**Title: classify the Size\_Categorie using SVM**

> library(caret)

Loading required package: lattice

Loading required package: ggplot2

> library(ggplot2)

> library(psych)

Attaching package: ‘psych’

The following objects are masked from ‘package:ggplot2’:

%+%, alpha

Warning message:

package ‘psych’ was built under R version 4.0.3

> library(kernlab)

Attaching package: ‘kernlab’

The following object is masked from ‘package:psych’:

alpha

The following object is masked from ‘package:ggplot2’:

alpha

Warning message:

package ‘kernlab’ was built under R version 4.0.3

> forest <- read.csv(file.choose())

> View(forest)

> str(forest)

'data.frame': 517 obs. of 31 variables:

$ month : chr "mar" "oct" "oct" "mar" ...

$ day : chr "fri" "tue" "sat" "fri" ...

$ FFMC : num 86.2 90.6 90.6 91.7 89.3 92.3 92.3 91.5 91 92.5 ...

$ DMC : num 26.2 35.4 43.7 33.3 51.3 ...

$ DC : num 94.3 669.1 686.9 77.5 102.2 ...

$ ISI : num 5.1 6.7 6.7 9 9.6 14.7 8.5 10.7 7 7.1 ...

$ temp : num 8.2 18 14.6 8.3 11.4 22.2 24.1 8 13.1 22.8 ...

$ RH : int 51 33 33 97 99 29 27 86 63 40 ...

$ wind : num 6.7 0.9 1.3 4 1.8 5.4 3.1 2.2 5.4 4 ...

$ rain : num 0 0 0 0.2 0 0 0 0 0 0 ...

$ area : num 0 0 0 0 0 0 0 0 0 0 ...

$ dayfri : int 1 0 0 1 0 0 0 0 0 0 ...

$ daymon : int 0 0 0 0 0 0 1 1 0 0 ...

$ daysat : int 0 0 1 0 0 0 0 0 0 1 ...

$ daysun : int 0 0 0 0 1 1 0 0 0 0 ...

$ daythu : int 0 0 0 0 0 0 0 0 0 0 ...

$ daytue : int 0 1 0 0 0 0 0 0 1 0 ...

$ daywed : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthapr : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthaug : int 0 0 0 0 0 1 1 1 0 0 ...

$ monthdec : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthfeb : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthjan : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthjul : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthjun : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthmar : int 1 0 0 1 1 0 0 0 0 0 ...

$ monthmay : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthnov : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthoct : int 0 1 1 0 0 0 0 0 0 0 ...

$ monthsep : int 0 0 0 0 0 0 0 0 1 1 ...

$ size\_category: chr "small" "small" "small" "small" ...

> table(forest$size\_category)

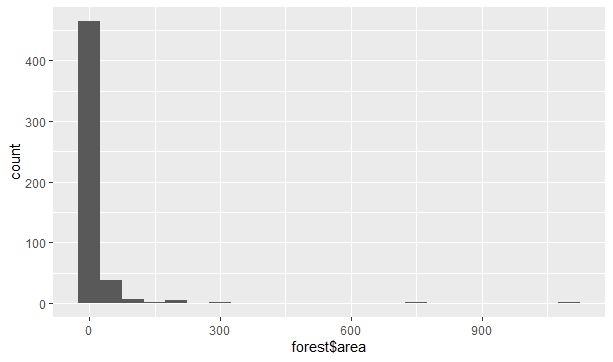
large small

139 378

> ggplot(data = forest)+geom\_histogram(mapping = aes(x=forest$area),binwidth = 50)

Warning message:

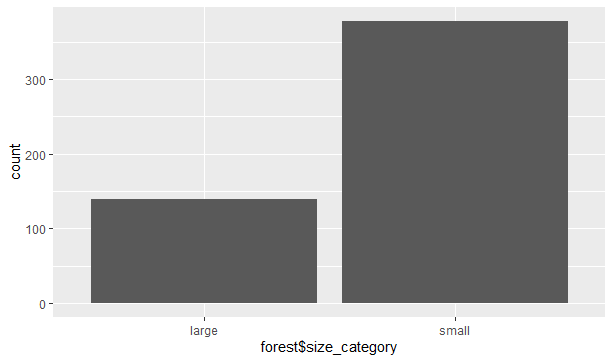
Use of `forest$area` is discouraged. Use `area` instead.



> ggplot(data = forest)+geom\_bar(mapping = aes(x=forest$size\_category))

Warning message:

Use of `forest$size\_category` is discouraged. Use `size\_category` instead.



> summary(forest)

month day FFMC DMC

Length:517 Length:517 Min. :18.70 Min. : 1.1

Class :character Class :character 1st Qu.:90.20 1st Qu.: 68.6

Mode :character Mode :character Median :91.60 Median :108.3

Mean :90.64 Mean :110.9

3rd Qu.:92.90 3rd Qu.:142.4

Max. :96.20 Max. :291.3

DC ISI temp RH wind

Min. : 7.9 Min. : 0.000 Min. : 2.20 Min. : 15.00 Min. :0.400

1st Qu.:437.7 1st Qu.: 6.500 1st Qu.:15.50 1st Qu.: 33.00 1st Qu.:2.700

Median :664.2 Median : 8.400 Median :19.30 Median : 42.00 Median :4.000

Mean :547.9 Mean : 9.022 Mean :18.89 Mean : 44.29 Mean :4.018

3rd Qu.:713.9 3rd Qu.:10.800 3rd Qu.:22.80 3rd Qu.: 53.00 3rd Qu.:4.900

Max. :860.6 Max. :56.100 Max. :33.30 Max. :100.00 Max. :9.400

rain area dayfri daymon

Min. :0.00000 Min. : 0.00 Min. :0.0000 Min. :0.0000

1st Qu.:0.00000 1st Qu.: 0.00 1st Qu.:0.0000 1st Qu.:0.0000

Median :0.00000 Median : 0.52 Median :0.0000 Median :0.0000

Mean :0.02166 Mean : 12.85 Mean :0.1644 Mean :0.1431

3rd Qu.:0.00000 3rd Qu.: 6.57 3rd Qu.:0.0000 3rd Qu.:0.0000

Max. :6.40000 Max. :1090.84 Max. :1.0000 Max. :1.0000

daysat daysun daythu daytue daywed

Min. :0.0000 Min. :0.0000 Min. :0.000 Min. :0.0000 Min. :0.0000

1st Qu.:0.0000 1st Qu.:0.0000 1st Qu.:0.000 1st Qu.:0.0000 1st Qu.:0.0000

Median :0.0000 Median :0.0000 Median :0.000 Median :0.0000 Median :0.0000

Mean :0.1625 Mean :0.1838 Mean :0.118 Mean :0.1238 Mean :0.1044

3rd Qu.:0.0000 3rd Qu.:0.0000 3rd Qu.:0.000 3rd Qu.:0.0000 3rd Qu.:0.0000

Max. :1.0000 Max. :1.0000 Max. :1.000 Max. :1.0000 Max. :1.0000

monthapr monthaug monthdec monthfeb

Min. :0.00000 Min. :0.0000 Min. :0.00000 Min. :0.00000

1st Qu.:0.00000 1st Qu.:0.0000 1st Qu.:0.00000 1st Qu.:0.00000

Median :0.00000 Median :0.0000 Median :0.00000 Median :0.00000

Mean :0.01741 Mean :0.3559 Mean :0.01741 Mean :0.03868

3rd Qu.:0.00000 3rd Qu.:1.0000 3rd Qu.:0.00000 3rd Qu.:0.00000

Max. :1.00000 Max. :1.0000 Max. :1.00000 Max. :1.00000

monthjan monthjul monthjun monthmar

Min. :0.000000 Min. :0.0000 Min. :0.00000 Min. :0.0000

1st Qu.:0.000000 1st Qu.:0.0000 1st Qu.:0.00000 1st Qu.:0.0000

Median :0.000000 Median :0.0000 Median :0.00000 Median :0.0000

Mean :0.003868 Mean :0.0619 Mean :0.03288 Mean :0.1044

3rd Qu.:0.000000 3rd Qu.:0.0000 3rd Qu.:0.00000 3rd Qu.:0.0000

Max. :1.000000 Max. :1.0000 Max. :1.00000 Max. :1.0000

monthmay monthnov monthoct monthsep

Min. :0.000000 Min. :0.000000 Min. :0.00000 Min. :0.0000

1st Qu.:0.000000 1st Qu.:0.000000 1st Qu.:0.00000 1st Qu.:0.0000

Median :0.000000 Median :0.000000 Median :0.00000 Median :0.0000

Mean :0.003868 Mean :0.001934 Mean :0.02901 Mean :0.3327

3rd Qu.:0.000000 3rd Qu.:0.000000 3rd Qu.:0.00000 3rd Qu.:1.0000

Max. :1.000000 Max. :1.000000 Max. :1.00000 Max. :1.0000

size\_category

Length:517

Class :character

Mode :character

> describe(forest)

vars n mean sd median trimmed mad min max range

month\* 1 517 6.76 4.37 7.00 6.72 7.41 1.0 12.00 11.00

day\* 2 517 3.74 1.93 4.00 3.67 2.97 1.0 7.00 6.00

FFMC 3 517 90.64 5.52 91.60 91.45 1.93 18.7 96.20 77.50

DMC 4 517 110.87 64.05 108.30 106.52 51.74 1.1 291.30 290.20

DC 5 517 547.94 248.07 664.20 578.69 118.90 7.9 860.60 852.70

ISI 6 517 9.02 4.56 8.40 8.73 3.11 0.0 56.10 56.10

temp 7 517 18.89 5.81 19.30 19.09 5.34 2.2 33.30 31.10

RH 8 517 44.29 16.32 42.00 42.71 14.83 15.0 100.00 85.00

wind 9 517 4.02 1.79 4.00 3.90 1.93 0.4 9.40 9.00

rain 10 517 0.02 0.30 0.00 0.00 0.00 0.0 6.40 6.40

area 11 517 12.85 63.66 0.52 3.18 0.77 0.0 1090.84 1090.84

dayfri 12 517 0.16 0.37 0.00 0.08 0.00 0.0 1.00 1.00

daymon 13 517 0.14 0.35 0.00 0.06 0.00 0.0 1.00 1.00

daysat 14 517 0.16 0.37 0.00 0.08 0.00 0.0 1.00 1.00

daysun 15 517 0.18 0.39 0.00 0.11 0.00 0.0 1.00 1.00

daythu 16 517 0.12 0.32 0.00 0.02 0.00 0.0 1.00 1.00

daytue 17 517 0.12 0.33 0.00 0.03 0.00 0.0 1.00 1.00

daywed 18 517 0.10 0.31 0.00 0.01 0.00 0.0 1.00 1.00

monthapr 19 517 0.02 0.13 0.00 0.00 0.00 0.0 1.00 1.00

monthaug 20 517 0.36 0.48 0.00 0.32 0.00 0.0 1.00 1.00

monthdec 21 517 0.02 0.13 0.00 0.00 0.00 0.0 1.00 1.00

monthfeb 22 517 0.04 0.19 0.00 0.00 0.00 0.0 1.00 1.00

monthjan 23 517 0.00 0.06 0.00 0.00 0.00 0.0 1.00 1.00

monthjul 24 517 0.06 0.24 0.00 0.00 0.00 0.0 1.00 1.00

monthjun 25 517 0.03 0.18 0.00 0.00 0.00 0.0 1.00 1.00

monthmar 26 517 0.10 0.31 0.00 0.01 0.00 0.0 1.00 1.00

monthmay 27 517 0.00 0.06 0.00 0.00 0.00 0.0 1.00 1.00

monthnov 28 517 0.00 0.04 0.00 0.00 0.00 0.0 1.00 1.00

monthoct 29 517 0.03 0.17 0.00 0.00 0.00 0.0 1.00 1.00

monthsep 30 517 0.33 0.47 0.00 0.29 0.00 0.0 1.00 1.00

size\_category\* 31 517 1.73 0.44 2.00 1.79 0.00 1.0 2.00 1.00

skew kurtosis se

month\* 0.08 -1.72 0.19

day\* 0.16 -1.11 0.08

FFMC -6.54 66.14 0.24

DMC 0.54 0.18 2.82

DC -1.09 -0.27 10.91

ISI 2.52 21.15 0.20

temp -0.33 0.11 0.26

RH 0.86 0.41 0.72

wind 0.57 0.03 0.08

rain 19.70 415.60 0.01

area 12.77 191.50 2.80

dayfri 1.81 1.26 0.02

daymon 2.03 2.13 0.02

daysat 1.82 1.33 0.02

daysun 1.63 0.65 0.02

daythu 2.36 3.58 0.01

daytue 2.28 3.20 0.01

daywed 2.58 4.66 0.01

monthapr 7.36 52.25 0.01

monthaug 0.60 -1.64 0.02

monthdec 7.36 52.25 0.01

monthfeb 4.77 20.80 0.01

monthjan 15.94 252.51 0.00

monthjul 3.63 11.17 0.01

monthjun 5.22 25.34 0.01

monthmar 2.58 4.66 0.01

monthmay 15.94 252.51 0.00

monthnov 22.61 510.01 0.00

monthoct 5.60 29.37 0.01

monthsep 0.71 -1.50 0.02

size\_category\* -1.04 -0.92 0.02

> anyNA(forest)

[1] FALSE

> #creating dummies

> forest$month=as.integer(factor(forest$month,levels = c("jan","feb","mar","apr","may","jun","jul","aug","sep","oct","nov","dec"),labels = c(1,2,3,4,5,6,7,8,9,10,11,12)))

> forest$day=as.integer(factor(forest$day,levels = c("sun","mon","tue","wed","thu","fri","sat"),labels = c(1,2,3,4,5,6,7)))

> forest$size\_category=as.integer(factor(forest$size\_category,levels = c("large","small"),labels = c(1,0)))

> str(forest)

'data.frame': 517 obs. of 31 variables:

$ month : int 3 10 10 3 3 8 8 8 9 9 ...

$ day : int 6 3 7 6 1 1 2 2 3 7 ...

$ FFMC : num 86.2 90.6 90.6 91.7 89.3 92.3 92.3 91.5 91 92.5 ...

$ DMC : num 26.2 35.4 43.7 33.3 51.3 ...

$ DC : num 94.3 669.1 686.9 77.5 102.2 ...

$ ISI : num 5.1 6.7 6.7 9 9.6 14.7 8.5 10.7 7 7.1 ...

$ temp : num 8.2 18 14.6 8.3 11.4 22.2 24.1 8 13.1 22.8 ...

$ RH : int 51 33 33 97 99 29 27 86 63 40 ...

$ wind : num 6.7 0.9 1.3 4 1.8 5.4 3.1 2.2 5.4 4 ...

$ rain : num 0 0 0 0.2 0 0 0 0 0 0 ...

$ area : num 0 0 0 0 0 0 0 0 0 0 ...

$ dayfri : int 1 0 0 1 0 0 0 0 0 0 ...

$ daymon : int 0 0 0 0 0 0 1 1 0 0 ...

$ daysat : int 0 0 1 0 0 0 0 0 0 1 ...

$ daysun : int 0 0 0 0 1 1 0 0 0 0 ...

$ daythu : int 0 0 0 0 0 0 0 0 0 0 ...

$ daytue : int 0 1 0 0 0 0 0 0 1 0 ...

$ daywed : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthapr : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthaug : int 0 0 0 0 0 1 1 1 0 0 ...

$ monthdec : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthfeb : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthjan : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthjul : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthjun : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthmar : int 1 0 0 1 1 0 0 0 0 0 ...

$ monthmay : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthnov : int 0 0 0 0 0 0 0 0 0 0 ...

$ monthoct : int 0 1 1 0 0 0 0 0 0 0 ...

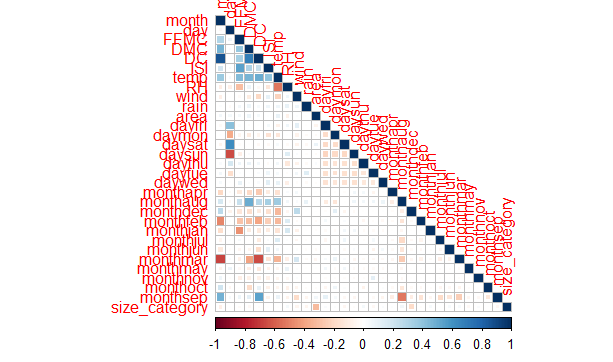
$ monthsep : int 0 0 0 0 0 0 0 0 1 1 ...

$ size\_category: int 2 2 2 2 2 2 2 2 2 2 ...

>

> corr <- cor(forest)

corrplot::corrplot(corr,method = c("square"),type ="lower" )



#Normalising

> norm <- function(x){

+ return((x-min(x))/(max(x)-min(x)))

+ }

>

> forest\_norm <- as.data.frame(lapply(forest,norm))

> head(forest\_norm)

month day FFMC DMC DC ISI temp RH

1 0.1818182 0.8333333 0.8709677 0.08649207 0.10132520 0.09090909 0.1929260 0.4235294

2 0.8181818 0.3333333 0.9277419 0.11819435 0.77541926 0.11942959 0.5080386 0.2117647

3 0.8181818 1.0000000 0.9277419 0.14679531 0.79629412 0.11942959 0.3987138 0.2117647

4 0.1818182 0.8333333 0.9419355 0.11095796 0.08162308 0.16042781 0.1961415 0.9647059

5 0.1818182 0.0000000 0.9109677 0.17298415 0.11058989 0.17112299 0.2958199 0.9882353

6 0.6363636 0.0000000 0.9496774 0.29014473 0.56303507 0.26203209 0.6430868 0.1647059

wind rain area dayfri daymon daysat daysun daythu daytue daywed monthapr

1 0.70000000 0.00000 0 1 0 0 0 0 0 0 0

2 0.05555556 0.00000 0 0 0 0 0 0 1 0 0

3 0.10000000 0.00000 0 0 0 1 0 0 0 0 0

4 0.40000000 0.03125 0 1 0 0 0 0 0 0 0

5 0.15555556 0.00000 0 0 0 0 1 0 0 0 0

6 0.55555556 0.00000 0 0 0 0 1 0 0 0 0

monthaug monthdec monthfeb monthjan monthjul monthjun monthmar monthmay monthnov

1 0 0 0 0 0 0 1 0 0

2 0 0 0 0 0 0 0 0 0

3 0 0 0 0 0 0 0 0 0

4 0 0 0 0 0 0 1 0 0

5 0 0 0 0 0 0 1 0 0

6 1 0 0 0 0 0 0 0 0

monthoct monthsep size\_category

1 0 0 1

2 1 0 1

3 1 0 1

4 0 0 1

5 0 0 1

6 0 0 1

>

> #splitting of data to test and train

> set.seed(100)

> trns <- createDataPartition(forest\_norm$area,p=0.8,list = F)

> tn <- forest\_norm[trns,]

> ts <- forest\_norm[-trns,]

>

> # Model building

>

> #rbfdot

> modelrbfdot <- ksvm(area~.,data=tn,kernel="rbfdot")

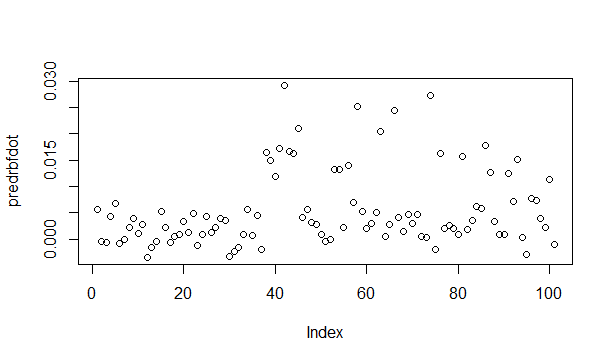
> predrbfdot <- predict(modelrbfdot,newdata=ts)

> cor(predrbfdot,ts$area)

[,1]

[1,] 0.3431461

plot(predrbfdot)



> #besseldot

> modelbessel <- ksvm(area~.,data=tn,kernel="besseldot")

Setting default kernel parameters

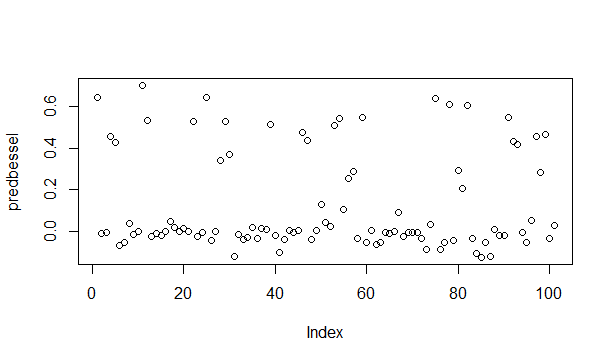
> predbessel <- predict(modelbessel,newdata=ts)

> cor(predbessel,ts$area)

[,1]

[1,] -0.04111227

> plot(predbessel)



#ploydot

> modelpoly <- ksvm(area~.,data=tn,kernel="polydot")

Setting default kernel parameters

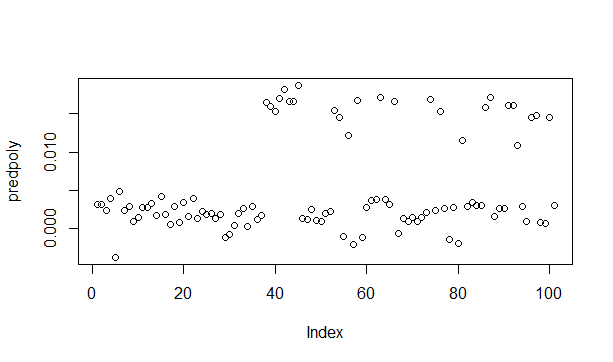
> predpoly <- predict(modelpoly,newdata=ts)

> cor(predpoly,ts$area) #acc = 0.3455455

[,1]

[1,] 0.3455455

> plot(predpoly)



> #vanilladot

> modelvanilla <- ksvm(area~.,data=tn,kernel="vanilladot")

Setting default kernel parameters

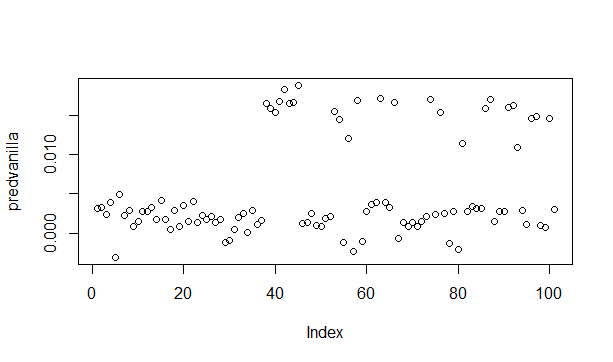
> predvanilla <- predict(modelvanilla,newdata=ts)

> cor(predvanilla,ts$area) #acc = 0.3464077

[,1]

[1,] 0.3464077

> plot(predvanilla)



> #tanhdot

> modeltanh <- ksvm(area~.,data=tn,kernel="tanhdot")

Setting default kernel parameters

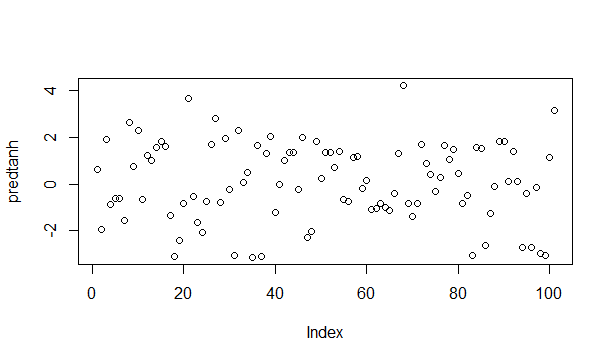
> predtanh <- predict(modeltanh,newdata=ts)

> cor(predtanh,ts$area)

[,1]

[1,] 0.005924511

> plot(predtanh)



#anovadot

> modelanova <- ksvm(area~.,data=tn,kernel="anovadot")

Setting default kernel parameters

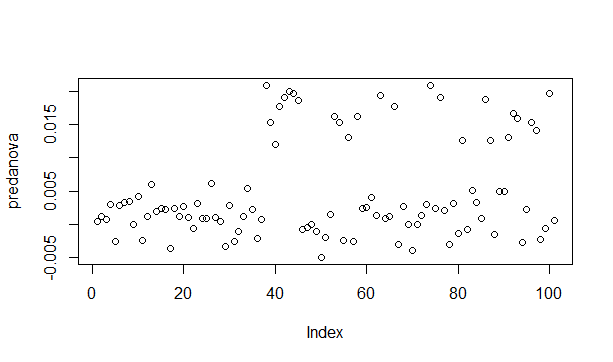
> predanova <- predict(modelanova,newdata=ts)

> cor(predanova,ts$area) #acc = 0.3368088

[,1]

[1,] 0.3368088

> plot(predanova)



> #using bagging method

>

> kernels <- c("rbfdot","polydot","vanilladot","tanhdot","laplacedot","besseldot","anovadot")

> acc\_bag <- list()

> pred\_inf <- list()

> table\_inf <- list()

> for(i in kernels){

+ model\_bag <- ksvm(area~.,data=tn,kernel=i)

+ pred\_bag <- predict(model\_bag,ts)

+ pred\_inf[[i]] <- pred\_bag

+ acc\_bag[[i]] <- (cor(pred\_bag,ts$area))

+ table\_inf <- table(pred\_bag,ts$area)

+ }

Setting default kernel parameters

Setting default kernel parameters

Setting default kernel parameters

Setting default kernel parameters

Setting default kernel parameters

> acc\_bag

$rbfdot

[,1]

[1,] 0.3464792

$polydot

[,1]

[1,] 0.3455455

$vanilladot

[,1]

[1,] 0.3464077

$tanhdot

[,1]

[1,] 0.005924511

$laplacedot

[,1]

[1,] 0.3447945

$besseldot

[,1]

[1,] -0.04111227

$anovadot

[,1]

[1,] 0.3368088

> pred\_inf

$rbfdot

[,1]

[1,] 0.0055235381

[2,] 0.0002937640

[3,] -0.0003760850

[4,] 0.0043287864

[5,] 0.0063759245

[6,] -0.0003612238

[7,] 0.0002175055

[8,] 0.0024799374

[9,] 0.0039723575

[10,] 0.0009358707

[11,] 0.0026161601

[12,] -0.0033290073

[13,] -0.0006498956

[14,] 0.0002744147

[15,] 0.0050088581

[16,] 0.0027927009

[17,] -0.0001142374

[18,] 0.0009953393

[19,] 0.0008030128

[20,] 0.0034959706

[21,] 0.0012072462

[22,] 0.0049244166

[23,] -0.0009249317

[24,] 0.0008160039

[25,] 0.0042545117

[26,] 0.0013925864

[27,] 0.0023012753

[28,] 0.0039809844

[29,] 0.0035219106

[30,] -0.0031164448

[31,] -0.0013714528

[32,] -0.0009608787

[33,] 0.0012869451

[34,] 0.0054575072

[35,] 0.0010310670

[36,] 0.0043328459

[37,] -0.0012385130

[38,] 0.0163087120

[39,] 0.0150743722

[40,] 0.0119676593

[41,] 0.0174029636

[42,] 0.0275961634

[43,] 0.0164531512

[44,] 0.0162046302

[45,] 0.0207862993

[46,] 0.0039926947

[47,] 0.0054703392

[48,] 0.0032527619

[49,] 0.0028864316

[50,] 0.0012335796

[51,] -0.0002252932

[52,] 0.0001228827

[53,] 0.0135643713

[54,] 0.0137644245

[55,] 0.0019945898

[56,] 0.0137566718

[57,] 0.0059827745

[58,] 0.0244478746

[59,] 0.0045454028

[60,] 0.0022065884

[61,] 0.0030303802

[62,] 0.0049154407

[63,] 0.0199550872

[64,] 0.0009212730

[65,] 0.0029724095

[66,] 0.0235689314

[67,] 0.0041783826

[68,] 0.0014574975

[69,] 0.0044497293

[70,] 0.0028258480

[71,] 0.0044497293

[72,] 0.0005483527

[73,] 0.0004162945

[74,] 0.0260433219

[75,] -0.0024131621

[76,] 0.0162827235

[77,] 0.0016817110

[78,] 0.0022452980

[79,] 0.0016175337

[80,] 0.0006554819

[81,] 0.0148209618

[82,] 0.0019370744

[83,] 0.0035820943

[84,] 0.0059783846

[85,] 0.0057174662

[86,] 0.0176376460

[87,] 0.0128637612

[88,] 0.0033074890

[89,] 0.0011400065

[90,] 0.0011400065

[91,] 0.0129443262

[92,] 0.0076272717

[93,] 0.0144719952

[94,] 0.0010427072

[95,] -0.0027462668

[96,] 0.0080713413

[97,] 0.0071456248

[98,] 0.0039834170

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pred\_bag 0.00242015327637417 0.00246598951266914 0.0025118257489641

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pred\_bag 0.00268600344688497 0.00302519159546771 0.00320853654064757

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pred\_bag 0.00643540757581313 0.00645374207033112 0.006609585273734

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pred\_bag 0.00849803820908658 0.0091305782699571 0.00917641450625206

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pred\_bag 0.0099189615342305 0.0102856514245902 0.0115874005353672

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pred\_bag 0.0130999963331011 0.0140625572952954 0.0149701147739357

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pred\_bag 0.029078508305526 0.0428110446994976 0.0454603791573466

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pred\_bag 0.0560393824942246 0.087253859411096 0.0947801694107294

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pred\_bag 0.195152359649444 0.255335337904734 1

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[ reached getOption("max.print") -- omitted 80 rows ]

> acc\_bagg <- data.frame(kernels,acc\_bag)

> ggplot(data = acc\_bagg)+

+ geom\_col(mapping=aes(x=1:7,y=acc\_bag))

