0	6.6770754	0	0	1	18	0.5	3.00000000	4.0000000	0	0	0	10	0	0	0.5	1.33333340	0	0	
6	156.40298000	0	0	246.0559800	0	0	1	970	28.0	76.14925400	131.9008300	0	1	0	725	0	0	16.0	53.32835800	0	1	1
7	10.50931600	0	0	36.5939830	0	0	1	191	1.0	3.60248450	20.6338310	0	0	0	179	0	0	0.0	3.68944100	0	1	
8	123.86919000	0	0	129.5662200	0	0	1	1065	87.0	43.32897000	62.7741470	0	0	0	491	0	0	19.5	41.18556200	0	0	
9	22.46341500	0	0	42.1849000	0	0	0	188	7.5	8.21951200	25.0204930	0	0	0	174	0	0	1.5	7.89024400	0	0	
10	0.00000000	0	0	0.0000000	0	0	1	0	0.0	0.00000000	0.0000000	0	0	0	0	0	0	0.0	0.00000000	0	1	
11	0.15550756	0	0	0.6683261	0	0	0	7	0.0	0.07559396	0.4113776	0	0	0	5	0	0	0.0	0.06047516	0	0	
12	16.59357500	0	0	19.6713640	1	0	0	144	10.0	6.51244970	11.0512150	0	0	0	111	0	0	2.0	5.82570270	0	0	
13	0.37869823	0	0	1.0817565	0	0	1	4	0.0	0.03550296	0.2146551	0	0	0	2	0	0	0.0	0.03550296	0	0	
14	49.44236800	0	0	112.6201250	1	0	0	849	9.0	20.44548200	62.6193900	0	0	0	506	0	0	2.0	19.22118400	0	0	
15	122.81293000	0	0	109.9611000	0	0	1	1069	89.0	44.89454300	74.5475300	0	0	0	1046	0	0	12.0	42.81889000	0	0	
16	56.51209300	0	0	77.4428300	0	0	1	438	32.0	19.29653000	49.2213440	0	0	0	432	0	0	0.0	18.96635000	0	0	
17	43.43582500	0	0	75.5904850	0	0	1	634	20.0	15.99858950	44.5608700	0	0	0	473	0	0	2.0	15.46967600	0	1	
18	10.63066000	0	0	17.8829920	1	0	0	259	5.0	4.01827600	10.3967900	0	0	0	235	0	0	1.0	3.81723950	0	0	
19	122.81293000	0	0	109.9611000	0	0	1	1069	89.0	44.89454300	74.5475300	0	0	0	1046	0	0	12.0	42.81889000	0	0	
20	122.81293000	0	0	109.9611000	0	0	1	1069	89.0	44.89454300	74.5475300	0	0	0	1046	0	0	12.0	42.81889000	0	0	
21	0.00000000	0	0	0.0000000	0	0	1	0	0.0	0.00000000	0.0000000	0	0	0	0	0	0	0.0	0.00000000	0	0	
22	0.37869823	0	0	1.0817565	0	0	1	4	0.0	0.03550296	0.2146551	0	0	0	2	0	0	0.0	0.03550296	0	0	

Showing 1 to 23 of 7,624 entries


```
> str(blogData_train)
Classes ‘spec_tbl_df’, ‘tbl_df’, ‘tbl’ and 'data.frame':     52396 obs. of
281 variables:
 $ plikes    : num  40.3 40.3 40.3 40.3 40.3 ...
 $ checkin   : num  53.8 53.8 53.8 53.8 53.8 ...
 $ talking   : num  0 0 0 0 0 0 0 0 0 0 ...
 $ category  : num  401 401 401 401 401 401 401 401 401 401 ...
 $ d5        : num  15 15 15 15 15 15 15 15 15 15 ...
 $ d6        : num  15.5 15.5 15.5 15.5 15.5 ...
 $ d7        : num  32.4 32.4 32.4 32.4 32.4 ...
 $ d8        : num  0 0 0 0 0 0 0 0 0 0 ...
 $ d9        : num  377 377 377 377 377 377 377 377 377 377 ...
 $ d10       : num  3 3 3 3 3 3 3 3 3 3 ...
 $ d11       : num  14 14 14 14 14 ...
 $ d12       : num  32.6 32.6 32.6 32.6 32.6 ...
 $ d13       : num  0 0 0 0 0 0 0 0 0 0 ...
 $ d14       : num  377 377 377 377 377 377 377 377 377 377 ...
 $ d15       : num  2 2 2 2 2 2 2 2 2 2 ...
 $ d16       : num  34.6 34.6 34.6 34.6 34.6 ...
 $ d17       : num  48.5 48.5 48.5 48.5 48.5 ...
 $ d18       : num  0 0 0 0 0 0 0 0 0 0 ...
 $ d19       : num  378 378 378 378 378 378 378 378 378 378 ...
```

```
$ d20        : num  12 12  12 12 12 12  12 12  12 12 ...
$ d21        : num  1.48 1.48 1.48 1.48 1.48 ...
$ d22        : num  46.2 46.2 46.2 46.2 46.2 ...
$ d23        : num  -356 -356 -356 -356 -356 -356 -356 -356 -356 -356 ...
$ d24        : num  377  377 377 377  377 377  377 377 377 377 ...
$ d25        : num  0  0 0  0 0 0 0 0  0 0 ...
$ d26        : num  1.08 1.08 1.08 1.08 1.08 ...
$ d27        : num  1.8 1.8  1.8 1.8  1.8 ...
$ d28        : num  0  0 0  0 0  0 0 0  0 0 ...
$ d29        : num  11 11  11 11 11 11  11 11  11 11 ...
$ cc1        : num  0  0 0  0 0 0 0 0  0 0 ...
$ cc2        : num  0.4 0.4  0.4 0.4  0.4 ...
$ cc3        : num  1.08 1.08 1.08 1.08 1.08 ...
$ cc4        : num  0  0 0  0 0 0 0 0  0 0 ...
$ cc5        : num  9  9 9  9 9 9 9 9  9 9 ...
$ basetime   : num  0  0 0  0 0 0 0 0  0 0 ...
$ postlength: num  0.378  0.378 0.378  0.378  0.378 ...
$ postshre   : num  1.07 1.07 1.07 1.07 1.07 ...
$ postpromo  : num  0  0 0  0 0 0 0 0  0 0 ...
$ Hhrs       : num  9  9 9  9 9  9 9 9  9 9 ...
$ sun        : num  0  0 0  0 0 0 0 0  0 0 ...
$ mon        : num  0.973  0.973 0.973  0.973  0.973 ...
$ tue        : num  1.7 1.7  1.7 1.7  1.7 ...
$ wed        : num  0  0 0  0 0 0 0 0  0 0 ...
$ thu        : num  10 10  10 10 10 10  10 10  10 10 ...
$ fri        : num  0  0 0  0 0 0 0 0  0 0 ...
$ sat        : num  0.0229 0.0229 0.0229 0.0229 0.0229 ...
$ basesun    : num  1.52 1.52 1.52 1.52 1.52 ...
$ basemon    : num  -8 -8 -8 -8 -8 -8  -8 -8 -8 -8 ...
$ basetue    : num  9  9 9  9 9 9 9 9  9 9 ...
$ basewed    : num  0  0 0  0 0 0 0 0  0 0 ...
$ basethu    : num  6  6 2  3 6 6 3  30 30 0 ...
$ basefri    : num  2  2 2  1 0 0 1  27 27 0 ...
$ basesat    : num  4  4 0  2 2 2 2 1  1 0 ...
$ target     : num  5  5 2  2 5 5 2 2  2 0 ...
$ NA         : num  -2 -2 2 -1 -2 -2 -1 26 26 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 2 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 2 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 2 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 2 ...
$ NA         : num  35 35  10 34 59 59  34 58  58 11 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0  0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0  0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
$ NA         : num  0  0 0  0 0 0 0 0  0 0 ...
```

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$ NA          : num   0 0 0 0 0 0 0 0 0 0 ...
$ NA          : num   0 0 0 0 0 0 0 0 0 0 ...
$ NA          : num   0 0 0 0 0 0 0 0 0 0 ...
$ NA          : num   0 0 0 0 0 0 0 0 0 0 ...
$ NA          : num   0 0 0 0 0 0 0 0 0 0 ...
$ NA          : num   0 0 0 0 0 0 0 0 0 0 ...
$ NA          : num   0 0 0 0 0 0 0 0 0 0 ...
$ NA          : num   0 0 0 0 0 0 0 0 0 0 ...
  [list output truncated]
- attr(*, "spec")=
 .. cols(
 ..   `40.30467` = col_double(),
 ..   `53.845657` = col_double(),
 ..   `0.0` = col_double(),
 ..   `401.0` = col_double(),
 ..   `15.0` = col_double(),
 ..   `15.52416` = col_double(),
 ..   `32.44188` = col_double(),
 ..   `0.0_1` = col_double(),
 ..   `377.0` = col_double(),
 ..   `3.0` = col_double(),
 ..   `14.044226` = col_double(),
 ..   `32.615417` = col_double(),
 ..   `0.0_2` = col_double(),
 ..   `377.0_1` = col_double(),
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 ..   `34.567566` = col_double(),
 ..   `48.475178` = col_double(),
 ..   `0.0_3` = col_double(),
 ..   `378.0` = col_double(),
 ..   `12.0` = col_double(),
 ..   `1.4799345` = col_double(),
 ..   `46.18691` = col_double(),
 ..   `-356.0` = col_double(),
 ..   `377.0_2` = col_double(),
 ..   `0.0_4` = col_double(),
 ..   `1.0761671` = col_double(),
 ..   `1.795416` = col_double(),
 ..   `0.0_5` = col_double(),
 ..   `11.0` = col_double(),
 ..   `0.0_6` = col_double(),
 ..   `0.4004914` = col_double(),
 ..   `1.0780969` = col_double(),
 ..   `0.0_7` = col_double(),
 ..   `9.0` = col_double(),
 ..   `0.0_8` = col_double(),
 ..   `0.37755936` = col_double(),
 ..   `1.07421` = col_double(),
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 ..   `0.972973` = col_double(),
 ..   `1.704671` = col_double(),
 ..   `0.0_11` = col_double(),
 ..   `10.0` = col_double(),
 ..   `0.0_12` = col_double(),
 ..   `0.022932023` = col_double(),
 ..   `1.521174` = col_double(),
 ..   `-8.0` = col_double(),
 ..   `9.0_2` = col_double(),
 ..   `0.0_13` = col_double(),
 ..   `2.0_1` = col_double(),
 ..   `2.0_2` = col_double(),
 ..   `0.0_14` = col_double(),
 ..   `2.0_3` = col_double(),
 ..   `2.0_4` = col_double(),
 ..   `0.0_15` = col_double(),
 ..   `0.0_16` = col_double(),
 ..   `0.0_17` = col_double(),
 ..   `0.0_18` = col_double(),
 ..   `0.0_19` = col_double(),
 ..   `10.0_1` = col_double(),
```

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..   `0.0_20` = col_double(),
..   `0.0_21` = col_double(),
..   `0.0_22` = col_double(),
..   `0.0_23` = col_double(),
..   `0.0_24` = col_double(),
..   `0.0_25` = col_double(),
..   `0.0_26` = col_double(),
..   `0.0_27` = col_double(),
..   `0.0_28` = col_double(),
..   `0.0_29` = col_double(),
..   `0.0_30` = col_double(),
..   `0.0_31` = col_double(),
..   `0.0_32` = col_double(),
..   `0.0_33` = col_double(),
..   `0.0_34` = col_double(),
..   `0.0_35` = col_double(),
..   `0.0_36` = col_double(),
..   `0.0_37` = col_double(),
..   `0.0_38` = col_double(),
..   `0.0_39` = col_double(),
..   `0.0_40` = col_double(),
..   `0.0_41` = col_double(),
..   `0.0_42` = col_double(),
..   `0.0_43` = col_double(),
..   `0.0_44` = col_double(),
..   `0.0_45` = col_double(),
..   `0.0_46` = col_double(),
..   `0.0_47` = col_double(),
..   `0.0_48` = col_double(),
..   `0.0_49` = col_double(),
..   `0.0_50` = col_double(),
..   `0.0_51` = col_double(),
..   `0.0_52` = col_double(),
..   `0.0_53` = col_double(),
..   `0.0_54` = col_double(),
..   `0.0_55` = col_double(),
..   `0.0_56` = col_double(),
..   `0.0_57` = col_double(),
..   `0.0_58` = col_double(),
..   `0.0_59` = col_double(),
..   `0.0_60` = col_double(),
..   `0.0_61` = col_double(),
..   `0.0_62` = col_double(),
..   `0.0_63` = col_double(),
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..   `0.0_68` = col_double(),
..   `0.0_69` = col_double(),
..   `0.0_70` = col_double(),
..   `0.0_71` = col_double(),
..   `0.0_72` = col_double(),
..   `0.0_73` = col_double(),
..   `0.0_74` = col_double(),
..   `0.0_75` = col_double(),
..   `0.0_76` = col_double(),
..   `0.0_77` = col_double(),
..   `0.0_78` = col_double(),
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..   `0.0_80` = col_double(),
..   `0.0_81` = col_double(),
..   `0.0_82` = col_double(),
..   `0.0_83` = col_double(),
..   `0.0_84` = col_double(),
..   `0.0_85` = col_double(),
..   `0.0_86` = col_double(),
..   `0.0_87` = col_double(),
..   `0.0_88` = col_double(),
..   `0.0_89` = col_double(),
..   `0.0_90` = col_double(),
..   `0.0_91` = col_double(),
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..   `0.0_92` = col_double(),
..   `0.0_93` = col_double(),
..   `0.0_94` = col_double(),
..   `0.0_95` = col_double(),
..   `0.0_96` = col_double(),
..   `0.0_97` = col_double(),
..   `0.0_98` = col_double(),
..   `0.0_99` = col_double(),
..   `0.0_100` = col_double(),
..   `0.0_101` = col_double(),
..   `0.0_102` = col_double(),
..   `0.0_103` = col_double(),
..   `0.0_104` = col_double(),
..   `0.0_105` = col_double(),
..   `0.0_106` = col_double(),
..   `0.0_107` = col_double(),
..   `0.0_108` = col_double(),
..   `0.0_109` = col_double(),
..   `0.0_110` = col_double(),
..   `0.0_111` = col_double(),
..   `0.0_112` = col_double(),
..   `0.0_113` = col_double(),
..   `0.0_114` = col_double(),
..   `0.0_115` = col_double(),
..   `0.0_116` = col_double(),
..   `0.0_117` = col_double(),
..   `0.0_118` = col_double(),
..   `0.0_119` = col_double(),
..   `0.0_120` = col_double(),
..   `0.0_121` = col_double(),
..   `0.0_122` = col_double(),
..   `0.0_123` = col_double(),
..   `0.0_124` = col_double(),
..   `0.0_125` = col_double(),
..   `0.0_126` = col_double(),
..   `0.0_127` = col_double(),
..   `0.0_128` = col_double(),
..   `0.0_129` = col_double(),
..   `0.0_130` = col_double(),
..   `0.0_131` = col_double(),
..   `0.0_132` = col_double(),
..   `0.0_133` = col_double(),
..   `0.0_134` = col_double(),
..   `0.0_135` = col_double(),
..   `0.0_136` = col_double(),
..   `0.0_137` = col_double(),
..   `0.0_138` = col_double(),
..   `0.0_139` = col_double(),
..   `0.0_140` = col_double(),
..   `0.0_141` = col_double(),
..   `0.0_142` = col_double(),
..   `0.0_143` = col_double(),
..   `0.0_144` = col_double(),
..   `0.0_145` = col_double(),
..   `0.0_146` = col_double(),
..   `0.0_147` = col_double(),
..   `0.0_148` = col_double(),
..   `0.0_149` = col_double(),
..   `0.0_150` = col_double(),
..   `0.0_151` = col_double(),
..   `0.0_152` = col_double(),
..   `0.0_153` = col_double(),
..   `0.0_154` = col_double(),
..   `0.0_155` = col_double(),
..   `0.0_156` = col_double(),
..   `0.0_157` = col_double(),
..   `0.0_158` = col_double(),
..   `0.0_159` = col_double(),
..   `0.0_160` = col_double(),
..   `0.0_161` = col_double(),
..   `0.0_162` = col_double(),
..   `0.0_163` = col_double(),
```

```
..   `0.0_164` = col_double(),
..   `0.0_165` = col_double(),
..   `0.0_166` = col_double(),
..   `0.0_167` = col_double(),
..   `0.0_168` = col_double(),
..   `0.0_169` = col_double(),
..   `0.0_170` = col_double(),
..   `0.0_171` = col_double(),
..   `0.0_172` = col_double(),
..   `0.0_173` = col_double(),
..   `0.0_174` = col_double(),
..   `0.0_175` = col_double(),
..   `0.0_176` = col_double(),
..   `0.0_177` = col_double(),
..   `0.0_178` = col_double(),
..   `0.0_179` = col_double(),
..   `0.0_180` = col_double(),
..   `0.0_181` = col_double(),
..   `0.0_182` = col_double(),
..   `0.0_183` = col_double(),
..   `0.0_184` = col_double(),
..   `0.0_185` = col_double(),
..   `0.0_186` = col_double(),
..   `0.0_187` = col_double(),
..   `0.0_188` = col_double(),
..   `0.0_189` = col_double(),
..   `0.0_190` = col_double(),
..   `0.0_191` = col_double(),
..   `0.0_192` = col_double(),
..   `0.0_193` = col_double(),
..   `0.0_194` = col_double(),
..   `0.0_195` = col_double(),
..   `0.0_196` = col_double(),
..   `0.0_197` = col_double(),
..   `0.0_198` = col_double(),
..   `0.0_199` = col_double(),
..   `0.0_200` = col_double(),
..   `0.0_201` = col_double(),
..   `0.0_202` = col_double(),
..   `0.0_203` = col_double(),
..   `0.0_204` = col_double(),
..   `0.0_205` = col_double(),
..   `0.0_206` = col_double(),
..   `0.0_207` = col_double(),
..   `0.0_208` = col_double(),
..   `0.0_209` = col_double(),
..   `0.0_210` = col_double(),
..   `0.0_211` = col_double(),
..   `0.0_212` = col_double(),
..   `0.0_213` = col_double(),
..   `0.0_214` = col_double(),
..   `0.0_215` = col_double(),
..   `0.0_216` = col_double(),
..   `0.0_217` = col_double(),
..   `0.0_218` = col_double(),
..   `0.0_219` = col_double(),
..   `0.0_220` = col_double(),
..   `0.0_221` = col_double(),
..   `0.0_222` = col_double(),
..   `0.0_223` = col_double(),
..   `0.0_224` = col_double(),
..   `1.0` = col_double(),
..   `0.0_225` = col_double(),
..   `0.0_226` = col_double(),
..   `0.0_227` = col_double(),
..   `0.0_228` = col_double(),
..   `0.0_229` = col_double(),
..   `1.0_1` = col_double(),
..   `0.0_230` = col_double(),
..   `0.0_231` = col_double(),
..   `0.0_232` = col_double(),
..   `0.0_233` = col_double(),
```

```
  ..   `0.0_234` = col_double(),
  ..   `0.0_235` = col_double(),
  ..   `0.0_236` = col_double(),
  ..   `1.0_2` = col_double()
  .. )
> str(fbtest)
Classes ‘data.table’ and 'data.frame':7624 obs. of  281 variables:
 $ plikes    : num  10.63 43.44 1.73 27.23 4.5 ...
 $ checkin   : num  0 0  0 0 0 0 0 0 0 0 ...
 $ talking   : num  0 0  0 0 0 0 0 0 0 0 ...
 $ category  : num  17.88 75.59 3.04 45.97 6.68 ...
 $ d5        : num  1 0  0 0 0 0 0 0 0 0 ...
 $ d6        : num  259 634 9 371 18 ...
 $ d7        : num  5 20 0 14 0.5 28 1 87 7.5 0 ...
 $ d8        : num  0 0  0 0 0 0 0 0 0 0 ...
 $ d9        : num  0 0  0 0 0 1 0 0 0 0 ...
 $ d10       : num  4.018 15.999 0.733 10.784 3 ...
 $ d11       : num  10.4 44.56 1.53 24.21 4 ...
 $ d12       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ d13       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ d14       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ d15       : num  235 473 5 228 10 725 179 491 174 0 ...
 $ d16       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ d17       : num  0 1  1 0 0 1 1 0 0 1 ...
 $ d18       : num  1 2  0 4  0.5 16 0 19.5 1.5 0 ...
 $ d19       : num  3.817 15.47 0.667 9.998 1.333 ...
 $ d20       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ d21       : num  0 0  1 0 0 1 0 0 0 0 ...
 $ d22       : num  10.3 44.69 1.53 24.4 2.56 ...
 $ d23       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ d24       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ d25       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ d26       : num  235 473 5 228 7 725 179 491 174 0 ...
 $ d27       : num  1 1  0 2 0 3 0 14 1 0 ...
 $ d28       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ d29       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ cc1       : num  9.78 40.97 1.13 22.56 2.83 ...
 $ cc2       : num  16.07 70.31 1.82 39.76 3.67 ...
 $ cc3       : num  0 0  1 1 0 1 1 0 0 1 ...
 $ cc4       : num  0 0  1 0 0 1 0 0 0 0 ...
 $ cc5       : num  1 0  0 0 0 0 0 0 0 0 ...
 $ basetime  : num  192 479 5 337 8 913 189 786 186 0 ...
 $ postlength: num  0 0  0 0 0 0 0 0 0 0 ...
 $ postshre  : num  0 0  0 0 0 0 0 0 0 0 ...
 $ postpromo : num  5 18 0 10 0.5 26 0 74 5.5 0 ...
 $ Hhrs      : num  0.201 0.5289 0.0667 0.7866 1.6667 ...
 $ sun       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ mon       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ tue       : num  13.95 62.13 1.73 30.36 2.21 ...
 $ wed       : num  -229 -461 -5 -156 0 -519 -178 -418 -161 0 ...
 $ thu       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ fri       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ sat       : num  217 473 4 228 6 725 170 491 174 0 ...
 $ basesun   : num  0 0  0 0 0.5 2 0 -3 0 0 ...
 $ basemon   : num  0 0  0 0 0 0 0 0 0 0 ...
 $ basetue   : num  0 0  0 0 0 0 0 0 0 0 ...
 $ basewed   : num  0.252 0.193 0.333 0.11 0 ...
 $ basethu   : num  0.904 0.458 0.699 0.356 0 ...
 $ basefri   : num  0 0  0 0 0 0 0 0 0 0 ...
 $ basesat   : num  0 0  0 0 0 0 0 0 0 0 ...
 $ target    : num  0 0  0 0 0 0 0 0 0 0 ...
 $ V55       : num  14 2 2 2 0 0 6 0 1 0 ...
 $ V56       : num  0 0  1 0 0 1 0 0 0 0 ...
 $ V57       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ V58       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ V55       : num  0.0944 0.0733 0.1333 0.0432 0 ...
 $ V56       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ V57       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ V58       : num  0.507 0.286 0.34 0.215 0 ...
 $ V55       : num  0 0  0 0 0 0 0 0 0 0 ...
 $ V56       : num  0 0  0 0 0 0 0 0 1 0 ...
 $ V57       : num  0 0  0 0 0 0 0 0 0 0 ...
```

```
  $ V58      : num  12 2 1 2 0 0 5 0 1 0 ...
  $ V55      : num  0 00 0 0 0 0 0  00 ...
  $ V56      : num  0 00 0 0 0 0 0  00 ...
  $ V57      : num  0 00 0 0 0 0 0  00 ...
  $ V58      : num  0.0919 0.0677 0.1333 0.0408 0 ...
  $ V55      : num  0.504 0.278 0.34 0.21 0 ...
  $ V56      : num  0 00 0 0 0 0 0  00 ...
  $ V57      : num  0 00 0 0 0 0 0  00 ...
  $ V58      : num  0 00 0 0 0 0 0  00 ...
  $ V55      : num  12 2 1 2 0 0 5 0 1 0 ...
  $ V56      : num  0 01 0 0 1 1 0  00 ...
  $ V57      : num  0 01 0 0 0 0 0  00 ...
  $ V58      : num  0 00 0 0 0 0 0  00 ...
  $ V55      : num  0.2335 0.1763  0.2 0.0983 0 ...
  $ V56      : num  0 00 0 0 0 0 0  00 ...
  $ V57      : num  0 00 0 0 1 0 0  00 ...
  $ V58      : num  0.855 0.43 0.4 0.321 0 ...
  $ V55      : num  0 00 0 0 0 0 0  00 ...
  $ V56      : num  0 00 0 0 0 0 0  00 ...
  $ V57      : num  0 00 0 0 0 0 0  00 ...
  $ V58      : num  13 2 1 2 0 0 5 0 1 0 ...
  $ V55      : num  0 00 0 0 0 0 0  00 ...
  $ V56      : num  0 00 0 0 0 0 0  00 ...
  $ V57      : num  0 00 0 0 0 0 0  00 ...
  $ V58      : num  0.00245 0.00564  0 0.0024 0 ...
  $ V55      : num  0.675 0.404  0.365 0.29 0 ...
  $ V56      : num  0 00 0 0 0 0 0  00 ...
  $ V57      : num  0 00 0 0 0 0 0  00 ...
  $ V58      : num  -10 -2 -1 -2 0 0 -5 0 -1 0 ...
  $ V55      : num  12 2 1 2 0 0 5 0 1 0 ...
  $ V56      : num  0 00 0 0 0 0 0  00 ...
  $ V57      : num  0 01 0 0 1 1 0  01 ...
  $ V58      : num  0 00 0 0 0 0 0  00 ...
  $ V55      : num  35 21 2 3 0 12 103 61 7  0 ...
  [list output truncated]
 - attr(*, ".internal.selfref")=<externalptr>
>
> train <- blogData_train; test <- fbtest
> head(train); head(test)
# A tibble:  6 x 281
  plikes checkin talking category    d5    d6    d7    d8   d9    d10   d11
d12    d13   d14    d15   d16    d17    d18    d19    d20    d21   d22    d23
    <dbl>   <dbl>   <dbl>     <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
<dbl> <dbl>  <dbl> <dbl>  <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl> <dbl>
1    40.3    53.8      0     401     15  15.5  32.4     0  377      3  14.0
32.6      0   377     2  34.6  48.5     0    378     12  1.48  46.2   -356
2    40.3    53.8      0     401     15  15.5  32.4     0  377      3  14.0
32.6      0   377     2  34.6  48.5     0    378     12  1.48  46.2   -356
3    40.3    53.8      0     401     15  15.5  32.4     0  377      3  14.0
32.6      0   377     2  34.6  48.5     0    378     12  1.48  46.2   -356
4    40.3    53.8      0     401     15  15.5  32.4     0  377      3  14.0
32.6      0   377     2  34.6  48.5     0    378     12  1.48  46.2   -356
5    40.3    53.8      0     401     15  15.5  32.4     0  377      3  14.0
32.6      0   377     2  34.6  48.5     0    378     12  1.48  46.2   -356
6    40.3    53.8      0     401     15  15.5  32.4     0  377      3  14.0
32.6      0   377     2  34.6  48.5     0    378     12  1.48  46.2   -356
# ... with 258 more variables: d24 <dbl>, d25 <dbl>, d26 <dbl>, d27 <dbl>,
d28 <dbl>, d29 <dbl>, cc1 <dbl>, cc2 <dbl>, cc3 <dbl>, cc4 <dbl>,
#   cc5 <dbl>, basetime <dbl>, postlength <dbl>, postshre <dbl>, postpromo
<dbl>, Hhrs <dbl>, sun <dbl>, mon <dbl>, tue <dbl>, wed <dbl>, thu <dbl>,
#   fri <dbl>, sat <dbl>, basesun <dbl>, basemon <dbl>, basetue <dbl>,
basewed <dbl>, basethu <dbl>, basefri <dbl>, basesat <dbl>, target <dbl>,
#   NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA
<dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>,
#   NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA
<dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>,
#   NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA
<dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>,
#   NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA
<dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>,
#   NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA
<dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, NA <dbl>, ...
```

```
        plikes checkin talking  category d5   d6   d7  d8 d9        d10
d11 d12 d13  d14  d15  d16  d17   d18        d19 d20 d21          d22 d23   d24
1:  10.630660        0        0  17.882992   1 259   5.0 0   0  4.0182760
10.39679   0    0   0  235   0   0  1.0   3.8172395   0   0  10.297346    0    0
2:  43.435825        0        0  75.590485   0 634 20.0  0   0 15.9985895
44.56087   0    0   0  473   0   1  2.0  15.4696760    0   0  44.685085    0    0
3:   1.733333        0        0   3.043390  0    9   0.0 0   0  0.7333333
1.52607   0   0   0   5   0   1  0.0   0.6666667   0   1   1.534782    0   0
   d25 d26  d27 d28 d29        cc1        cc2 cc3 cc4 cc5 basetime postlength
postshre postpromo         Hhrs sun mon         tue   wed thu fri sat
1:   0 235    1   0   0    9.776869  16.073494      0   0  1       192          0
0       5.0   0.20103656   0   0   13.948867 -229   0   0 217
2:   0 473    1   0   0  40.971790   70.307840      0   0  0       479          0
0      18.0   0.52891400   0   0   62.134968 -461   0   0 473
3:   0   5    0   0   0    1.133333  1.820867       1   1  0         5          0
0       0.0   0.06666667   0   0    1.730767   -5   0   0   4
   basesun basemon basetue   basewed   basethu basefri basesat target V55 V56
V57 V58         V55 V56  V57       V58 V55  V56 V57 V58 V55 V56  V57
1:     0.0        0         0 0.2517731  0.9038038         0       0      0   14   0
0   0   0.09438080  0     0 0.5067316     0   0   0    12    0   0    0
2:     0.0        0         0 0.1932299  0.4576994         0       0      0    2   0
0   0   0.07334273  0     0 0.2864750     0   0   0     2    0   0    0
3:     0.0        0         0 0.3333333  0.6992059         0       0      0    2   1
0   0   0.13333334  0     0 0.3399347     0   0   0     1    0   0    0
          V58        V55 V56 V57 V58 V55  V56 V57 V58          V55 V56  V57
V58 V55 V56  V57 V58 V55 V56 V57           V58         V55 V56 V57 V58 V55
1: 0.09192581 0.5042160   0   0   0  12    0    0   0  0.23349700   0    0
0.8547111   0   0   0  13    0   0   0 0.002454992 0.6747285   0    0 -10   12
2: 0.06770099 0.2778884   0   0   0   2    0    0   0  0.17630465   0    0
0.4297832   0   0   0   2    0   0   0 0.005641749 0.4044489   0    0  -2    2
3: 0.13333334 0.3399347   0   0   0   1    1    1   0  0.20000000   0    0
0.4000000   0   0   0   1    0   0   0 0.000000000 0.3651484   0    0  -1    1
   V56 V57  V58 V55 V56  V57 V58 V55  V56 V57 V58  V55 V56 V57 V58 V55  V56 V57
V58 V55 V56 V57 V58 V55 V56 V57    V58 V55 V56 V57  V58 V55 V56 V57 V58  V55
1:   0   0   0  35   0   0  35  0    0   0 35   35   0   0   0  0   0   0   0
0   0   0   0   0   9   0   0   0   0   0   0   0   0   0   0   0   0   0
2:   0   0   0  21   0   0   0  2   0   0  21  -2   0   0   0  0   0   0   0
0   0   0   0   0  62   0   0  696  0   0   0   0   0   0   0   0   0   0
3:   0   1   0   2   0   0   2  0   0   0  2   2   0   0   2  2   0   0   0
0   2   0   0   2  13   1   0  8361  0   0   0   1   0   0   1   0   1   0
   V56 V57  V58 V55 V56  V57 V58 V55  V56 V57 V58  V55 V56 V57 V58 V55  V56 V57
V58 V55 V56 V57 V58 V55 V56 V57 V58 V55 V56 V57 V58 V55 V56 V57 V55 V56
1:   0   0   0   0   0   0   0  0   0   0   0   0   0   0   0  0   0   0   0
0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
2:   0   0   1   0   0   0   0  0   0   0   0   0   0   0   0  0   0   0   0
0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
3:   0   0   1   1   1   0   0  0   0   1   0   0   0   0   0  0   0   0   0
0   0   0   0   0   1   0   0   0   0   0   0   0   0   0   0   0   0   0
   V57 V58  V55 V56 V57  V58 V55 V56  V57  V58 V55  V56 V57 V58  V55 V56  V57 V58
V55 V56 V57 V58 V55 V56 V57 V58 V55 V56  V57 V58 V55 V56 V57 V58 V55 V56
1:   0   0   0   0   0   0   0  0   0    0   0   0   0   0   0   0   0   0   0
0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
2:   1   0   0   0   0   0   0  0   0   0   0   0   1   0   0   0   0   0   0
0   0   0   0   0   0   0   0   0   0   0   0   0   1   0   0   0   0
3:   1   0   0   0   1   0   0  0   0   0   0   0   1   0   0   0   0   0   0
0   0   0   0   1   0   0   0   0   0   0   0   1   0   0   1   0
   V57 V58  V55 V56 V57  V58 V55 V56  V57  V58 V55  V56 V57 V58  V55 V56  V57 V58
V55 V56 V57 V58 V55 V56 V57 V58 V55 V56  V57 V58 V55 V56 V57 V58 V55 V56
1:   0   0   0   0   0   0   0  0   0    0   0   0   0   0   0   0   0   0   0
0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
2:   0   0   0   0   1   0   0  0   0   0   0   0   0   0   0   0   0   0   0
0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
3:   0   0   0   0   1   0   0  0   1   0   0   0   0   0   0   0   0   0   0
0   0   1   0   0   0   0   0   0   0   0   0   0   0   0   1   0
   V57 V58  V55 V56 V57  V58 V55 V56  V57  V58 V55  V56 V57 V58  V55 V56  V57 V58
V55 V56 V57 V58 V55 V56 V57 V58 V55 V56  V57 V58 V55 V56 V57 V58 V55 V56
1:   0   0   0   0   0   1   0  0   0    0   0   0   0   0   0   0   0   0   1
0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
2:   0   0   0   0   0   1   0  0   0   0   0   0   0   0   0   0   0   0   0
0   0   0   0   0   0   0   0   0   0   1   0   0   0   0   0   0   1
3:   0   0   1   0   0   1   0  0   0   0   0   0   0   0   0   0   0   0   1
0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
```

```
   V57 V58 V55 V56 V57  V58
1:   0   4   0   0   0   0
2:   0   0   0   0   0   0
3:   0   1   0   0   0   1
 [ reached getOption("max.print") -- omitted 3 rows ]
>
> # making the data tidy by constructing single collumn for post publish day
> train$pubday<- ifelse(train$sun ==1, 1, ifelse(train$mon ==1,
2, ifelse(train$tue ==1, 3,
+
ifelse(train$wed ==1, 4, ifelse(train$thu ==1, 5, ifelse(train$fri ==1, 6,
+
ifelse(train$sat ==1, 7, NA)))))))
> # making the data tidy by constructing single collumn for base day
> train$baseday<- ifelse(train$basesun ==1, 1, ifelse(train$basemon ==1, 2,
ifelse(train$basetue ==1, 3,
+
ifelse(train$basewed ==1, 4, ifelse(train$basethu ==1, 5,
+
ifelse(train$basefri ==1, 6, ifelse(train$basesat ==1, 7, NA)))))))
>
> # a. Create a linear regression model to predict the number of comments in
the next 24 hours
> # (relative to basetime)
> #install.packages(MASS)
> library(MASS)
>
> final_model <- lm(target ~ checkin + talking + d5 + d6 + d7 + d8 + d9 + d10
+ d11 +
+                     d12 + d13 + d16 + d17 + d19 + d20 + d21 + d22 + d23 +
d24 +
+                     cc1 + cc2 + cc3 + cc4 + basetime + postshre + Hhrs +
wed +
+                     thu + fri + basemon + basewed, data = train)
> summary(final_model)

Call:
lm(formula = target ~ checkin +  talking + d5 + d6 + d7 + d8 +
    d9 + d10 + d11 + d12 + d13 + d16 + d17 + d19 + d20 + d21 +
    d22 + d23 + d24 + cc1 + cc2 + cc3 + cc4 + basetime + postshre +
    Hhrs + wed + thu + fri + basemon + basewed, data = train)

Residuals:
    Min       1Q  Median      3Q     Max
-561.78   -13.04    -1.83    0.00 1743.64

Coefficients: (2 not defined because of singularities)
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -4.947e-04   5.171e-01  -0.001    0.999
checkin      3.892e-05   1.692e-01   0.000    1.000
talking      1.700e-04   1.203e-01   0.001    0.999
d5           1.263e-05   1.282e-01   0.000    1.000
d6          -9.984e+02   6.649e+05  -0.002    0.999
d7          -1.411e-03   5.473e-01  -0.003    0.998
d8           4.528e-04   3.698e+00   0.000    1.000
d9           3.487e-05   2.347e-02   0.001    0.999
d10         -3.316e-04   1.752e-01  -0.002    0.998
d11          9.984e+02   6.649e+05   0.002    0.999
d12          3.521e-04   3.883e-01   0.001    0.999
d13                 NA          NA      NA       NA
d16          9.999e-01   1.997e-01   5.007 5.55e-07 ***
d17          5.831e-05   1.330e-01   0.000    1.000
d19         -1.190e-05   1.008e-02  -0.001    0.999
d20         -8.603e-05   1.488e-01  -0.001    1.000
d21          9.984e+02   6.649e+05   0.002    0.999
d22          5.252e-04   2.758e-01   0.002    0.998
d23          1.633e-05   1.088e-02   0.002    0.999
d24         -1.133e-06   1.780e-02   0.000    1.000
cc1         -7.536e-03   1.932e+00  -0.004    0.997
cc2          1.402e-02   8.699e+00   0.002    0.999
cc3          2.395e-04   1.436e+01   0.000    1.000
cc4                 NA          NA      NA       NA
```

```
basetime     -8.246e-03 1.027e+01   -0.001    0.999
postshre      2.803e-03 1.443e+01    0.000    1.000
Hhrs         -8.483e-04 8.746e-01   -0.001    0.999
wed           8.755e-04 4.810e+00    0.000    1.000
thu           3.968e-04 3.294e-01    0.001    0.999
fri           4.796e-04 1.784e+00    0.000    1.000
basemon      -2.404e-04 8.184e-01    0.000    1.000
basewed       4.229e-03 2.081e+01    0.000    1.000
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 67.27 on 52366 degrees of freedom
Multiple R-squared:  0.4976,   Adjusted R-squared:  0.4973
F-statistic:  1788 on 29 and 52366 DF,  p-value: < 2.2e-16
```

Conclusion/Interpretation:

A linear regression model is created to predict the number of comments in the next 24 hours (relative to base time) and following observation is obtained:
Residual standard error: 67.27 on 52366 degrees of freedom
Multiple R-squared: 0.4976, Adjusted R-squared: 0.4973
F-statistic: 1788 on 29 and 52366 DF, p-value: < 2.2e-16

b. Fine tune the model and represent important features Visualize the dataset and make inferences from that.

The R-script for the given problem is as follows:

```
final_model <- lm(target ~ talking + d5 + d7 + d8 + d10 + d11 +
                  d12 + d13 + d16 + d17 + d19 + d20 + d22 + d23 +
                  cc1 + cc2 + cc3 + cc4 + basetime + postshre + Hhrs, data = train)
summary(final_model)

prediction <- predict(final_model, test)
predicted <- data.frame(cbind(actuals = test$target, prediction = prediction))
predicted$prediction <- ifelse(prediction<0, 0, round(prediction,0))
cor(predicted)
View(predicted)
```

The output of the R-Script (from Console window) is given as follows:

```
> final_model <- lm(target ~ talking + d5 +  d7 + d8 + d10 + d11  +
+                     d12 + d13 + d16 + d17  + d19 + d20 + d22 +  d23 +
+                     cc1 + cc2 + cc3 +  cc4 + basetime + postshre +
Hhrs, data = train)
> summary(final_model)

Call:
lm(formula = target ~ talking + d5 + d7 + d8 + d10 + d11 + d12 +
    d13 + d16 + d17 + d19 + d20 + d22 + d23 + cc1 + cc2 + cc3 +
    cc4 + basetime + postshre + Hhrs, data = train)

 Residuals:
     Min       1Q   Median       3Q      Max
-561.80  -13.04   -1.82    0.00 1743.64
```

```
Coefficients: (2 not defined because of singularities)
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -2.666e-04 5.008e-01  -0.001    1.000
talking     -5.647e-05 8.142e-02  -0.001    0.999
d5           3.962e-05 1.220e-01   0.000    1.000
d7          -2.452e-04 2.637e-01  -0.001    0.999
d8           1.983e-03 3.565e+00   0.001    1.000
d10          2.184e-05 1.151e-01   0.000    1.000
d11          1.320e-04 4.381e-01   0.000    1.000
d12          5.752e-05 3.379e-01   0.000    1.000
d13                 NA        NA      NA       NA
d16          1.000e+00 1.706e-01   5.862  4.6e-09 ***
d17         -8.778e-05 8.403e-02  -0.001    0.999
d19          1.831e-06 3.633e-03   0.001    1.000
d20         -1.967e-04 1.334e-01  -0.001    0.999
d22          1.001e-04 1.820e-01   0.001    1.000
d23         -2.766e-06 4.255e-03  -0.001    0.999
cc1         -6.988e-03 1.420e+00  -0.005    0.996
cc2          1.500e-02 7.565e+00   0.002    0.998
cc3         -1.322e-03 1.424e+01   0.000    1.000
cc4                 NA        NA      NA       NA
basetime    -9.812e-04 8.624e+00   0.000    1.000
postshre     3.307e-03 1.424e+01   0.000    1.000
Hhrs        -1.781e-04 1.616e-01  -0.001    0.999
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 67.26 on 52376 degrees of freedom
Multiple R-squared:  0.4976,    Adjusted R-squared:  0.4974
F-statistic:  2730 on 19 and 52376 DF,  p-value: < 2.2e-16

>
> prediction <- predict(final_model, test)
> predicted <- data.frame(cbind(actuals = test$target, prediction =
prediction))
> predicted$prediction <- ifelse(prediction<0, 0, round(prediction,0))
> cor(predicted)
               actuals  prediction
actuals     1.00000000 -0.03790971
prediction -0.03790971  1.00000000
> View(predicted)
```

Conclusion/Interpretation:

Residual standard error: 67.26 on 52376 degrees of freedom
Multiple R-squared: 0.4976, Adjusted R-squared: 0.4974
F-statistic: 2730 on 19 and 52376 DF, p-value: < 2.2e-16

c. Interpret the summary of the linear model.

The R-script for the given problem is as follows:
summary(final_model)

The output of the R-Script (from Console window) is given as follows:

```
> summary(final_model)
```

```
Call:
lm(formula = target ~ talking + d5 + d7 + d8 + d10 + d11 + d12
    + d13 + d16 + d17 + d19 + d20 + d22 + d23 + cc1 + cc2 + cc3
    + cc4 + basetime + postshre + Hhrs, data = train)

Residuals:
    Min      1Q  Median      3Q     Max
-561.80  -13.04   -1.82    0.00 1743.64

Coefficients: (2 not defined because of singularities)
              Estimate Std. Error t value Pr(>|t|)
(Intercept) -2.666e-04  5.008e-01  -0.001    1.000
talking     -5.647e-05  8.142e-02  -0.001    0.999
d5           3.962e-05  1.220e-01   0.000    1.000
d7          -2.452e-04  2.637e-01  -0.001    0.999
d8           1.983e-03  3.565e+00   0.001    1.000
d10          2.184e-05  1.151e-01   0.000    1.000
d11          1.320e-04  4.381e-01   0.000    1.000
d12          5.752e-05  3.379e-01   0.000    1.000
d13                 NA         NA      NA       NA
d16          1.000e+00  1.706e-01   5.862  4.6e-09 ***
d17         -8.778e-05  8.403e-02  -0.001    0.999
d19          1.831e-06  3.633e-03   0.001    1.000
d20         -1.967e-04  1.334e-01  -0.001    0.999
d22          1.001e-04  1.820e-01   0.001    1.000
d23         -2.766e-06  4.255e-03  -0.001    0.999
cc1         -6.988e-03  1.420e+00  -0.005    0.996
cc2          1.500e-02  7.565e+00   0.002    0.998
cc3         -1.322e-03  1.424e+01   0.000    1.000
cc4                 NA         NA      NA       NA
basetime    -9.812e-04  8.624e+00   0.000    1.000
postshre     3.307e-03  1.424e+01   0.000    1.000
Hhrs        -1.781e-04  1.616e-01  -0.001    0.999
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 67.26 on 52376 degrees of freedom
Multiple R-squared:  0.4976,    Adjusted R-squared:  0.4974
F-statistic:  2730 on 19 and 52376 DF,  p-value: < 2.2e-16
```

Conclusion/Interpretation:


```
Residual standard error: 67.26 on 52376 degrees of freedom
Multiple R-squared:  0.4976,    Adjusted R-squared:  0.4974
F-statistic:  2730 on 19 and 52376 DF,  p-value: < 2.2e-16
```


d. Report the test accuracy vs. the training accuracy

The R-script for the given problem is as follows:

```
# test accuracy
round(accuracy(predicted$prediction,predicted$actuals),3)

prediction <- predict(final_model, test)
predicted <- data.frame(cbind(actuals = test$target, prediction = prediction))
```

```
predicted$prediction <- ifelse(prediction<0, 0, round(prediction,0))

min_max_accuracy <- mean(apply(predicted, 1, min) / apply(predicted, 1, max))

# training accuracy
round(accuracy(predicted$prediction,predicted$actuals),3)

prediction <- predict(final_model, train)
predicted <- data.frame(cbind(actuals = train$target, prediction = prediction))
predicted$prediction <- ifelse(prediction<0, 0, round(prediction, 0))
min_max_accuracy <- mean(apply(predicted, 1, min) / apply(predicted, 1, max))
```

The output of the R-Script (from Console window) is given as follows:

```
> # test accuracy
> round(accuracy(predicted$prediction,predicted$actuals),3)

             ME RMSE MAE MPE MAPE Test
set -0.007 67.251 27.405 -Inf Inf >

> prediction <- predict(final_model, test)

> predicted <- data.frame(cbind(actuals = test$target, prediction =
prediction))
> predicted$prediction <- ifelse(prediction<0, 0, round(prediction,0))
>
> min_max_accuracy <- mean(apply(predicted, 1, min) / apply(predicted,
1, max))
> # training accuracy
> round(accuracy(predicted$prediction,predicted$actuals),3)
             ME  RMSE   MAE  MPE MAPE
Test set -0.026 0.207 0.035 -Inf  Inf
>
> prediction <- predict(final_model, train)
> predicted <- data.frame(cbind(actuals = train$target, prediction =
prediction))
> predicted$prediction <- ifelse(prediction<0, 0, round(prediction, 0))
> min_max_accuracy <- mean(apply(predicted, 1, min) / apply(predicted,
1, max))
```

Conclusion/Interpretation:

FOR TEST DATASET:

```
             ME RMSE MAE MPE MAPE Test
set -0.007 67.251 27.405 -Inf Inf
```

FOR TRAIN DATASET

```
             ME  RMSE   MAE  MPE MAPE
Test set -0.026 0.207 0.035 -Inf  Inf
```