AYUDANTÍA NO PRESENCIAL

1) MODELOS COMBINADOS

Cargar librerias

```
#install.packages("MASS")
#install.packages("randomForest")
#install.packages("ggplot2")
#install.packages("tibble")
#install.packages("dplyr")
#install.packages("ipred")
set.seed(125)
library(MASS)
library(randomForest)
library(ggplot2)
library(tibble)
library(dplyr)
library(ipred)
```

Cargar set de datos

Separamos en train y test.

NOTA: Dado que las etapas de preprocesamiento y transformacion no son el foco seran omitidas

```
data("Boston")
index <- sample(nrow(Boston),nrow(Boston)*0.70) # separar train/test
boston.train <- Boston[index,]
boston.test <- Boston[-index,]
rm(Boston)
```

Exploración del set

El data set tiene 14 columnas: 1 variables respuesta y 13 predictores.

```
head(Boston)
```

Bagging

En lugar de ajustar un único árbol, se ajustan muchos de ellos en paralelo formando un "bosque". En cada nueva predicción, todos los árboles que forman el "bosque" participan aportando su predicción. Como valor final, se toma la media de todas las predicciones (variables continuas) o la clase más frecuente (variables cualitativas). Uno de los métodos de bagging más conocidos es Random Forest. El paquete de R "ipred", tiene funciones facilitadoras para el Bagging.

Instalamos el paquete ipred

```
#install.packages("ipred")
library(ipred)
```

Bagging para un arbol de decisiones

Modelo simple de Bagging con 100 replicaciones. Calculamos el error cuadrático medio.

```
boston.bag<- bagging(medv~., data = boston.train, nbagg=100)
boston.bag.pred<- predict(boston.bag, newdata = boston.test)
```

```r
mean((boston.test$medv-boston.bag.pred)^2)
rm(boston.bag,boston.bag.pred)
```

14.6008387807017

Para el caso de un árbol normal.

```r
#install.packages("rpart")
library(rpart)
```

```r
boston.tree<- rpart(medv~., data = boston.train)
boston.tree.pred<- predict(boston.tree, newdata = boston.test)
mean((boston.test$medv-boston.tree.pred)^2)
rm(boston.tree,boston.tree.pred)
```

21.1008575041993

Como podemos ver, ingresar árboles paralelos al modelo disminuye el error. Cabe preguntarse, **¿Hasta cuantos árboles es eficiente ingresar?**

Numero optimo de arboles

```r
ntree<- c(1, 3, 5, seq(10, 200, 10))
MSE.test<- rep(0, length(ntree))
for(i in 1:length(ntree)){
  boston.bag1<- bagging(medv~., data = boston.train, nbagg=ntree[i])
  boston.bag.pred1<- predict(boston.bag1, newdata = boston.test)
  MSE.test[i]<- mean((boston.test$medv-boston.bag.pred1)^2)
}
plot(ntree, MSE.test, type = 'l', col=2, lwd=2)
rm(boston.bag1,boston.bag.pred1)
```

> **Notar que a mayor cantidad de árboles llega un punto donde su ganancia marginal es nula. Además, ingresar demasiados árboles tiende a sobreajustarse a la base de entrenamiento, lo que perjudicaría el modelo y su capacidad de adaptarse a nuevos datos.**

Out-of-bag (OOB)

OOB es una forma de validar un modelo de Random Forest. En cada iteración de Bootstrap, las muestras no usadas servirán para testear el modelo. Finalmente, se muestra el MSE disminuído.

```r
boston.bag.oob<- bagging(medv~., data = boston.train, coob=T, nbagg=100)
boston.bag.oob # coob=T significa que sea TRUE el uso de OOB
rm(boston.bag.oob)
```

```
Bagging regression trees with 100 bootstrap replications

Call: bagging.data.frame(formula = medv ~ ., data = boston.train, coob = T,
    nbagg = 100)

Out-of-bag estimate of root mean squared error:  4.2551
```

RANDOM FOREST

Random Forest es un derivado del Bagging, y mejora significativamente la predicción. La idea es que, aleatoriamente, se selecciona un subconjunto de predictores como variables candidatas en cada separación

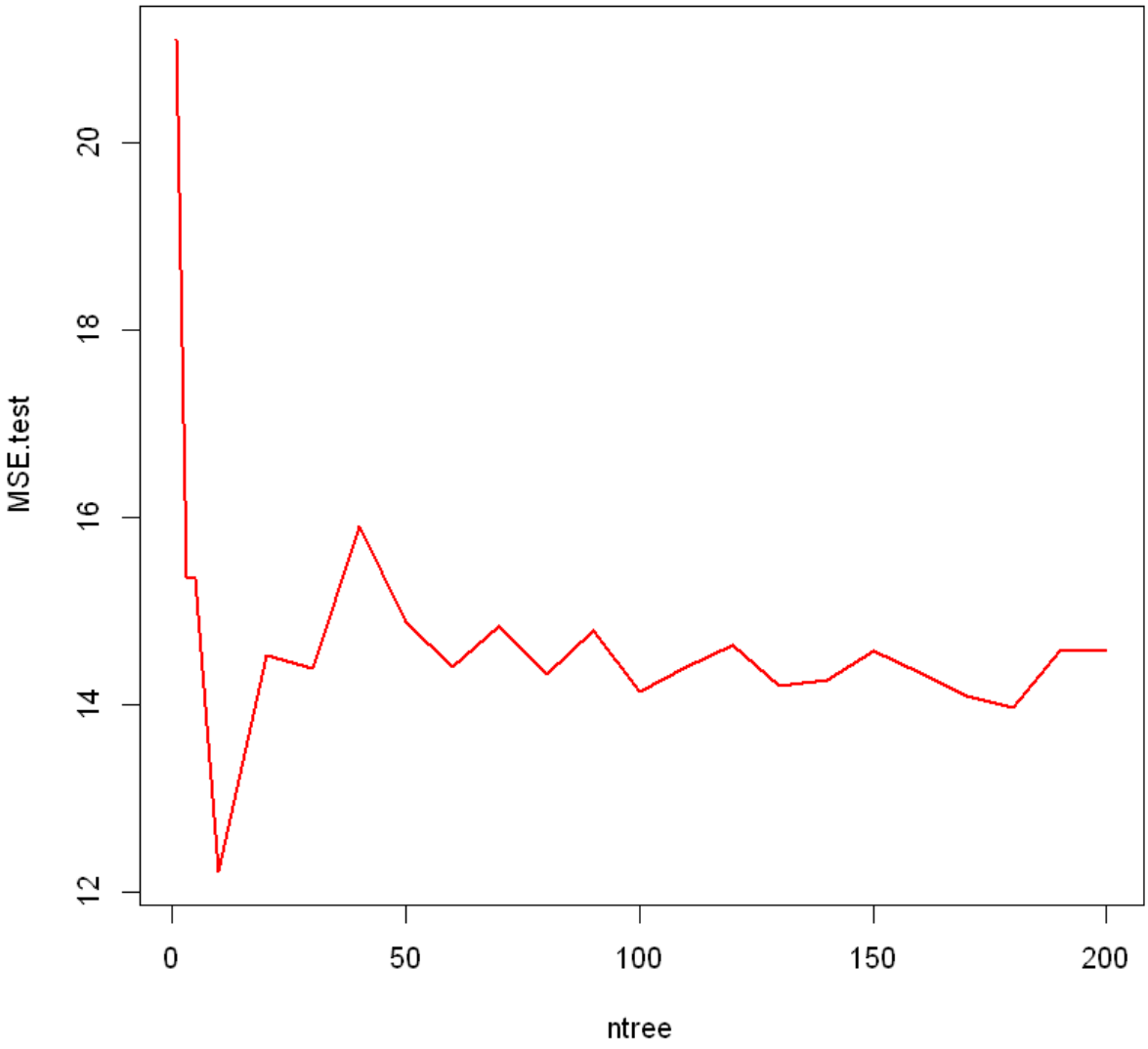

Figure 1: png

del árbol. La razón de esto es adaptarse a las correlaciónes naturales entre las variables y los árboles, así se reduce la varianza al agregar árboles.

```
library(randomForest)
boston.rf<- randomForest(medv~., data = boston.train, importance=TRUE)
boston.rf
```

```
Call:
 randomForest(formula = medv ~ ., data = boston.train, importance = TRUE)
               Type of random forest: regression
                     Number of trees: 500
No. of variables tried at each split: 4

          Mean of squared residuals: 12.50255
                    % Var explained: 85.06
```

Por defecto, el modelo de árbol de regresión utiliza un tercio de las variables como predictoras en cada iteración. Mientras que utiliza la raíz de las variables para las el problema de clasificación poor defecto. En ambos casos se puede cambiar modificando el hyperparámetro **mtry=**. También se puede especificar el número de árboles con el hyperparámetro **ntree=**. por defecto se utilizan 500. El argumento **importance=TRUE** nos permite ver la importancia de cada variable en el modelo.

Tabla con Feature Importances

```
tabla<- rownames_to_column(data.frame(boston.rf$importance),"Variable")
tabla
```

A data.frame: 13 × 3

Variable

X.IncMSE

IncNodePurity

<chr>

<dbl>

<dbl>

crim

7.6486481

1722.89516

zn

0.9453036

277.94043

indus

8.4174948

2163.93997

chas

0.1716375

64.33896

nox

10.9156503

2166.44884

rm

35.4212732

8856.93299

age

5.2684310

979.69613

dis

5.7751579

1547.28728

rad

1.5132440

320.90579

tax

4.0493400

918.71034

ptratio

6.1823490

1723.88378

black

1.0908891

613.63540

lstat

51.1183895

7617.72310

Gráfico con Feature Importances

```
tabla %>% ggplot(aes(y=X.IncMSE,x=Variable))+geom_bar(stat="identity")+
  coord_flip()+theme_classic()+
  geom_text(aes(x=Variable,y=X.IncMSE,label=X.IncMSE),hjust=0)
```

OBB y RANDOM FOREST

El Random Forest guarda todos los errores del OOB para cada ntree desde 1 a 500. podemos graficarlo para ver cómo el error OOB cambia según el número de árboles ntree.

```
plot(boston.rf$mse, type='l', col=2, lwd=2, xlab = "ntree", ylab = "OOB Error")
```

Podemos ver el error al aplicar el modelo en la base test

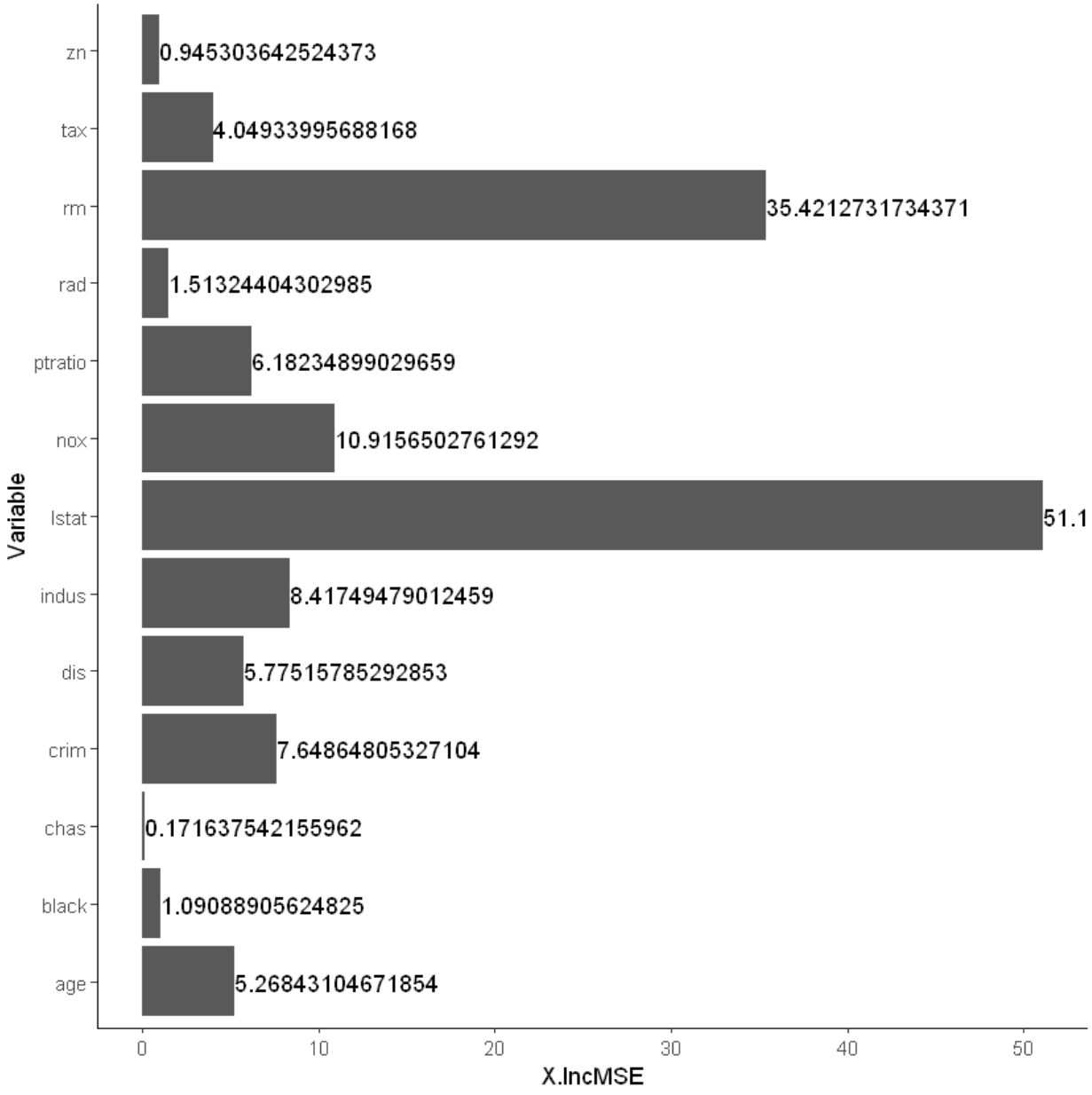
zn
tax
rm
rad
ptratio
nox
lstat
indus
dis
crim
chas
black
age
Variable
0.945303642524373
4.04933995688168
35.4212731734371
1.51324404302985
6.18234899029659
10.9156502761292
51.1
8.41749479012459
5.77515785292853
7.64864805327104
0.171637542155962
1.09088905624825
5.26843104671854
0
10
20
30
40
50
X.IncMSE

Figure 2: png

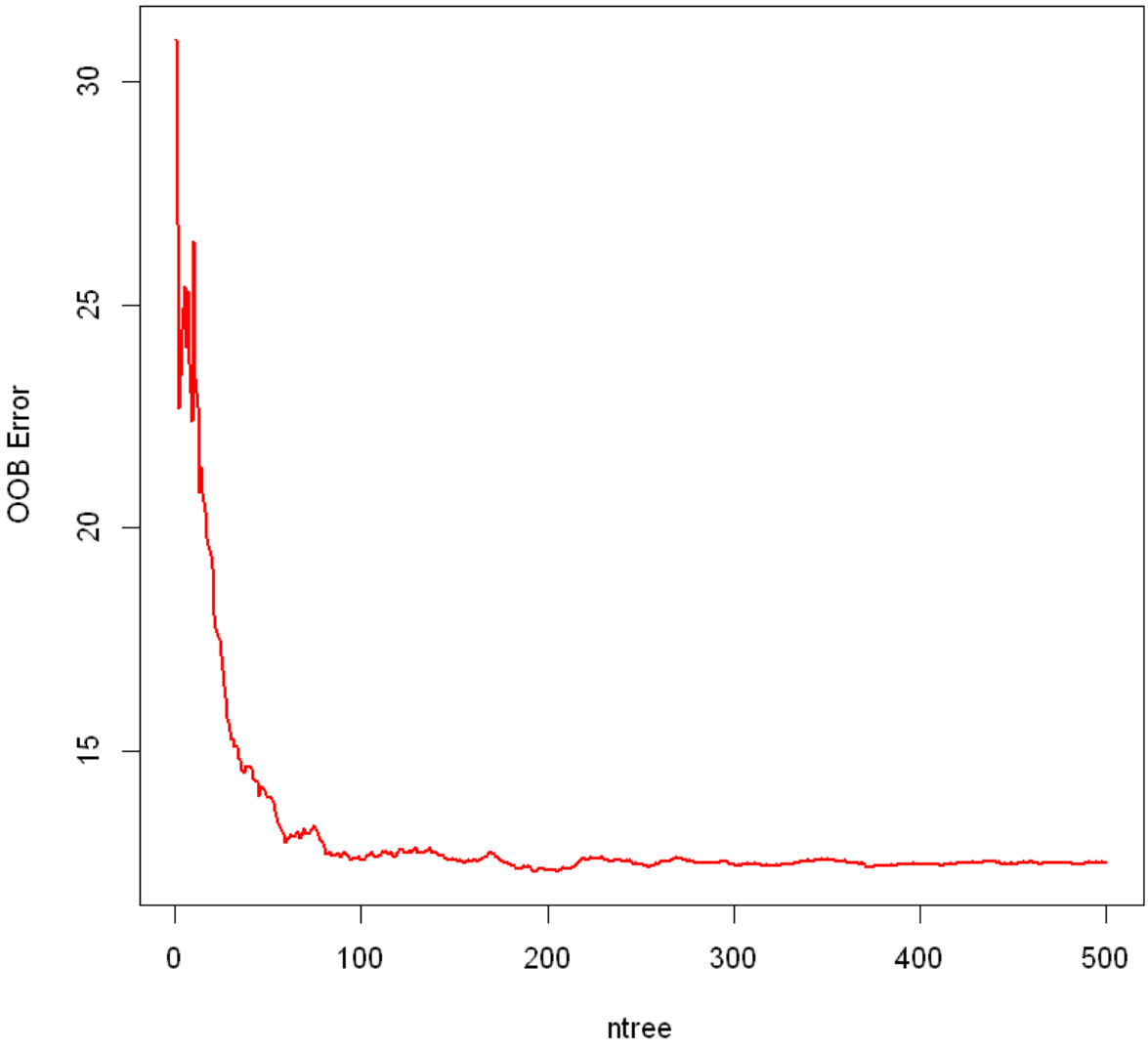

Figure 3: png

```
boston.rf.pred<- predict(boston.rf, boston.test)
mean((boston.test$medv-boston.rf.pred)^2)
rm(boston.rf)
```

10.7169607941446

Como se dijo previamente, el número de variables candidatas en cada iteración o separación es la raíz de las variables totales: Si son 13 variables, m~4. También podemos especificar este número en el argumento **mtry=**. Ahora podemos graficar las diferencias del error en OOB y el testing y como éstos cambian según el hyperparametro **mtry=**

```
oob.err<- rep(0, 13)
test.err<- rep(0, 13)
for(i in 1:13){
  fit<- randomForest(medv~., data = boston.train, mtry=i)
  oob.err[i]<- fit$mse[500]
  test.err[i]<- mean((boston.test$medv-predict(fit, boston.test))^2)
  cat(i, " ")
}
matplot(cbind(test.err, oob.err), pch=15, col = c("red", "blue"), type = "b", ylab = "MSE", xlab = "mtry
  legend("topright", legend = c("test Error", "OOB Error"), pch = 15, col = c("red", "blue"))
```

```
1  2  3  4  5  6  7  8  9  10  11  12  13
```

```
Error in matplot(cbind(test.err, oob.err), pch = 15, col = c("red", "blue"), : argumento no-numérico pa
Traceback:
```

BOOSTING

Consiste en ajustar secuencialmente múltiples modelos sencillos, llamados weak learners, de forma que cada modelo aprende de los errores del anterior. Como valor final, al igual que en bagging, se toma la media de todas las predicciones (variables continuas) o la clase más frecuente (variables cualitativas). Tres de los métodos de boosting más empleados son AdaBoost, Gradient Boosting y * Stochastic Gradient Boosting*.

```
install.packages("gbm")
library(gbm)
```

```
Installing package into 'C:/Users/feseg/OneDrive/Documentos/R/win-library/3.6'
(as 'lib' is unspecified)
```

```
package 'gbm' successfully unpacked and MD5 sums checked
```

```
Warning message:
"cannot remove prior installation of package 'gbm'"Warning message in file.copy(savedcopy, lib, recursi
"problema al copiar C:\Users\feseg\OneDrive\Documentos\R\win-library\3.6\00LOCK\gbm\libs\x64\gbm.dll  a
"restored 'gbm'"
```

```
The downloaded binary packages are in
    C:\Users\feseg\AppData\Local\Temp\RtmpqqKUbs\downloaded_packages
```

```
Loaded gbm 2.1.5
```

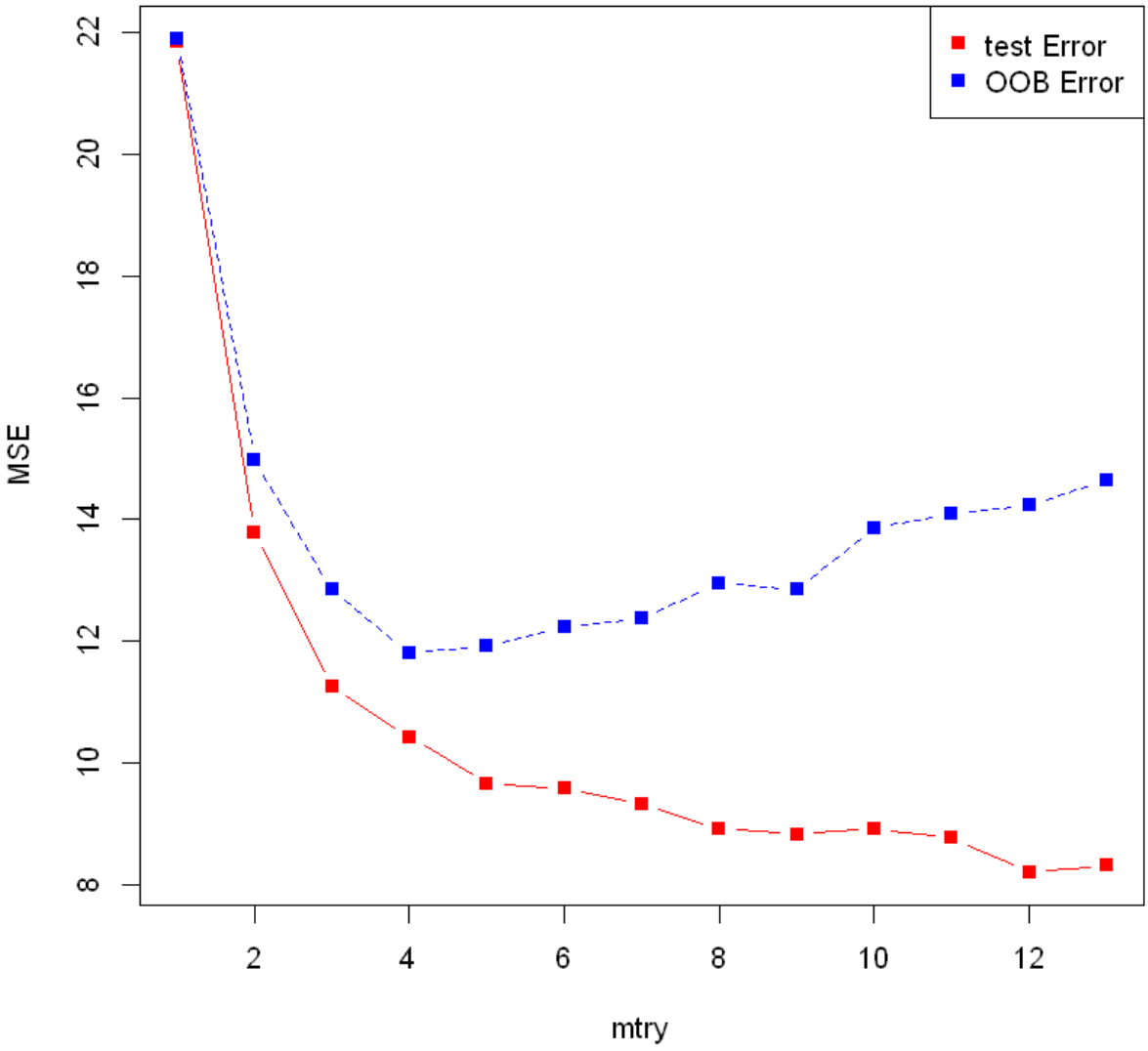

Figure 4: png

```
boston.boost<- gbm(medv~., data = boston.train, distribution = "gaussian",
                   n.trees = 10000, shrinkage = 0.01, interaction.depth = 8)
summary(boston.boost)

boston.boost.pred.test<- predict(boston.boost, boston.test, n.trees = 10000)
mean((boston.test$medv-boston.boost.pred.test)^2)
```

A data.frame: 13 × 2

var

rel.inf

<fct>

<dbl>

lstat

lstat

35.05254078

rm

rm

33.46763381

dis

dis

7.43413837

nox

nox

5.14080480

crim

crim

4.88776641

age

age

3.85606598

ptratio

ptratio

2.99971204

black

black

2.70122402

tax

tax

2.32318795

indus

indus

1.24348825

rad

rad

0.65065339

zn

zn

0.14796637

chas

chas

0.09481782

9.18446843327496

Notar que debemos especificar el tipo de distribución en distribution = **"gaussian"** al trabajar en árboles de regresión. Por defecto esto trabaja en distribución **Bernoulli** para clasificación binaria.

- **n.trees** corresponde al número de árboles a ajustar. A mayor n.trees podría haber mayor sobreajuste.
- **shrinkage** es un argumento para decidir cuanta contribución aporta cada nuevo árbol al modelo.
- **interaction.depth** es cuantas separaciones tendrá cada árbol.

La mejor manera de ajustar estos parámetros es mediante Validación cruzada y grid search (que se verá en la respectiva ayudantía).

```
ntree<- seq(100, 10000, 100)
predmat<- predict(boston.boost, newdata = boston.test, n.trees = ntree)
err<- apply((predmat-boston.test$medv)^2, 2, mean)
plot(ntree, err, type = 'l', col=2, lwd=2, xlab = "n.trees", ylab = "Test MSE")
abline(h=min(test.err), lty=2)
```

2) GRID SEARCH

El paquete caret R proporciona un Gridsearch donde puede especificar los parámetros para tratar su problema. Y probará todas las combinaciones y localizará la combinación que ofrezca los mejores resultados. No todos los algoritmos de aprendizaje automático están disponibles para el ajuste En https://topepo.github.io/caret/available-models.html pueden verificar que parametros del modelo de caret se pueden ajustar

Cargar librerias

```
#install.packages("mlbench")
#install.packages("caret")
#install.packages("e1071")
library(mlbench)
library(caret)
library(e1071)
set.seed(1)
```

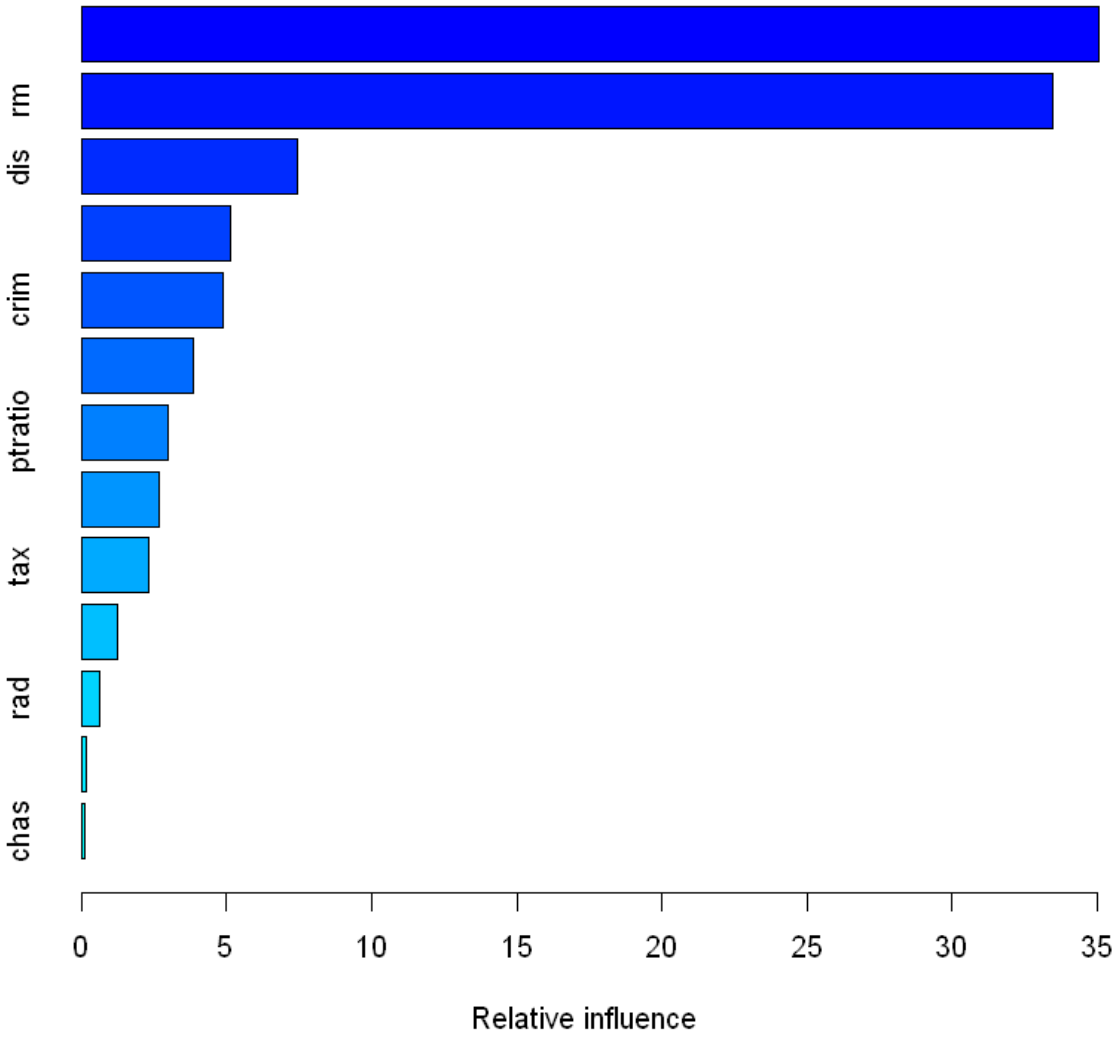
rm
dis
crim
ptratio
tax
rad
chas
0
5
10
15
20
25
30
35
Relative influence

Figure 5: png

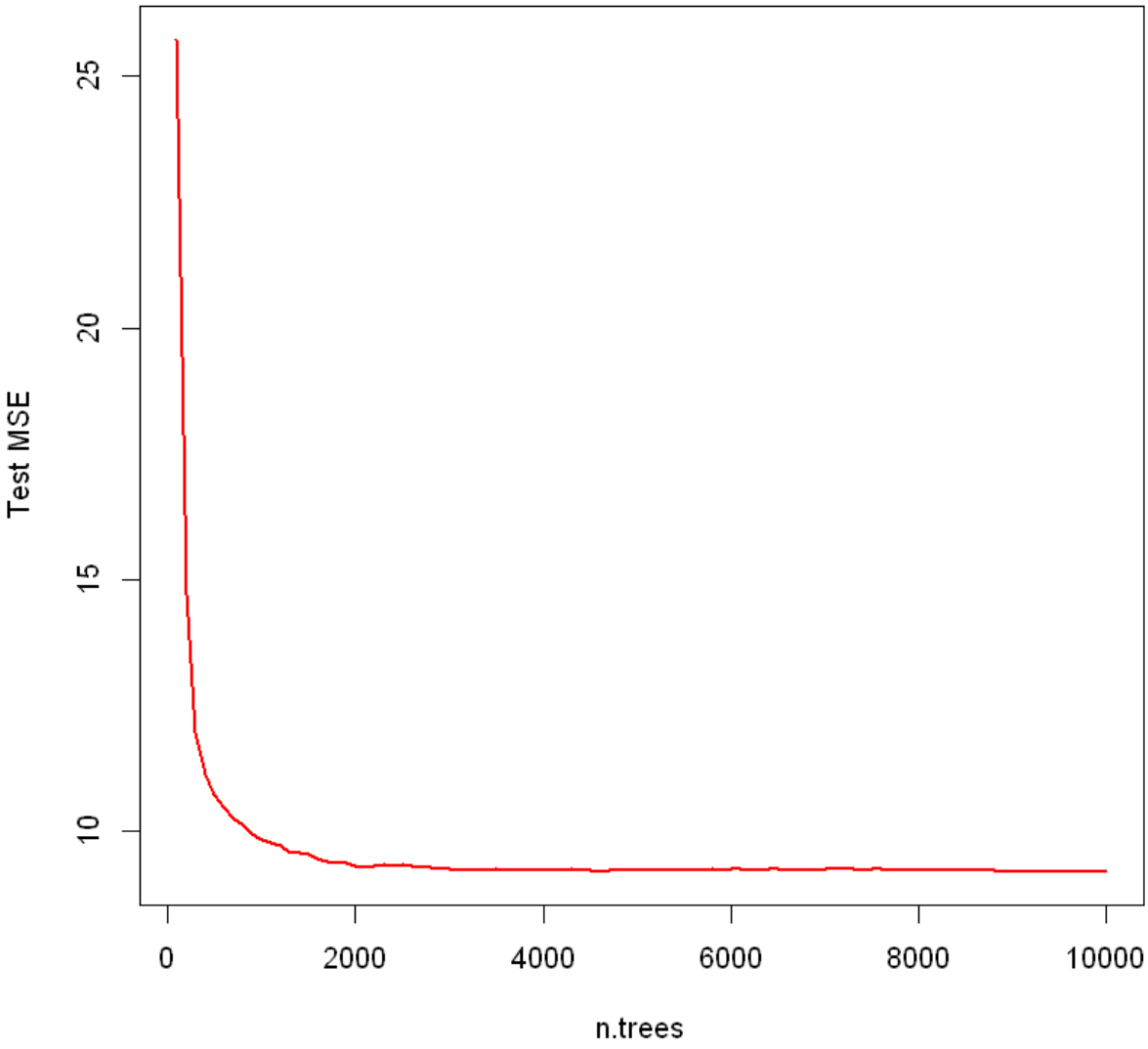

Figure 6: png

Cargamos la base

Particionamos la base en training y testing

DADO QUE LAS ETAPAS DE PREPROCESAMIENTO Y TRANSFORMACION NO SON EL FOCO DE ESTA AYUDANTIA SERAN OMITIDAS.

```
data(Sonar)
Base <- Sonar
Variables <- Base[,1:60]
Clase <- Base[,61]

inTraining <- createDataPartition(Base$Class, p = .70, list =FALSE)

#Training corresponde al 70% de la base train
training <- Base[inTraining,]

#Testing corresponde al restante 30% de la base train
testing  <- Base[-inTraining,]
```

Exploración de la base

```
head(Sonar)
```

A data.frame: 6 × 61

V1

V2

V3

V4

V5

V6

V7

V8

V9

V10

...

V52

V53

V54

V55

V56

V57

V58

V59

V60

Class

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

...

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<fct>

0.0200

0.0371

0.0428

0.0207

0.0954

0.0986

0.1539

0.1601

0.3109

0.2111

...

0.0027

0.0065

0.0159

0.0072

0.0167

0.0180

0.0084

0.0090

0.0032

R

0.0453

0.0523

0.0843

0.0689

0.1183

0.2583

0.2156

0.3481

0.3337

0.2872

...

0.0084

0.0089

0.0048

0.0094

0.0191

0.0140

0.0049

0.0052

0.0044

R

0.0262

0.0582

0.1099

0.1083

0.0974

0.2280

0.2431

0.3771

0.5598

0.6194

...

0.0232

0.0166

0.0095

0.0180

0.0244

0.0316

0.0164

0.0095

0.0078

R

0.0100

0.0171

0.0623

0.0205

0.0205

0.0368

0.1098

0.1276

0.0598

0.1264

...

0.0121

0.0036

0.0150

0.0085

0.0073

0.0050

0.0044

0.0040

0.0117

R

0.0762

0.0666

0.0481

0.0394

0.0590

0.0649

0.1209

0.2467

0.3564

0.4459

...

0.0031

0.0054

0.0105

0.0110

0.0015

0.0072

0.0048

0.0107

0.0094

R

0.0286

0.0453

0.0277

0.0174

0.0384

0.0990

0.1201

0.1833

0.2105

0.3039

...

0.0045

0.0014

0.0038

0.0013

0.0089

0.0057

0.0027

0.0051

0.0062

R

Primera opción de Grid Search: Automatic Grid

Permite que el sistema lo haga automáticamente. Esto se puede hacer configurando **tuneLength** para indicar el número de valores diferentes para probar para cada parámetro del algoritmo.

OJO: ESTE MÉTODO PUEDE TOMAR ARTO TIEMPO COMPUTACIONAL Y EN ESPECIAL CUANDO ELIGEN UN **tunelength** MUY GRANDE

MODELO SVM

El modelo **svmPoly** tiene como parametros: degree, scale, C

C: es el parámetro de regularización, C, del término de error es el grado de la función del núcleo polinomial ('poli') y es ignorado por todos los demás núcleos. El valor predeterminado es 3.

- El código en la celda a continuación utiliza la capacidad del paquete R Caret para estimar los mejores hiperparámetros usando la validación cruzada 5 veces. Esta primera validación cruzada se realiza utilizando ROC como la métrica. Hay algunos puntos a tener en cuenta aquí:
- **trainControl** se utiliza para definir el entrenamiento. Por ejemplo:
  - `method = cv` corresponde a la cross-validation y `number=10` corresponde a 10 fold.
  - Se especifica la función `twoClassSummary`, lo que convierte a ROC en la métrica para la optimización de hiperparámetros.
  - El argumento `tuneLength` le dice al algoritmo que pruebe diferentes valores predeterminados para el parámetro principal

```
control_svm <- trainControl(method='cv',
                        number=10,

                        verboseIter = TRUE,
                        summaryFunction = twoClassSummary,
                        classProbs = TRUE)
# Entrenamiento de la base training utilizando el metodo de support vector machine con AUTOMATIC GRID
model_SVM_AG <- train(
  Class ~ ., training,
  method = "svmPoly",
  trControl = control_svm,
  tuneLength = 6,
  metric ="ROC"
  )
```

```
+ Fold01: degree=1, scale=1e-03, C=0.25
- Fold01: degree=1, scale=1e-03, C=0.25
+ Fold01: degree=2, scale=1e-03, C=0.25
- Fold01: degree=2, scale=1e-03, C=0.25
+ Fold01: degree=3, scale=1e-03, C=0.25
- Fold01: degree=3, scale=1e-03, C=0.25
+ Fold01: degree=1, scale=1e-02, C=0.25
```

```
- Fold01: degree=1, scale=1e-02, C=0.25
+ Fold01: degree=2, scale=1e-02, C=0.25
- Fold01: degree=2, scale=1e-02, C=0.25
+ Fold01: degree=3, scale=1e-02, C=0.25
- Fold01: degree=3, scale=1e-02, C=0.25
+ Fold01: degree=1, scale=1e-01, C=0.25
- Fold01: degree=1, scale=1e-01, C=0.25
+ Fold01: degree=2, scale=1e-01, C=0.25
- Fold01: degree=2, scale=1e-01, C=0.25
+ Fold01: degree=3, scale=1e-01, C=0.25
- Fold01: degree=3, scale=1e-01, C=0.25
+ Fold01: degree=1, scale=1e+00, C=0.25
- Fold01: degree=1, scale=1e+00, C=0.25
+ Fold01: degree=2, scale=1e+00, C=0.25
- Fold01: degree=2, scale=1e+00, C=0.25
+ Fold01: degree=3, scale=1e+00, C=0.25
- Fold01: degree=3, scale=1e+00, C=0.25
+ Fold01: degree=1, scale=1e+01, C=0.25
- Fold01: degree=1, scale=1e+01, C=0.25
+ Fold01: degree=2, scale=1e+01, C=0.25
- Fold01: degree=2, scale=1e+01, C=0.25
+ Fold01: degree=3, scale=1e+01, C=0.25
- Fold01: degree=3, scale=1e+01, C=0.25
+ Fold01: degree=1, scale=1e+02, C=0.25
- Fold01: degree=1, scale=1e+02, C=0.25
+ Fold01: degree=2, scale=1e+02, C=0.25
- Fold01: degree=2, scale=1e+02, C=0.25
+ Fold01: degree=3, scale=1e+02, C=0.25
- Fold01: degree=3, scale=1e+02, C=0.25
+ Fold01: degree=1, scale=1e-03, C=0.50
- Fold01: degree=1, scale=1e-03, C=0.50
+ Fold01: degree=2, scale=1e-03, C=0.50
- Fold01: degree=2, scale=1e-03, C=0.50
+ Fold01: degree=3, scale=1e-03, C=0.50
- Fold01: degree=3, scale=1e-03, C=0.50
+ Fold01: degree=1, scale=1e-02, C=0.50
- Fold01: degree=1, scale=1e-02, C=0.50
+ Fold01: degree=2, scale=1e-02, C=0.50
- Fold01: degree=2, scale=1e-02, C=0.50
+ Fold01: degree=3, scale=1e-02, C=0.50
- Fold01: degree=3, scale=1e-02, C=0.50
+ Fold01: degree=1, scale=1e-01, C=0.50
- Fold01: degree=1, scale=1e-01, C=0.50
+ Fold01: degree=2, scale=1e-01, C=0.50
- Fold01: degree=2, scale=1e-01, C=0.50
+ Fold01: degree=3, scale=1e-01, C=0.50
- Fold01: degree=3, scale=1e-01, C=0.50
+ Fold01: degree=1, scale=1e+00, C=0.50
- Fold01: degree=1, scale=1e+00, C=0.50
+ Fold01: degree=2, scale=1e+00, C=0.50
- Fold01: degree=2, scale=1e+00, C=0.50
+ Fold01: degree=3, scale=1e+00, C=0.50
- Fold01: degree=3, scale=1e+00, C=0.50
+ Fold01: degree=1, scale=1e+01, C=0.50
```

```
- Fold01: degree=1, scale=1e+01, C=0.50
+ Fold01: degree=2, scale=1e+01, C=0.50
- Fold01: degree=2, scale=1e+01, C=0.50
+ Fold01: degree=3, scale=1e+01, C=0.50
- Fold01: degree=3, scale=1e+01, C=0.50
+ Fold01: degree=1, scale=1e+02, C=0.50
- Fold01: degree=1, scale=1e+02, C=0.50
+ Fold01: degree=2, scale=1e+02, C=0.50
- Fold01: degree=2, scale=1e+02, C=0.50
+ Fold01: degree=3, scale=1e+02, C=0.50
- Fold01: degree=3, scale=1e+02, C=0.50
+ Fold01: degree=1, scale=1e-03, C=1.00
- Fold01: degree=1, scale=1e-03, C=1.00
+ Fold01: degree=2, scale=1e-03, C=1.00
- Fold01: degree=2, scale=1e-03, C=1.00
+ Fold01: degree=3, scale=1e-03, C=1.00
- Fold01: degree=3, scale=1e-03, C=1.00
+ Fold01: degree=1, scale=1e-02, C=1.00
- Fold01: degree=1, scale=1e-02, C=1.00
+ Fold01: degree=2, scale=1e-02, C=1.00
- Fold01: degree=2, scale=1e-02, C=1.00
+ Fold01: degree=3, scale=1e-02, C=1.00
- Fold01: degree=3, scale=1e-02, C=1.00
+ Fold01: degree=1, scale=1e-01, C=1.00
- Fold01: degree=1, scale=1e-01, C=1.00
+ Fold01: degree=2, scale=1e-01, C=1.00
- Fold01: degree=2, scale=1e-01, C=1.00
+ Fold01: degree=3, scale=1e-01, C=1.00
- Fold01: degree=3, scale=1e-01, C=1.00
+ Fold01: degree=1, scale=1e+00, C=1.00
- Fold01: degree=1, scale=1e+00, C=1.00
+ Fold01: degree=2, scale=1e+00, C=1.00
- Fold01: degree=2, scale=1e+00, C=1.00
+ Fold01: degree=3, scale=1e+00, C=1.00
- Fold01: degree=3, scale=1e+00, C=1.00
+ Fold01: degree=1, scale=1e+01, C=1.00
- Fold01: degree=1, scale=1e+01, C=1.00
+ Fold01: degree=2, scale=1e+01, C=1.00
- Fold01: degree=2, scale=1e+01, C=1.00
+ Fold01: degree=3, scale=1e+01, C=1.00
- Fold01: degree=3, scale=1e+01, C=1.00
+ Fold01: degree=1, scale=1e+02, C=1.00
- Fold01: degree=1, scale=1e+02, C=1.00
+ Fold01: degree=2, scale=1e+02, C=1.00
- Fold01: degree=2, scale=1e+02, C=1.00
+ Fold01: degree=3, scale=1e+02, C=1.00
- Fold01: degree=3, scale=1e+02, C=1.00
+ Fold01: degree=1, scale=1e-03, C=2.00
- Fold01: degree=1, scale=1e-03, C=2.00
+ Fold01: degree=2, scale=1e-03, C=2.00
- Fold01: degree=2, scale=1e-03, C=2.00
+ Fold01: degree=3, scale=1e-03, C=2.00
- Fold01: degree=3, scale=1e-03, C=2.00
+ Fold01: degree=1, scale=1e-02, C=2.00
```

```
- Fold01: degree=1, scale=1e-02, C=2.00
+ Fold01: degree=2, scale=1e-02, C=2.00
- Fold01: degree=2, scale=1e-02, C=2.00
+ Fold01: degree=3, scale=1e-02, C=2.00
- Fold01: degree=3, scale=1e-02, C=2.00
+ Fold01: degree=1, scale=1e-01, C=2.00
- Fold01: degree=1, scale=1e-01, C=2.00
+ Fold01: degree=2, scale=1e-01, C=2.00
- Fold01: degree=2, scale=1e-01, C=2.00
+ Fold01: degree=3, scale=1e-01, C=2.00
- Fold01: degree=3, scale=1e-01, C=2.00
+ Fold01: degree=1, scale=1e+00, C=2.00
- Fold01: degree=1, scale=1e+00, C=2.00
+ Fold01: degree=2, scale=1e+00, C=2.00
- Fold01: degree=2, scale=1e+00, C=2.00
+ Fold01: degree=3, scale=1e+00, C=2.00
- Fold01: degree=3, scale=1e+00, C=2.00
+ Fold01: degree=1, scale=1e+01, C=2.00
- Fold01: degree=1, scale=1e+01, C=2.00
+ Fold01: degree=2, scale=1e+01, C=2.00
- Fold01: degree=2, scale=1e+01, C=2.00
+ Fold01: degree=3, scale=1e+01, C=2.00
- Fold01: degree=3, scale=1e+01, C=2.00
+ Fold01: degree=1, scale=1e+02, C=2.00
- Fold01: degree=1, scale=1e+02, C=2.00
+ Fold01: degree=2, scale=1e+02, C=2.00
- Fold01: degree=2, scale=1e+02, C=2.00
+ Fold01: degree=3, scale=1e+02, C=2.00
- Fold01: degree=3, scale=1e+02, C=2.00
+ Fold01: degree=1, scale=1e-03, C=4.00
- Fold01: degree=1, scale=1e-03, C=4.00
+ Fold01: degree=2, scale=1e-03, C=4.00
- Fold01: degree=2, scale=1e-03, C=4.00
+ Fold01: degree=3, scale=1e-03, C=4.00
- Fold01: degree=3, scale=1e-03, C=4.00
+ Fold01: degree=1, scale=1e-02, C=4.00
- Fold01: degree=1, scale=1e-02, C=4.00
+ Fold01: degree=2, scale=1e-02, C=4.00
- Fold01: degree=2, scale=1e-02, C=4.00
+ Fold01: degree=3, scale=1e-02, C=4.00
- Fold01: degree=3, scale=1e-02, C=4.00
+ Fold01: degree=1, scale=1e-01, C=4.00
- Fold01: degree=1, scale=1e-01, C=4.00
+ Fold01: degree=2, scale=1e-01, C=4.00
- Fold01: degree=2, scale=1e-01, C=4.00
+ Fold01: degree=3, scale=1e-01, C=4.00
- Fold01: degree=3, scale=1e-01, C=4.00
+ Fold01: degree=1, scale=1e+00, C=4.00
- Fold01: degree=1, scale=1e+00, C=4.00
+ Fold01: degree=2, scale=1e+00, C=4.00
- Fold01: degree=2, scale=1e+00, C=4.00
+ Fold01: degree=3, scale=1e+00, C=4.00
- Fold01: degree=3, scale=1e+00, C=4.00
+ Fold01: degree=1, scale=1e+01, C=4.00
```

```
- Fold01: degree=1, scale=1e+01, C=4.00
+ Fold01: degree=2, scale=1e+01, C=4.00
- Fold01: degree=2, scale=1e+01, C=4.00
+ Fold01: degree=3, scale=1e+01, C=4.00
- Fold01: degree=3, scale=1e+01, C=4.00
+ Fold01: degree=1, scale=1e+02, C=4.00
- Fold01: degree=1, scale=1e+02, C=4.00
+ Fold01: degree=2, scale=1e+02, C=4.00
- Fold01: degree=2, scale=1e+02, C=4.00
+ Fold01: degree=3, scale=1e+02, C=4.00
- Fold01: degree=3, scale=1e+02, C=4.00
+ Fold01: degree=1, scale=1e-03, C=8.00
- Fold01: degree=1, scale=1e-03, C=8.00
+ Fold01: degree=2, scale=1e-03, C=8.00
- Fold01: degree=2, scale=1e-03, C=8.00
+ Fold01: degree=3, scale=1e-03, C=8.00
- Fold01: degree=3, scale=1e-03, C=8.00
+ Fold01: degree=1, scale=1e-02, C=8.00
- Fold01: degree=1, scale=1e-02, C=8.00
+ Fold01: degree=2, scale=1e-02, C=8.00
- Fold01: degree=2, scale=1e-02, C=8.00
+ Fold01: degree=3, scale=1e-02, C=8.00
- Fold01: degree=3, scale=1e-02, C=8.00
+ Fold01: degree=1, scale=1e-01, C=8.00
- Fold01: degree=1, scale=1e-01, C=8.00
+ Fold01: degree=2, scale=1e-01, C=8.00
- Fold01: degree=2, scale=1e-01, C=8.00
+ Fold01: degree=3, scale=1e-01, C=8.00
- Fold01: degree=3, scale=1e-01, C=8.00
+ Fold01: degree=1, scale=1e+00, C=8.00
- Fold01: degree=1, scale=1e+00, C=8.00
+ Fold01: degree=2, scale=1e+00, C=8.00
- Fold01: degree=2, scale=1e+00, C=8.00
+ Fold01: degree=3, scale=1e+00, C=8.00
- Fold01: degree=3, scale=1e+00, C=8.00
+ Fold01: degree=1, scale=1e+01, C=8.00
- Fold01: degree=1, scale=1e+01, C=8.00
+ Fold01: degree=2, scale=1e+01, C=8.00
- Fold01: degree=2, scale=1e+01, C=8.00
+ Fold01: degree=3, scale=1e+01, C=8.00
- Fold01: degree=3, scale=1e+01, C=8.00
+ Fold01: degree=1, scale=1e+02, C=8.00
- Fold01: degree=1, scale=1e+02, C=8.00
+ Fold01: degree=2, scale=1e+02, C=8.00
- Fold01: degree=2, scale=1e+02, C=8.00
+ Fold01: degree=3, scale=1e+02, C=8.00
- Fold01: degree=3, scale=1e+02, C=8.00
+ Fold02: degree=1, scale=1e-03, C=0.25
- Fold02: degree=1, scale=1e-03, C=0.25
+ Fold02: degree=2, scale=1e-03, C=0.25
- Fold02: degree=2, scale=1e-03, C=0.25
+ Fold02: degree=3, scale=1e-03, C=0.25
- Fold02: degree=3, scale=1e-03, C=0.25
+ Fold02: degree=1, scale=1e-02, C=0.25
```

```
- Fold02: degree=1, scale=1e-02, C=0.25
+ Fold02: degree=2, scale=1e-02, C=0.25
- Fold02: degree=2, scale=1e-02, C=0.25
+ Fold02: degree=3, scale=1e-02, C=0.25
- Fold02: degree=3, scale=1e-02, C=0.25
+ Fold02: degree=1, scale=1e-01, C=0.25
- Fold02: degree=1, scale=1e-01, C=0.25
+ Fold02: degree=2, scale=1e-01, C=0.25
- Fold02: degree=2, scale=1e-01, C=0.25
+ Fold02: degree=3, scale=1e-01, C=0.25
- Fold02: degree=3, scale=1e-01, C=0.25
+ Fold02: degree=1, scale=1e+00, C=0.25
- Fold02: degree=1, scale=1e+00, C=0.25
+ Fold02: degree=2, scale=1e+00, C=0.25
- Fold02: degree=2, scale=1e+00, C=0.25
+ Fold02: degree=3, scale=1e+00, C=0.25
- Fold02: degree=3, scale=1e+00, C=0.25
+ Fold02: degree=1, scale=1e+01, C=0.25
- Fold02: degree=1, scale=1e+01, C=0.25
+ Fold02: degree=2, scale=1e+01, C=0.25
- Fold02: degree=2, scale=1e+01, C=0.25
+ Fold02: degree=3, scale=1e+01, C=0.25
- Fold02: degree=3, scale=1e+01, C=0.25
+ Fold02: degree=1, scale=1e+02, C=0.25
- Fold02: degree=1, scale=1e+02, C=0.25
+ Fold02: degree=2, scale=1e+02, C=0.25
- Fold02: degree=2, scale=1e+02, C=0.25
+ Fold02: degree=3, scale=1e+02, C=0.25
- Fold02: degree=3, scale=1e+02, C=0.25
+ Fold02: degree=1, scale=1e-03, C=0.50
- Fold02: degree=1, scale=1e-03, C=0.50
+ Fold02: degree=2, scale=1e-03, C=0.50
- Fold02: degree=2, scale=1e-03, C=0.50
+ Fold02: degree=3, scale=1e-03, C=0.50
- Fold02: degree=3, scale=1e-03, C=0.50
+ Fold02: degree=1, scale=1e-02, C=0.50
- Fold02: degree=1, scale=1e-02, C=0.50
+ Fold02: degree=2, scale=1e-02, C=0.50
- Fold02: degree=2, scale=1e-02, C=0.50
+ Fold02: degree=3, scale=1e-02, C=0.50
- Fold02: degree=3, scale=1e-02, C=0.50
+ Fold02: degree=1, scale=1e-01, C=0.50
- Fold02: degree=1, scale=1e-01, C=0.50
+ Fold02: degree=2, scale=1e-01, C=0.50
- Fold02: degree=2, scale=1e-01, C=0.50
+ Fold02: degree=3, scale=1e-01, C=0.50
- Fold02: degree=3, scale=1e-01, C=0.50
+ Fold02: degree=1, scale=1e+00, C=0.50
- Fold02: degree=1, scale=1e+00, C=0.50
+ Fold02: degree=2, scale=1e+00, C=0.50
- Fold02: degree=2, scale=1e+00, C=0.50
+ Fold02: degree=3, scale=1e+00, C=0.50
- Fold02: degree=3, scale=1e+00, C=0.50
+ Fold02: degree=1, scale=1e+01, C=0.50
```

```
- Fold02: degree=1, scale=1e+01, C=0.50
+ Fold02: degree=2, scale=1e+01, C=0.50
- Fold02: degree=2, scale=1e+01, C=0.50
+ Fold02: degree=3, scale=1e+01, C=0.50
- Fold02: degree=3, scale=1e+01, C=0.50
+ Fold02: degree=1, scale=1e+02, C=0.50
- Fold02: degree=1, scale=1e+02, C=0.50
+ Fold02: degree=2, scale=1e+02, C=0.50
- Fold02: degree=2, scale=1e+02, C=0.50
+ Fold02: degree=3, scale=1e+02, C=0.50
- Fold02: degree=3, scale=1e+02, C=0.50
+ Fold02: degree=1, scale=1e-03, C=1.00
- Fold02: degree=1, scale=1e-03, C=1.00
+ Fold02: degree=2, scale=1e-03, C=1.00
- Fold02: degree=2, scale=1e-03, C=1.00
+ Fold02: degree=3, scale=1e-03, C=1.00
- Fold02: degree=3, scale=1e-03, C=1.00
+ Fold02: degree=1, scale=1e-02, C=1.00
- Fold02: degree=1, scale=1e-02, C=1.00
+ Fold02: degree=2, scale=1e-02, C=1.00
- Fold02: degree=2, scale=1e-02, C=1.00
+ Fold02: degree=3, scale=1e-02, C=1.00
- Fold02: degree=3, scale=1e-02, C=1.00
+ Fold02: degree=1, scale=1e-01, C=1.00
- Fold02: degree=1, scale=1e-01, C=1.00
+ Fold02: degree=2, scale=1e-01, C=1.00
- Fold02: degree=2, scale=1e-01, C=1.00
+ Fold02: degree=3, scale=1e-01, C=1.00
- Fold02: degree=3, scale=1e-01, C=1.00
+ Fold02: degree=1, scale=1e+00, C=1.00
- Fold02: degree=1, scale=1e+00, C=1.00
+ Fold02: degree=2, scale=1e+00, C=1.00
- Fold02: degree=2, scale=1e+00, C=1.00
+ Fold02: degree=3, scale=1e+00, C=1.00
- Fold02: degree=3, scale=1e+00, C=1.00
+ Fold02: degree=1, scale=1e+01, C=1.00
- Fold02: degree=1, scale=1e+01, C=1.00
+ Fold02: degree=2, scale=1e+01, C=1.00
- Fold02: degree=2, scale=1e+01, C=1.00
+ Fold02: degree=3, scale=1e+01, C=1.00
- Fold02: degree=3, scale=1e+01, C=1.00
+ Fold02: degree=1, scale=1e+02, C=1.00
- Fold02: degree=1, scale=1e+02, C=1.00
+ Fold02: degree=2, scale=1e+02, C=1.00
- Fold02: degree=2, scale=1e+02, C=1.00
+ Fold02: degree=3, scale=1e+02, C=1.00
- Fold02: degree=3, scale=1e+02, C=1.00
+ Fold02: degree=1, scale=1e-03, C=2.00
- Fold02: degree=1, scale=1e-03, C=2.00
+ Fold02: degree=2, scale=1e-03, C=2.00
- Fold02: degree=2, scale=1e-03, C=2.00
+ Fold02: degree=3, scale=1e-03, C=2.00
- Fold02: degree=3, scale=1e-03, C=2.00
+ Fold02: degree=1, scale=1e-02, C=2.00
```

```
- Fold02: degree=1, scale=1e-02, C=2.00
+ Fold02: degree=2, scale=1e-02, C=2.00
- Fold02: degree=2, scale=1e-02, C=2.00
+ Fold02: degree=3, scale=1e-02, C=2.00
- Fold02: degree=3, scale=1e-02, C=2.00
+ Fold02: degree=1, scale=1e-01, C=2.00
- Fold02: degree=1, scale=1e-01, C=2.00
+ Fold02: degree=2, scale=1e-01, C=2.00
- Fold02: degree=2, scale=1e-01, C=2.00
+ Fold02: degree=3, scale=1e-01, C=2.00
- Fold02: degree=3, scale=1e-01, C=2.00
+ Fold02: degree=1, scale=1e+00, C=2.00
- Fold02: degree=1, scale=1e+00, C=2.00
+ Fold02: degree=2, scale=1e+00, C=2.00
- Fold02: degree=2, scale=1e+00, C=2.00
+ Fold02: degree=3, scale=1e+00, C=2.00
- Fold02: degree=3, scale=1e+00, C=2.00
+ Fold02: degree=1, scale=1e+01, C=2.00
- Fold02: degree=1, scale=1e+01, C=2.00
+ Fold02: degree=2, scale=1e+01, C=2.00
- Fold02: degree=2, scale=1e+01, C=2.00
+ Fold02: degree=3, scale=1e+01, C=2.00
- Fold02: degree=3, scale=1e+01, C=2.00
+ Fold02: degree=1, scale=1e+02, C=2.00
- Fold02: degree=1, scale=1e+02, C=2.00
+ Fold02: degree=2, scale=1e+02, C=2.00
- Fold02: degree=2, scale=1e+02, C=2.00
+ Fold02: degree=3, scale=1e+02, C=2.00
- Fold02: degree=3, scale=1e+02, C=2.00
+ Fold02: degree=1, scale=1e-03, C=4.00
- Fold02: degree=1, scale=1e-03, C=4.00
+ Fold02: degree=2, scale=1e-03, C=4.00
- Fold02: degree=2, scale=1e-03, C=4.00
+ Fold02: degree=3, scale=1e-03, C=4.00
- Fold02: degree=3, scale=1e-03, C=4.00
+ Fold02: degree=1, scale=1e-02, C=4.00
- Fold02: degree=1, scale=1e-02, C=4.00
+ Fold02: degree=2, scale=1e-02, C=4.00
- Fold02: degree=2, scale=1e-02, C=4.00
+ Fold02: degree=3, scale=1e-02, C=4.00
- Fold02: degree=3, scale=1e-02, C=4.00
+ Fold02: degree=1, scale=1e-01, C=4.00
- Fold02: degree=1, scale=1e-01, C=4.00
+ Fold02: degree=2, scale=1e-01, C=4.00
- Fold02: degree=2, scale=1e-01, C=4.00
+ Fold02: degree=3, scale=1e-01, C=4.00
- Fold02: degree=3, scale=1e-01, C=4.00
+ Fold02: degree=1, scale=1e+00, C=4.00
- Fold02: degree=1, scale=1e+00, C=4.00
+ Fold02: degree=2, scale=1e+00, C=4.00
- Fold02: degree=2, scale=1e+00, C=4.00
+ Fold02: degree=3, scale=1e+00, C=4.00
- Fold02: degree=3, scale=1e+00, C=4.00
+ Fold02: degree=1, scale=1e+01, C=4.00
```

```
- Fold02: degree=1, scale=1e+01, C=4.00
+ Fold02: degree=2, scale=1e+01, C=4.00
- Fold02: degree=2, scale=1e+01, C=4.00
+ Fold02: degree=3, scale=1e+01, C=4.00
- Fold02: degree=3, scale=1e+01, C=4.00
+ Fold02: degree=1, scale=1e+02, C=4.00
- Fold02: degree=1, scale=1e+02, C=4.00
+ Fold02: degree=2, scale=1e+02, C=4.00
- Fold02: degree=2, scale=1e+02, C=4.00
+ Fold02: degree=3, scale=1e+02, C=4.00
- Fold02: degree=3, scale=1e+02, C=4.00
+ Fold02: degree=1, scale=1e-03, C=8.00
- Fold02: degree=1, scale=1e-03, C=8.00
+ Fold02: degree=2, scale=1e-03, C=8.00
- Fold02: degree=2, scale=1e-03, C=8.00
+ Fold02: degree=3, scale=1e-03, C=8.00
- Fold02: degree=3, scale=1e-03, C=8.00
+ Fold02: degree=1, scale=1e-02, C=8.00
- Fold02: degree=1, scale=1e-02, C=8.00
+ Fold02: degree=2, scale=1e-02, C=8.00
- Fold02: degree=2, scale=1e-02, C=8.00
+ Fold02: degree=3, scale=1e-02, C=8.00
- Fold02: degree=3, scale=1e-02, C=8.00
+ Fold02: degree=1, scale=1e-01, C=8.00
- Fold02: degree=1, scale=1e-01, C=8.00
+ Fold02: degree=2, scale=1e-01, C=8.00
- Fold02: degree=2, scale=1e-01, C=8.00
+ Fold02: degree=3, scale=1e-01, C=8.00
- Fold02: degree=3, scale=1e-01, C=8.00
+ Fold02: degree=1, scale=1e+00, C=8.00
- Fold02: degree=1, scale=1e+00, C=8.00
+ Fold02: degree=2, scale=1e+00, C=8.00
- Fold02: degree=2, scale=1e+00, C=8.00
+ Fold02: degree=3, scale=1e+00, C=8.00
- Fold02: degree=3, scale=1e+00, C=8.00
+ Fold02: degree=1, scale=1e+01, C=8.00
- Fold02: degree=1, scale=1e+01, C=8.00
+ Fold02: degree=2, scale=1e+01, C=8.00
- Fold02: degree=2, scale=1e+01, C=8.00
+ Fold02: degree=3, scale=1e+01, C=8.00
- Fold02: degree=3, scale=1e+01, C=8.00
+ Fold02: degree=1, scale=1e+02, C=8.00
- Fold02: degree=1, scale=1e+02, C=8.00
+ Fold02: degree=2, scale=1e+02, C=8.00
- Fold02: degree=2, scale=1e+02, C=8.00
+ Fold02: degree=3, scale=1e+02, C=8.00
- Fold02: degree=3, scale=1e+02, C=8.00
+ Fold03: degree=1, scale=1e-03, C=0.25
- Fold03: degree=1, scale=1e-03, C=0.25
+ Fold03: degree=2, scale=1e-03, C=0.25
- Fold03: degree=2, scale=1e-03, C=0.25
+ Fold03: degree=3, scale=1e-03, C=0.25
- Fold03: degree=3, scale=1e-03, C=0.25
+ Fold03: degree=1, scale=1e-02, C=0.25
```

```
- Fold03: degree=1, scale=1e-02, C=0.25
+ Fold03: degree=2, scale=1e-02, C=0.25
- Fold03: degree=2, scale=1e-02, C=0.25
+ Fold03: degree=3, scale=1e-02, C=0.25
- Fold03: degree=3, scale=1e-02, C=0.25
+ Fold03: degree=1, scale=1e-01, C=0.25
- Fold03: degree=1, scale=1e-01, C=0.25
+ Fold03: degree=2, scale=1e-01, C=0.25
- Fold03: degree=2, scale=1e-01, C=0.25
+ Fold03: degree=3, scale=1e-01, C=0.25
- Fold03: degree=3, scale=1e-01, C=0.25
+ Fold03: degree=1, scale=1e+00, C=0.25
- Fold03: degree=1, scale=1e+00, C=0.25
+ Fold03: degree=2, scale=1e+00, C=0.25
- Fold03: degree=2, scale=1e+00, C=0.25
+ Fold03: degree=3, scale=1e+00, C=0.25
- Fold03: degree=3, scale=1e+00, C=0.25
+ Fold03: degree=1, scale=1e+01, C=0.25
- Fold03: degree=1, scale=1e+01, C=0.25
+ Fold03: degree=2, scale=1e+01, C=0.25
- Fold03: degree=2, scale=1e+01, C=0.25
+ Fold03: degree=3, scale=1e+01, C=0.25
- Fold03: degree=3, scale=1e+01, C=0.25
+ Fold03: degree=1, scale=1e+02, C=0.25
- Fold03: degree=1, scale=1e+02, C=0.25
+ Fold03: degree=2, scale=1e+02, C=0.25
- Fold03: degree=2, scale=1e+02, C=0.25
+ Fold03: degree=3, scale=1e+02, C=0.25
- Fold03: degree=3, scale=1e+02, C=0.25
+ Fold03: degree=1, scale=1e-03, C=0.50
- Fold03: degree=1, scale=1e-03, C=0.50
+ Fold03: degree=2, scale=1e-03, C=0.50
- Fold03: degree=2, scale=1e-03, C=0.50
+ Fold03: degree=3, scale=1e-03, C=0.50
- Fold03: degree=3, scale=1e-03, C=0.50
+ Fold03: degree=1, scale=1e-02, C=0.50
- Fold03: degree=1, scale=1e-02, C=0.50
+ Fold03: degree=2, scale=1e-02, C=0.50
- Fold03: degree=2, scale=1e-02, C=0.50
+ Fold03: degree=3, scale=1e-02, C=0.50
- Fold03: degree=3, scale=1e-02, C=0.50
+ Fold03: degree=1, scale=1e-01, C=0.50
- Fold03: degree=1, scale=1e-01, C=0.50
+ Fold03: degree=2, scale=1e-01, C=0.50
- Fold03: degree=2, scale=1e-01, C=0.50
+ Fold03: degree=3, scale=1e-01, C=0.50
- Fold03: degree=3, scale=1e-01, C=0.50
+ Fold03: degree=1, scale=1e+00, C=0.50
- Fold03: degree=1, scale=1e+00, C=0.50
+ Fold03: degree=2, scale=1e+00, C=0.50
- Fold03: degree=2, scale=1e+00, C=0.50
+ Fold03: degree=3, scale=1e+00, C=0.50
- Fold03: degree=3, scale=1e+00, C=0.50
+ Fold03: degree=1, scale=1e+01, C=0.50
```

```
- Fold03: degree=1, scale=1e+01, C=0.50
+ Fold03: degree=2, scale=1e+01, C=0.50
- Fold03: degree=2, scale=1e+01, C=0.50
+ Fold03: degree=3, scale=1e+01, C=0.50
- Fold03: degree=3, scale=1e+01, C=0.50
+ Fold03: degree=1, scale=1e+02, C=0.50
- Fold03: degree=1, scale=1e+02, C=0.50
+ Fold03: degree=2, scale=1e+02, C=0.50
- Fold03: degree=2, scale=1e+02, C=0.50
+ Fold03: degree=3, scale=1e+02, C=0.50
- Fold03: degree=3, scale=1e+02, C=0.50
+ Fold03: degree=1, scale=1e-03, C=1.00
- Fold03: degree=1, scale=1e-03, C=1.00
+ Fold03: degree=2, scale=1e-03, C=1.00
- Fold03: degree=2, scale=1e-03, C=1.00
+ Fold03: degree=3, scale=1e-03, C=1.00
- Fold03: degree=3, scale=1e-03, C=1.00
+ Fold03: degree=1, scale=1e-02, C=1.00
- Fold03: degree=1, scale=1e-02, C=1.00
+ Fold03: degree=2, scale=1e-02, C=1.00
- Fold03: degree=2, scale=1e-02, C=1.00
+ Fold03: degree=3, scale=1e-02, C=1.00
- Fold03: degree=3, scale=1e-02, C=1.00
+ Fold03: degree=1, scale=1e-01, C=1.00
- Fold03: degree=1, scale=1e-01, C=1.00
+ Fold03: degree=2, scale=1e-01, C=1.00
- Fold03: degree=2, scale=1e-01, C=1.00
+ Fold03: degree=3, scale=1e-01, C=1.00
- Fold03: degree=3, scale=1e-01, C=1.00
+ Fold03: degree=1, scale=1e+00, C=1.00
- Fold03: degree=1, scale=1e+00, C=1.00
+ Fold03: degree=2, scale=1e+00, C=1.00
- Fold03: degree=2, scale=1e+00, C=1.00
+ Fold03: degree=3, scale=1e+00, C=1.00
- Fold03: degree=3, scale=1e+00, C=1.00
+ Fold03: degree=1, scale=1e+01, C=1.00
- Fold03: degree=1, scale=1e+01, C=1.00
+ Fold03: degree=2, scale=1e+01, C=1.00
- Fold03: degree=2, scale=1e+01, C=1.00
+ Fold03: degree=3, scale=1e+01, C=1.00
- Fold03: degree=3, scale=1e+01, C=1.00
+ Fold03: degree=1, scale=1e+02, C=1.00
- Fold03: degree=1, scale=1e+02, C=1.00
+ Fold03: degree=2, scale=1e+02, C=1.00
- Fold03: degree=2, scale=1e+02, C=1.00
+ Fold03: degree=3, scale=1e+02, C=1.00
- Fold03: degree=3, scale=1e+02, C=1.00
+ Fold03: degree=1, scale=1e-03, C=2.00
- Fold03: degree=1, scale=1e-03, C=2.00
+ Fold03: degree=2, scale=1e-03, C=2.00
- Fold03: degree=2, scale=1e-03, C=2.00
+ Fold03: degree=3, scale=1e-03, C=2.00
- Fold03: degree=3, scale=1e-03, C=2.00
+ Fold03: degree=1, scale=1e-02, C=2.00
```

```
- Fold03: degree=1, scale=1e-02, C=2.00
+ Fold03: degree=2, scale=1e-02, C=2.00
- Fold03: degree=2, scale=1e-02, C=2.00
+ Fold03: degree=3, scale=1e-02, C=2.00
- Fold03: degree=3, scale=1e-02, C=2.00
+ Fold03: degree=1, scale=1e-01, C=2.00
- Fold03: degree=1, scale=1e-01, C=2.00
+ Fold03: degree=2, scale=1e-01, C=2.00
- Fold03: degree=2, scale=1e-01, C=2.00
+ Fold03: degree=3, scale=1e-01, C=2.00
- Fold03: degree=3, scale=1e-01, C=2.00
+ Fold03: degree=1, scale=1e+00, C=2.00
- Fold03: degree=1, scale=1e+00, C=2.00
+ Fold03: degree=2, scale=1e+00, C=2.00
- Fold03: degree=2, scale=1e+00, C=2.00
+ Fold03: degree=3, scale=1e+00, C=2.00
- Fold03: degree=3, scale=1e+00, C=2.00
+ Fold03: degree=1, scale=1e+01, C=2.00
- Fold03: degree=1, scale=1e+01, C=2.00
+ Fold03: degree=2, scale=1e+01, C=2.00
- Fold03: degree=2, scale=1e+01, C=2.00
+ Fold03: degree=3, scale=1e+01, C=2.00
- Fold03: degree=3, scale=1e+01, C=2.00
+ Fold03: degree=1, scale=1e+02, C=2.00
- Fold03: degree=1, scale=1e+02, C=2.00
+ Fold03: degree=2, scale=1e+02, C=2.00
- Fold03: degree=2, scale=1e+02, C=2.00
+ Fold03: degree=3, scale=1e+02, C=2.00
- Fold03: degree=3, scale=1e+02, C=2.00
+ Fold03: degree=1, scale=1e-03, C=4.00
- Fold03: degree=1, scale=1e-03, C=4.00
+ Fold03: degree=2, scale=1e-03, C=4.00
- Fold03: degree=2, scale=1e-03, C=4.00
+ Fold03: degree=3, scale=1e-03, C=4.00
- Fold03: degree=3, scale=1e-03, C=4.00
+ Fold03: degree=1, scale=1e-02, C=4.00
- Fold03: degree=1, scale=1e-02, C=4.00
+ Fold03: degree=2, scale=1e-02, C=4.00
- Fold03: degree=2, scale=1e-02, C=4.00
+ Fold03: degree=3, scale=1e-02, C=4.00
- Fold03: degree=3, scale=1e-02, C=4.00
+ Fold03: degree=1, scale=1e-01, C=4.00
- Fold03: degree=1, scale=1e-01, C=4.00
+ Fold03: degree=2, scale=1e-01, C=4.00
- Fold03: degree=2, scale=1e-01, C=4.00
+ Fold03: degree=3, scale=1e-01, C=4.00
- Fold03: degree=3, scale=1e-01, C=4.00
+ Fold03: degree=1, scale=1e+00, C=4.00
- Fold03: degree=1, scale=1e+00, C=4.00
+ Fold03: degree=2, scale=1e+00, C=4.00
- Fold03: degree=2, scale=1e+00, C=4.00
+ Fold03: degree=3, scale=1e+00, C=4.00
- Fold03: degree=3, scale=1e+00, C=4.00
+ Fold03: degree=1, scale=1e+01, C=4.00
```

```
- Fold03: degree=1, scale=1e+01, C=4.00
+ Fold03: degree=2, scale=1e+01, C=4.00
- Fold03: degree=2, scale=1e+01, C=4.00
+ Fold03: degree=3, scale=1e+01, C=4.00
- Fold03: degree=3, scale=1e+01, C=4.00
+ Fold03: degree=1, scale=1e+02, C=4.00
- Fold03: degree=1, scale=1e+02, C=4.00
+ Fold03: degree=2, scale=1e+02, C=4.00
- Fold03: degree=2, scale=1e+02, C=4.00
+ Fold03: degree=3, scale=1e+02, C=4.00
- Fold03: degree=3, scale=1e+02, C=4.00
+ Fold03: degree=1, scale=1e-03, C=8.00
- Fold03: degree=1, scale=1e-03, C=8.00
+ Fold03: degree=2, scale=1e-03, C=8.00
- Fold03: degree=2, scale=1e-03, C=8.00
+ Fold03: degree=3, scale=1e-03, C=8.00
- Fold03: degree=3, scale=1e-03, C=8.00
+ Fold03: degree=1, scale=1e-02, C=8.00
- Fold03: degree=1, scale=1e-02, C=8.00
+ Fold03: degree=2, scale=1e-02, C=8.00
- Fold03: degree=2, scale=1e-02, C=8.00
+ Fold03: degree=3, scale=1e-02, C=8.00
- Fold03: degree=3, scale=1e-02, C=8.00
+ Fold03: degree=1, scale=1e-01, C=8.00
- Fold03: degree=1, scale=1e-01, C=8.00
+ Fold03: degree=2, scale=1e-01, C=8.00
- Fold03: degree=2, scale=1e-01, C=8.00
+ Fold03: degree=3, scale=1e-01, C=8.00
- Fold03: degree=3, scale=1e-01, C=8.00
+ Fold03: degree=1, scale=1e+00, C=8.00
- Fold03: degree=1, scale=1e+00, C=8.00
+ Fold03: degree=2, scale=1e+00, C=8.00
- Fold03: degree=2, scale=1e+00, C=8.00
+ Fold03: degree=3, scale=1e+00, C=8.00
- Fold03: degree=3, scale=1e+00, C=8.00
+ Fold03: degree=1, scale=1e+01, C=8.00
- Fold03: degree=1, scale=1e+01, C=8.00
+ Fold03: degree=2, scale=1e+01, C=8.00
- Fold03: degree=2, scale=1e+01, C=8.00
+ Fold03: degree=3, scale=1e+01, C=8.00
- Fold03: degree=3, scale=1e+01, C=8.00
+ Fold03: degree=1, scale=1e+02, C=8.00
- Fold03: degree=1, scale=1e+02, C=8.00
+ Fold03: degree=2, scale=1e+02, C=8.00
- Fold03: degree=2, scale=1e+02, C=8.00
+ Fold03: degree=3, scale=1e+02, C=8.00
- Fold03: degree=3, scale=1e+02, C=8.00
+ Fold04: degree=1, scale=1e-03, C=0.25
- Fold04: degree=1, scale=1e-03, C=0.25
+ Fold04: degree=2, scale=1e-03, C=0.25
- Fold04: degree=2, scale=1e-03, C=0.25
+ Fold04: degree=3, scale=1e-03, C=0.25
- Fold04: degree=3, scale=1e-03, C=0.25
+ Fold04: degree=1, scale=1e-02, C=0.25
```

```
- Fold04: degree=1, scale=1e-02, C=0.25
+ Fold04: degree=2, scale=1e-02, C=0.25
- Fold04: degree=2, scale=1e-02, C=0.25
+ Fold04: degree=3, scale=1e-02, C=0.25
- Fold04: degree=3, scale=1e-02, C=0.25
+ Fold04: degree=1, scale=1e-01, C=0.25
- Fold04: degree=1, scale=1e-01, C=0.25
+ Fold04: degree=2, scale=1e-01, C=0.25
- Fold04: degree=2, scale=1e-01, C=0.25
+ Fold04: degree=3, scale=1e-01, C=0.25
- Fold04: degree=3, scale=1e-01, C=0.25
+ Fold04: degree=1, scale=1e+00, C=0.25
- Fold04: degree=1, scale=1e+00, C=0.25
+ Fold04: degree=2, scale=1e+00, C=0.25
- Fold04: degree=2, scale=1e+00, C=0.25
+ Fold04: degree=3, scale=1e+00, C=0.25
- Fold04: degree=3, scale=1e+00, C=0.25
+ Fold04: degree=1, scale=1e+01, C=0.25
- Fold04: degree=1, scale=1e+01, C=0.25
+ Fold04: degree=2, scale=1e+01, C=0.25
- Fold04: degree=2, scale=1e+01, C=0.25
+ Fold04: degree=3, scale=1e+01, C=0.25
- Fold04: degree=3, scale=1e+01, C=0.25
+ Fold04: degree=1, scale=1e+02, C=0.25
- Fold04: degree=1, scale=1e+02, C=0.25
+ Fold04: degree=2, scale=1e+02, C=0.25
- Fold04: degree=2, scale=1e+02, C=0.25
+ Fold04: degree=3, scale=1e+02, C=0.25
- Fold04: degree=3, scale=1e+02, C=0.25
+ Fold04: degree=1, scale=1e-03, C=0.50
- Fold04: degree=1, scale=1e-03, C=0.50
+ Fold04: degree=2, scale=1e-03, C=0.50
- Fold04: degree=2, scale=1e-03, C=0.50
+ Fold04: degree=3, scale=1e-03, C=0.50
- Fold04: degree=3, scale=1e-03, C=0.50
+ Fold04: degree=1, scale=1e-02, C=0.50
- Fold04: degree=1, scale=1e-02, C=0.50
+ Fold04: degree=2, scale=1e-02, C=0.50
- Fold04: degree=2, scale=1e-02, C=0.50
+ Fold04: degree=3, scale=1e-02, C=0.50
- Fold04: degree=3, scale=1e-02, C=0.50
+ Fold04: degree=1, scale=1e-01, C=0.50
- Fold04: degree=1, scale=1e-01, C=0.50
+ Fold04: degree=2, scale=1e-01, C=0.50
- Fold04: degree=2, scale=1e-01, C=0.50
+ Fold04: degree=3, scale=1e-01, C=0.50
- Fold04: degree=3, scale=1e-01, C=0.50
+ Fold04: degree=1, scale=1e+00, C=0.50
- Fold04: degree=1, scale=1e+00, C=0.50
+ Fold04: degree=2, scale=1e+00, C=0.50
- Fold04: degree=2, scale=1e+00, C=0.50
+ Fold04: degree=3, scale=1e+00, C=0.50
- Fold04: degree=3, scale=1e+00, C=0.50
+ Fold04: degree=1, scale=1e+01, C=0.50
```

```
- Fold04: degree=1, scale=1e+01, C=0.50
+ Fold04: degree=2, scale=1e+01, C=0.50
- Fold04: degree=2, scale=1e+01, C=0.50
+ Fold04: degree=3, scale=1e+01, C=0.50
- Fold04: degree=3, scale=1e+01, C=0.50
+ Fold04: degree=1, scale=1e+02, C=0.50
- Fold04: degree=1, scale=1e+02, C=0.50
+ Fold04: degree=2, scale=1e+02, C=0.50
- Fold04: degree=2, scale=1e+02, C=0.50
+ Fold04: degree=3, scale=1e+02, C=0.50
- Fold04: degree=3, scale=1e+02, C=0.50
+ Fold04: degree=1, scale=1e-03, C=1.00
- Fold04: degree=1, scale=1e-03, C=1.00
+ Fold04: degree=2, scale=1e-03, C=1.00
- Fold04: degree=2, scale=1e-03, C=1.00
+ Fold04: degree=3, scale=1e-03, C=1.00
- Fold04: degree=3, scale=1e-03, C=1.00
+ Fold04: degree=1, scale=1e-02, C=1.00
- Fold04: degree=1, scale=1e-02, C=1.00
+ Fold04: degree=2, scale=1e-02, C=1.00
- Fold04: degree=2, scale=1e-02, C=1.00
+ Fold04: degree=3, scale=1e-02, C=1.00
- Fold04: degree=3, scale=1e-02, C=1.00
+ Fold04: degree=1, scale=1e-01, C=1.00
- Fold04: degree=1, scale=1e-01, C=1.00
+ Fold04: degree=2, scale=1e-01, C=1.00
- Fold04: degree=2, scale=1e-01, C=1.00
+ Fold04: degree=3, scale=1e-01, C=1.00
- Fold04: degree=3, scale=1e-01, C=1.00
+ Fold04: degree=1, scale=1e+00, C=1.00
- Fold04: degree=1, scale=1e+00, C=1.00
+ Fold04: degree=2, scale=1e+00, C=1.00
- Fold04: degree=2, scale=1e+00, C=1.00
+ Fold04: degree=3, scale=1e+00, C=1.00
- Fold04: degree=3, scale=1e+00, C=1.00
+ Fold04: degree=1, scale=1e+01, C=1.00
- Fold04: degree=1, scale=1e+01, C=1.00
+ Fold04: degree=2, scale=1e+01, C=1.00
- Fold04: degree=2, scale=1e+01, C=1.00
+ Fold04: degree=3, scale=1e+01, C=1.00
- Fold04: degree=3, scale=1e+01, C=1.00
+ Fold04: degree=1, scale=1e+02, C=1.00
- Fold04: degree=1, scale=1e+02, C=1.00
+ Fold04: degree=2, scale=1e+02, C=1.00
- Fold04: degree=2, scale=1e+02, C=1.00
+ Fold04: degree=3, scale=1e+02, C=1.00
- Fold04: degree=3, scale=1e+02, C=1.00
+ Fold04: degree=1, scale=1e-03, C=2.00
- Fold04: degree=1, scale=1e-03, C=2.00
+ Fold04: degree=2, scale=1e-03, C=2.00
- Fold04: degree=2, scale=1e-03, C=2.00
+ Fold04: degree=3, scale=1e-03, C=2.00
- Fold04: degree=3, scale=1e-03, C=2.00
+ Fold04: degree=1, scale=1e-02, C=2.00
```

```
- Fold04: degree=1, scale=1e-02, C=2.00
+ Fold04: degree=2, scale=1e-02, C=2.00
- Fold04: degree=2, scale=1e-02, C=2.00
+ Fold04: degree=3, scale=1e-02, C=2.00
- Fold04: degree=3, scale=1e-02, C=2.00
+ Fold04: degree=1, scale=1e-01, C=2.00
- Fold04: degree=1, scale=1e-01, C=2.00
+ Fold04: degree=2, scale=1e-01, C=2.00
- Fold04: degree=2, scale=1e-01, C=2.00
+ Fold04: degree=3, scale=1e-01, C=2.00
- Fold04: degree=3, scale=1e-01, C=2.00
+ Fold04: degree=1, scale=1e+00, C=2.00
- Fold04: degree=1, scale=1e+00, C=2.00
+ Fold04: degree=2, scale=1e+00, C=2.00
- Fold04: degree=2, scale=1e+00, C=2.00
+ Fold04: degree=3, scale=1e+00, C=2.00
- Fold04: degree=3, scale=1e+00, C=2.00
+ Fold04: degree=1, scale=1e+01, C=2.00
- Fold04: degree=1, scale=1e+01, C=2.00
+ Fold04: degree=2, scale=1e+01, C=2.00
- Fold04: degree=2, scale=1e+01, C=2.00
+ Fold04: degree=3, scale=1e+01, C=2.00
- Fold04: degree=3, scale=1e+01, C=2.00
+ Fold04: degree=1, scale=1e+02, C=2.00
- Fold04: degree=1, scale=1e+02, C=2.00
+ Fold04: degree=2, scale=1e+02, C=2.00
- Fold04: degree=2, scale=1e+02, C=2.00
+ Fold04: degree=3, scale=1e+02, C=2.00
- Fold04: degree=3, scale=1e+02, C=2.00
+ Fold04: degree=1, scale=1e-03, C=4.00
- Fold04: degree=1, scale=1e-03, C=4.00
+ Fold04: degree=2, scale=1e-03, C=4.00
- Fold04: degree=2, scale=1e-03, C=4.00
+ Fold04: degree=3, scale=1e-03, C=4.00
- Fold04: degree=3, scale=1e-03, C=4.00
+ Fold04: degree=1, scale=1e-02, C=4.00
- Fold04: degree=1, scale=1e-02, C=4.00
+ Fold04: degree=2, scale=1e-02, C=4.00
- Fold04: degree=2, scale=1e-02, C=4.00
+ Fold04: degree=3, scale=1e-02, C=4.00
- Fold04: degree=3, scale=1e-02, C=4.00
+ Fold04: degree=1, scale=1e-01, C=4.00
- Fold04: degree=1, scale=1e-01, C=4.00
+ Fold04: degree=2, scale=1e-01, C=4.00
- Fold04: degree=2, scale=1e-01, C=4.00
+ Fold04: degree=3, scale=1e-01, C=4.00
- Fold04: degree=3, scale=1e-01, C=4.00
+ Fold04: degree=1, scale=1e+00, C=4.00
- Fold04: degree=1, scale=1e+00, C=4.00
+ Fold04: degree=2, scale=1e+00, C=4.00
- Fold04: degree=2, scale=1e+00, C=4.00
+ Fold04: degree=3, scale=1e+00, C=4.00
- Fold04: degree=3, scale=1e+00, C=4.00
+ Fold04: degree=1, scale=1e+01, C=4.00
```

```
- Fold04: degree=1, scale=1e+01, C=4.00
+ Fold04: degree=2, scale=1e+01, C=4.00
- Fold04: degree=2, scale=1e+01, C=4.00
+ Fold04: degree=3, scale=1e+01, C=4.00
- Fold04: degree=3, scale=1e+01, C=4.00
+ Fold04: degree=1, scale=1e+02, C=4.00
- Fold04: degree=1, scale=1e+02, C=4.00
+ Fold04: degree=2, scale=1e+02, C=4.00
- Fold04: degree=2, scale=1e+02, C=4.00
+ Fold04: degree=3, scale=1e+02, C=4.00
- Fold04: degree=3, scale=1e+02, C=4.00
+ Fold04: degree=1, scale=1e-03, C=8.00
- Fold04: degree=1, scale=1e-03, C=8.00
+ Fold04: degree=2, scale=1e-03, C=8.00
- Fold04: degree=2, scale=1e-03, C=8.00
+ Fold04: degree=3, scale=1e-03, C=8.00
- Fold04: degree=3, scale=1e-03, C=8.00
+ Fold04: degree=1, scale=1e-02, C=8.00
- Fold04: degree=1, scale=1e-02, C=8.00
+ Fold04: degree=2, scale=1e-02, C=8.00
- Fold04: degree=2, scale=1e-02, C=8.00
+ Fold04: degree=3, scale=1e-02, C=8.00
- Fold04: degree=3, scale=1e-02, C=8.00
+ Fold04: degree=1, scale=1e-01, C=8.00
- Fold04: degree=1, scale=1e-01, C=8.00
+ Fold04: degree=2, scale=1e-01, C=8.00
- Fold04: degree=2, scale=1e-01, C=8.00
+ Fold04: degree=3, scale=1e-01, C=8.00
- Fold04: degree=3, scale=1e-01, C=8.00
+ Fold04: degree=1, scale=1e+00, C=8.00
- Fold04: degree=1, scale=1e+00, C=8.00
+ Fold04: degree=2, scale=1e+00, C=8.00
- Fold04: degree=2, scale=1e+00, C=8.00
+ Fold04: degree=3, scale=1e+00, C=8.00
- Fold04: degree=3, scale=1e+00, C=8.00
+ Fold04: degree=1, scale=1e+01, C=8.00
- Fold04: degree=1, scale=1e+01, C=8.00
+ Fold04: degree=2, scale=1e+01, C=8.00
- Fold04: degree=2, scale=1e+01, C=8.00
+ Fold04: degree=3, scale=1e+01, C=8.00
- Fold04: degree=3, scale=1e+01, C=8.00
+ Fold04: degree=1, scale=1e+02, C=8.00
- Fold04: degree=1, scale=1e+02, C=8.00
+ Fold04: degree=2, scale=1e+02, C=8.00
- Fold04: degree=2, scale=1e+02, C=8.00
+ Fold04: degree=3, scale=1e+02, C=8.00
- Fold04: degree=3, scale=1e+02, C=8.00
+ Fold05: degree=1, scale=1e-03, C=0.25
- Fold05: degree=1, scale=1e-03, C=0.25
+ Fold05: degree=2, scale=1e-03, C=0.25
- Fold05: degree=2, scale=1e-03, C=0.25
+ Fold05: degree=3, scale=1e-03, C=0.25
- Fold05: degree=3, scale=1e-03, C=0.25
+ Fold05: degree=1, scale=1e-02, C=0.25
```

```
- Fold05: degree=1, scale=1e-02, C=0.25
+ Fold05: degree=2, scale=1e-02, C=0.25
- Fold05: degree=2, scale=1e-02, C=0.25
+ Fold05: degree=3, scale=1e-02, C=0.25
- Fold05: degree=3, scale=1e-02, C=0.25
+ Fold05: degree=1, scale=1e-01, C=0.25
- Fold05: degree=1, scale=1e-01, C=0.25
+ Fold05: degree=2, scale=1e-01, C=0.25
- Fold05: degree=2, scale=1e-01, C=0.25
+ Fold05: degree=3, scale=1e-01, C=0.25
- Fold05: degree=3, scale=1e-01, C=0.25
+ Fold05: degree=1, scale=1e+00, C=0.25
- Fold05: degree=1, scale=1e+00, C=0.25
+ Fold05: degree=2, scale=1e+00, C=0.25
- Fold05: degree=2, scale=1e+00, C=0.25
+ Fold05: degree=3, scale=1e+00, C=0.25
- Fold05: degree=3, scale=1e+00, C=0.25
+ Fold05: degree=1, scale=1e+01, C=0.25
- Fold05: degree=1, scale=1e+01, C=0.25
+ Fold05: degree=2, scale=1e+01, C=0.25
- Fold05: degree=2, scale=1e+01, C=0.25
+ Fold05: degree=3, scale=1e+01, C=0.25
- Fold05: degree=3, scale=1e+01, C=0.25
+ Fold05: degree=1, scale=1e+02, C=0.25
- Fold05: degree=1, scale=1e+02, C=0.25
+ Fold05: degree=2, scale=1e+02, C=0.25
- Fold05: degree=2, scale=1e+02, C=0.25
+ Fold05: degree=3, scale=1e+02, C=0.25
- Fold05: degree=3, scale=1e+02, C=0.25
+ Fold05: degree=1, scale=1e-03, C=0.50
- Fold05: degree=1, scale=1e-03, C=0.50
+ Fold05: degree=2, scale=1e-03, C=0.50
- Fold05: degree=2, scale=1e-03, C=0.50
+ Fold05: degree=3, scale=1e-03, C=0.50
- Fold05: degree=3, scale=1e-03, C=0.50
+ Fold05: degree=1, scale=1e-02, C=0.50
- Fold05: degree=1, scale=1e-02, C=0.50
+ Fold05: degree=2, scale=1e-02, C=0.50
- Fold05: degree=2, scale=1e-02, C=0.50
+ Fold05: degree=3, scale=1e-02, C=0.50
- Fold05: degree=3, scale=1e-02, C=0.50
+ Fold05: degree=1, scale=1e-01, C=0.50
- Fold05: degree=1, scale=1e-01, C=0.50
+ Fold05: degree=2, scale=1e-01, C=0.50
- Fold05: degree=2, scale=1e-01, C=0.50
+ Fold05: degree=3, scale=1e-01, C=0.50
- Fold05: degree=3, scale=1e-01, C=0.50
+ Fold05: degree=1, scale=1e+00, C=0.50
- Fold05: degree=1, scale=1e+00, C=0.50
+ Fold05: degree=2, scale=1e+00, C=0.50
- Fold05: degree=2, scale=1e+00, C=0.50
+ Fold05: degree=3, scale=1e+00, C=0.50
- Fold05: degree=3, scale=1e+00, C=0.50
+ Fold05: degree=1, scale=1e+01, C=0.50
```

```
- Fold05: degree=1, scale=1e+01, C=0.50
+ Fold05: degree=2, scale=1e+01, C=0.50
- Fold05: degree=2, scale=1e+01, C=0.50
+ Fold05: degree=3, scale=1e+01, C=0.50
- Fold05: degree=3, scale=1e+01, C=0.50
+ Fold05: degree=1, scale=1e+02, C=0.50
- Fold05: degree=1, scale=1e+02, C=0.50
+ Fold05: degree=2, scale=1e+02, C=0.50
- Fold05: degree=2, scale=1e+02, C=0.50
+ Fold05: degree=3, scale=1e+02, C=0.50
- Fold05: degree=3, scale=1e+02, C=0.50
+ Fold05: degree=1, scale=1e-03, C=1.00
- Fold05: degree=1, scale=1e-03, C=1.00
+ Fold05: degree=2, scale=1e-03, C=1.00
- Fold05: degree=2, scale=1e-03, C=1.00
+ Fold05: degree=3, scale=1e-03, C=1.00
- Fold05: degree=3, scale=1e-03, C=1.00
+ Fold05: degree=1, scale=1e-02, C=1.00
- Fold05: degree=1, scale=1e-02, C=1.00
+ Fold05: degree=2, scale=1e-02, C=1.00
- Fold05: degree=2, scale=1e-02, C=1.00
+ Fold05: degree=3, scale=1e-02, C=1.00
- Fold05: degree=3, scale=1e-02, C=1.00
+ Fold05: degree=1, scale=1e-01, C=1.00
- Fold05: degree=1, scale=1e-01, C=1.00
+ Fold05: degree=2, scale=1e-01, C=1.00
- Fold05: degree=2, scale=1e-01, C=1.00
+ Fold05: degree=3, scale=1e-01, C=1.00
- Fold05: degree=3, scale=1e-01, C=1.00
+ Fold05: degree=1, scale=1e+00, C=1.00
- Fold05: degree=1, scale=1e+00, C=1.00
+ Fold05: degree=2, scale=1e+00, C=1.00
- Fold05: degree=2, scale=1e+00, C=1.00
+ Fold05: degree=3, scale=1e+00, C=1.00
- Fold05: degree=3, scale=1e+00, C=1.00
+ Fold05: degree=1, scale=1e+01, C=1.00
- Fold05: degree=1, scale=1e+01, C=1.00
+ Fold05: degree=2, scale=1e+01, C=1.00
- Fold05: degree=2, scale=1e+01, C=1.00
+ Fold05: degree=3, scale=1e+01, C=1.00
- Fold05: degree=3, scale=1e+01, C=1.00
+ Fold05: degree=1, scale=1e+02, C=1.00
- Fold05: degree=1, scale=1e+02, C=1.00
+ Fold05: degree=2, scale=1e+02, C=1.00
- Fold05: degree=2, scale=1e+02, C=1.00
+ Fold05: degree=3, scale=1e+02, C=1.00
- Fold05: degree=3, scale=1e+02, C=1.00
+ Fold05: degree=1, scale=1e-03, C=2.00
- Fold05: degree=1, scale=1e-03, C=2.00
+ Fold05: degree=2, scale=1e-03, C=2.00
- Fold05: degree=2, scale=1e-03, C=2.00
+ Fold05: degree=3, scale=1e-03, C=2.00
- Fold05: degree=3, scale=1e-03, C=2.00
+ Fold05: degree=1, scale=1e-02, C=2.00
```

```
- Fold05: degree=1, scale=1e-02, C=2.00
+ Fold05: degree=2, scale=1e-02, C=2.00
- Fold05: degree=2, scale=1e-02, C=2.00
+ Fold05: degree=3, scale=1e-02, C=2.00
- Fold05: degree=3, scale=1e-02, C=2.00
+ Fold05: degree=1, scale=1e-01, C=2.00
- Fold05: degree=1, scale=1e-01, C=2.00
+ Fold05: degree=2, scale=1e-01, C=2.00
- Fold05: degree=2, scale=1e-01, C=2.00
+ Fold05: degree=3, scale=1e-01, C=2.00
- Fold05: degree=3, scale=1e-01, C=2.00
+ Fold05: degree=1, scale=1e+00, C=2.00
- Fold05: degree=1, scale=1e+00, C=2.00
+ Fold05: degree=2, scale=1e+00, C=2.00
- Fold05: degree=2, scale=1e+00, C=2.00
+ Fold05: degree=3, scale=1e+00, C=2.00
- Fold05: degree=3, scale=1e+00, C=2.00
+ Fold05: degree=1, scale=1e+01, C=2.00
- Fold05: degree=1, scale=1e+01, C=2.00
+ Fold05: degree=2, scale=1e+01, C=2.00
- Fold05: degree=2, scale=1e+01, C=2.00
+ Fold05: degree=3, scale=1e+01, C=2.00
- Fold05: degree=3, scale=1e+01, C=2.00
+ Fold05: degree=1, scale=1e+02, C=2.00
- Fold05: degree=1, scale=1e+02, C=2.00
+ Fold05: degree=2, scale=1e+02, C=2.00
- Fold05: degree=2, scale=1e+02, C=2.00
+ Fold05: degree=3, scale=1e+02, C=2.00
- Fold05: degree=3, scale=1e+02, C=2.00
+ Fold05: degree=1, scale=1e-03, C=4.00
- Fold05: degree=1, scale=1e-03, C=4.00
+ Fold05: degree=2, scale=1e-03, C=4.00
- Fold05: degree=2, scale=1e-03, C=4.00
+ Fold05: degree=3, scale=1e-03, C=4.00
- Fold05: degree=3, scale=1e-03, C=4.00
+ Fold05: degree=1, scale=1e-02, C=4.00
- Fold05: degree=1, scale=1e-02, C=4.00
+ Fold05: degree=2, scale=1e-02, C=4.00
- Fold05: degree=2, scale=1e-02, C=4.00
+ Fold05: degree=3, scale=1e-02, C=4.00
- Fold05: degree=3, scale=1e-02, C=4.00
+ Fold05: degree=1, scale=1e-01, C=4.00
- Fold05: degree=1, scale=1e-01, C=4.00
+ Fold05: degree=2, scale=1e-01, C=4.00
- Fold05: degree=2, scale=1e-01, C=4.00
+ Fold05: degree=3, scale=1e-01, C=4.00
- Fold05: degree=3, scale=1e-01, C=4.00
+ Fold05: degree=1, scale=1e+00, C=4.00
- Fold05: degree=1, scale=1e+00, C=4.00
+ Fold05: degree=2, scale=1e+00, C=4.00
- Fold05: degree=2, scale=1e+00, C=4.00
+ Fold05: degree=3, scale=1e+00, C=4.00
- Fold05: degree=3, scale=1e+00, C=4.00
+ Fold05: degree=1, scale=1e+01, C=4.00
```

```
- Fold05: degree=1, scale=1e+01, C=4.00
+ Fold05: degree=2, scale=1e+01, C=4.00
- Fold05: degree=2, scale=1e+01, C=4.00
+ Fold05: degree=3, scale=1e+01, C=4.00
- Fold05: degree=3, scale=1e+01, C=4.00
+ Fold05: degree=1, scale=1e+02, C=4.00
- Fold05: degree=1, scale=1e+02, C=4.00
+ Fold05: degree=2, scale=1e+02, C=4.00
- Fold05: degree=2, scale=1e+02, C=4.00
+ Fold05: degree=3, scale=1e+02, C=4.00
- Fold05: degree=3, scale=1e+02, C=4.00
+ Fold05: degree=1, scale=1e-03, C=8.00
- Fold05: degree=1, scale=1e-03, C=8.00
+ Fold05: degree=2, scale=1e-03, C=8.00
- Fold05: degree=2, scale=1e-03, C=8.00
+ Fold05: degree=3, scale=1e-03, C=8.00
- Fold05: degree=3, scale=1e-03, C=8.00
+ Fold05: degree=1, scale=1e-02, C=8.00
- Fold05: degree=1, scale=1e-02, C=8.00
+ Fold05: degree=2, scale=1e-02, C=8.00
- Fold05: degree=2, scale=1e-02, C=8.00
+ Fold05: degree=3, scale=1e-02, C=8.00
- Fold05: degree=3, scale=1e-02, C=8.00
+ Fold05: degree=1, scale=1e-01, C=8.00
- Fold05: degree=1, scale=1e-01, C=8.00
+ Fold05: degree=2, scale=1e-01, C=8.00
- Fold05: degree=2, scale=1e-01, C=8.00
+ Fold05: degree=3, scale=1e-01, C=8.00
- Fold05: degree=3, scale=1e-01, C=8.00
+ Fold05: degree=1, scale=1e+00, C=8.00
- Fold05: degree=1, scale=1e+00, C=8.00
+ Fold05: degree=2, scale=1e+00, C=8.00
- Fold05: degree=2, scale=1e+00, C=8.00
+ Fold05: degree=3, scale=1e+00, C=8.00
- Fold05: degree=3, scale=1e+00, C=8.00
+ Fold05: degree=1, scale=1e+01, C=8.00
- Fold05: degree=1, scale=1e+01, C=8.00
+ Fold05: degree=2, scale=1e+01, C=8.00
- Fold05: degree=2, scale=1e+01, C=8.00
+ Fold05: degree=3, scale=1e+01, C=8.00
- Fold05: degree=3, scale=1e+01, C=8.00
+ Fold05: degree=1, scale=1e+02, C=8.00
- Fold05: degree=1, scale=1e+02, C=8.00
+ Fold05: degree=2, scale=1e+02, C=8.00
- Fold05: degree=2, scale=1e+02, C=8.00
+ Fold05: degree=3, scale=1e+02, C=8.00
- Fold05: degree=3, scale=1e+02, C=8.00
+ Fold06: degree=1, scale=1e-03, C=0.25
- Fold06: degree=1, scale=1e-03, C=0.25
+ Fold06: degree=2, scale=1e-03, C=0.25
- Fold06: degree=2, scale=1e-03, C=0.25
+ Fold06: degree=3, scale=1e-03, C=0.25
- Fold06: degree=3, scale=1e-03, C=0.25
+ Fold06: degree=1, scale=1e-02, C=0.25
```

```
- Fold06: degree=1, scale=1e-02, C=0.25
+ Fold06: degree=2, scale=1e-02, C=0.25
- Fold06: degree=2, scale=1e-02, C=0.25
+ Fold06: degree=3, scale=1e-02, C=0.25
- Fold06: degree=3, scale=1e-02, C=0.25
+ Fold06: degree=1, scale=1e-01, C=0.25
- Fold06: degree=1, scale=1e-01, C=0.25
+ Fold06: degree=2, scale=1e-01, C=0.25
- Fold06: degree=2, scale=1e-01, C=0.25
+ Fold06: degree=3, scale=1e-01, C=0.25
- Fold06: degree=3, scale=1e-01, C=0.25
+ Fold06: degree=1, scale=1e+00, C=0.25
- Fold06: degree=1, scale=1e+00, C=0.25
+ Fold06: degree=2, scale=1e+00, C=0.25
- Fold06: degree=2, scale=1e+00, C=0.25
+ Fold06: degree=3, scale=1e+00, C=0.25
- Fold06: degree=3, scale=1e+00, C=0.25
+ Fold06: degree=1, scale=1e+01, C=0.25
- Fold06: degree=1, scale=1e+01, C=0.25
+ Fold06: degree=2, scale=1e+01, C=0.25
- Fold06: degree=2, scale=1e+01, C=0.25
+ Fold06: degree=3, scale=1e+01, C=0.25
- Fold06: degree=3, scale=1e+01, C=0.25
+ Fold06: degree=1, scale=1e+02, C=0.25
- Fold06: degree=1, scale=1e+02, C=0.25
+ Fold06: degree=2, scale=1e+02, C=0.25
- Fold06: degree=2, scale=1e+02, C=0.25
+ Fold06: degree=3, scale=1e+02, C=0.25
- Fold06: degree=3, scale=1e+02, C=0.25
+ Fold06: degree=1, scale=1e-03, C=0.50
- Fold06: degree=1, scale=1e-03, C=0.50
+ Fold06: degree=2, scale=1e-03, C=0.50
- Fold06: degree=2, scale=1e-03, C=0.50
+ Fold06: degree=3, scale=1e-03, C=0.50
- Fold06: degree=3, scale=1e-03, C=0.50
+ Fold06: degree=1, scale=1e-02, C=0.50
- Fold06: degree=1, scale=1e-02, C=0.50
+ Fold06: degree=2, scale=1e-02, C=0.50
- Fold06: degree=2, scale=1e-02, C=0.50
+ Fold06: degree=3, scale=1e-02, C=0.50
- Fold06: degree=3, scale=1e-02, C=0.50
+ Fold06: degree=1, scale=1e-01, C=0.50
- Fold06: degree=1, scale=1e-01, C=0.50
+ Fold06: degree=2, scale=1e-01, C=0.50
- Fold06: degree=2, scale=1e-01, C=0.50
+ Fold06: degree=3, scale=1e-01, C=0.50
- Fold06: degree=3, scale=1e-01, C=0.50
+ Fold06: degree=1, scale=1e+00, C=0.50
- Fold06: degree=1, scale=1e+00, C=0.50
+ Fold06: degree=2, scale=1e+00, C=0.50
- Fold06: degree=2, scale=1e+00, C=0.50
+ Fold06: degree=3, scale=1e+00, C=0.50
- Fold06: degree=3, scale=1e+00, C=0.50
+ Fold06: degree=1, scale=1e+01, C=0.50
```

```
- Fold06: degree=1, scale=1e+01, C=0.50
+ Fold06: degree=2, scale=1e+01, C=0.50
- Fold06: degree=2, scale=1e+01, C=0.50
+ Fold06: degree=3, scale=1e+01, C=0.50
- Fold06: degree=3, scale=1e+01, C=0.50
+ Fold06: degree=1, scale=1e+02, C=0.50
- Fold06: degree=1, scale=1e+02, C=0.50
+ Fold06: degree=2, scale=1e+02, C=0.50
- Fold06: degree=2, scale=1e+02, C=0.50
+ Fold06: degree=3, scale=1e+02, C=0.50
- Fold06: degree=3, scale=1e+02, C=0.50
+ Fold06: degree=1, scale=1e-03, C=1.00
- Fold06: degree=1, scale=1e-03, C=1.00
+ Fold06: degree=2, scale=1e-03, C=1.00
- Fold06: degree=2, scale=1e-03, C=1.00
+ Fold06: degree=3, scale=1e-03, C=1.00
- Fold06: degree=3, scale=1e-03, C=1.00
+ Fold06: degree=1, scale=1e-02, C=1.00
- Fold06: degree=1, scale=1e-02, C=1.00
+ Fold06: degree=2, scale=1e-02, C=1.00
- Fold06: degree=2, scale=1e-02, C=1.00
+ Fold06: degree=3, scale=1e-02, C=1.00
- Fold06: degree=3, scale=1e-02, C=1.00
+ Fold06: degree=1, scale=1e-01, C=1.00
- Fold06: degree=1, scale=1e-01, C=1.00
+ Fold06: degree=2, scale=1e-01, C=1.00
- Fold06: degree=2, scale=1e-01, C=1.00
+ Fold06: degree=3, scale=1e-01, C=1.00
- Fold06: degree=3, scale=1e-01, C=1.00
+ Fold06: degree=1, scale=1e+00, C=1.00
- Fold06: degree=1, scale=1e+00, C=1.00
+ Fold06: degree=2, scale=1e+00, C=1.00
- Fold06: degree=2, scale=1e+00, C=1.00
+ Fold06: degree=3, scale=1e+00, C=1.00
- Fold06: degree=3, scale=1e+00, C=1.00
+ Fold06: degree=1, scale=1e+01, C=1.00
- Fold06: degree=1, scale=1e+01, C=1.00
+ Fold06: degree=2, scale=1e+01, C=1.00
- Fold06: degree=2, scale=1e+01, C=1.00
+ Fold06: degree=3, scale=1e+01, C=1.00
- Fold06: degree=3, scale=1e+01, C=1.00
+ Fold06: degree=1, scale=1e+02, C=1.00
- Fold06: degree=1, scale=1e+02, C=1.00
+ Fold06: degree=2, scale=1e+02, C=1.00
- Fold06: degree=2, scale=1e+02, C=1.00
+ Fold06: degree=3, scale=1e+02, C=1.00
- Fold06: degree=3, scale=1e+02, C=1.00
+ Fold06: degree=1, scale=1e-03, C=2.00
- Fold06: degree=1, scale=1e-03, C=2.00
+ Fold06: degree=2, scale=1e-03, C=2.00
- Fold06: degree=2, scale=1e-03, C=2.00
+ Fold06: degree=3, scale=1e-03, C=2.00
- Fold06: degree=3, scale=1e-03, C=2.00
+ Fold06: degree=1, scale=1e-02, C=2.00
```

```
- Fold06: degree=1, scale=1e-02, C=2.00
+ Fold06: degree=2, scale=1e-02, C=2.00
- Fold06: degree=2, scale=1e-02, C=2.00
+ Fold06: degree=3, scale=1e-02, C=2.00
- Fold06: degree=3, scale=1e-02, C=2.00
+ Fold06: degree=1, scale=1e-01, C=2.00
- Fold06: degree=1, scale=1e-01, C=2.00
+ Fold06: degree=2, scale=1e-01, C=2.00
- Fold06: degree=2, scale=1e-01, C=2.00
+ Fold06: degree=3, scale=1e-01, C=2.00
- Fold06: degree=3, scale=1e-01, C=2.00
+ Fold06: degree=1, scale=1e+00, C=2.00
- Fold06: degree=1, scale=1e+00, C=2.00
+ Fold06: degree=2, scale=1e+00, C=2.00
- Fold06: degree=2, scale=1e+00, C=2.00
+ Fold06: degree=3, scale=1e+00, C=2.00
- Fold06: degree=3, scale=1e+00, C=2.00
+ Fold06: degree=1, scale=1e+01, C=2.00
- Fold06: degree=1, scale=1e+01, C=2.00
+ Fold06: degree=2, scale=1e+01, C=2.00
- Fold06: degree=2, scale=1e+01, C=2.00
+ Fold06: degree=3, scale=1e+01, C=2.00
- Fold06: degree=3, scale=1e+01, C=2.00
+ Fold06: degree=1, scale=1e+02, C=2.00
- Fold06: degree=1, scale=1e+02, C=2.00
+ Fold06: degree=2, scale=1e+02, C=2.00
- Fold06: degree=2, scale=1e+02, C=2.00
+ Fold06: degree=3, scale=1e+02, C=2.00
- Fold06: degree=3, scale=1e+02, C=2.00
+ Fold06: degree=1, scale=1e-03, C=4.00
- Fold06: degree=1, scale=1e-03, C=4.00
+ Fold06: degree=2, scale=1e-03, C=4.00
- Fold06: degree=2, scale=1e-03, C=4.00
+ Fold06: degree=3, scale=1e-03, C=4.00
- Fold06: degree=3, scale=1e-03, C=4.00
+ Fold06: degree=1, scale=1e-02, C=4.00
- Fold06: degree=1, scale=1e-02, C=4.00
+ Fold06: degree=2, scale=1e-02, C=4.00
- Fold06: degree=2, scale=1e-02, C=4.00
+ Fold06: degree=3, scale=1e-02, C=4.00
- Fold06: degree=3, scale=1e-02, C=4.00
+ Fold06: degree=1, scale=1e-01, C=4.00
- Fold06: degree=1, scale=1e-01, C=4.00
+ Fold06: degree=2, scale=1e-01, C=4.00
- Fold06: degree=2, scale=1e-01, C=4.00
+ Fold06: degree=3, scale=1e-01, C=4.00
- Fold06: degree=3, scale=1e-01, C=4.00
+ Fold06: degree=1, scale=1e+00, C=4.00
- Fold06: degree=1, scale=1e+00, C=4.00
+ Fold06: degree=2, scale=1e+00, C=4.00
- Fold06: degree=2, scale=1e+00, C=4.00
+ Fold06: degree=3, scale=1e+00, C=4.00
- Fold06: degree=3, scale=1e+00, C=4.00
+ Fold06: degree=1, scale=1e+01, C=4.00
```

```
- Fold06: degree=1, scale=1e+01, C=4.00
+ Fold06: degree=2, scale=1e+01, C=4.00
- Fold06: degree=2, scale=1e+01, C=4.00
+ Fold06: degree=3, scale=1e+01, C=4.00
- Fold06: degree=3, scale=1e+01, C=4.00
+ Fold06: degree=1, scale=1e+02, C=4.00
- Fold06: degree=1, scale=1e+02, C=4.00
+ Fold06: degree=2, scale=1e+02, C=4.00
- Fold06: degree=2, scale=1e+02, C=4.00
+ Fold06: degree=3, scale=1e+02, C=4.00
- Fold06: degree=3, scale=1e+02, C=4.00
+ Fold06: degree=1, scale=1e-03, C=8.00
- Fold06: degree=1, scale=1e-03, C=8.00
+ Fold06: degree=2, scale=1e-03, C=8.00
- Fold06: degree=2, scale=1e-03, C=8.00
+ Fold06: degree=3, scale=1e-03, C=8.00
- Fold06: degree=3, scale=1e-03, C=8.00
+ Fold06: degree=1, scale=1e-02, C=8.00
- Fold06: degree=1, scale=1e-02, C=8.00
+ Fold06: degree=2, scale=1e-02, C=8.00
- Fold06: degree=2, scale=1e-02, C=8.00
+ Fold06: degree=3, scale=1e-02, C=8.00
- Fold06: degree=3, scale=1e-02, C=8.00
+ Fold06: degree=1, scale=1e-01, C=8.00
- Fold06: degree=1, scale=1e-01, C=8.00
+ Fold06: degree=2, scale=1e-01, C=8.00
- Fold06: degree=2, scale=1e-01, C=8.00
+ Fold06: degree=3, scale=1e-01, C=8.00
- Fold06: degree=3, scale=1e-01, C=8.00
+ Fold06: degree=1, scale=1e+00, C=8.00
- Fold06: degree=1, scale=1e+00, C=8.00
+ Fold06: degree=2, scale=1e+00, C=8.00
- Fold06: degree=2, scale=1e+00, C=8.00
+ Fold06: degree=3, scale=1e+00, C=8.00
- Fold06: degree=3, scale=1e+00, C=8.00
+ Fold06: degree=1, scale=1e+01, C=8.00
- Fold06: degree=1, scale=1e+01, C=8.00
+ Fold06: degree=2, scale=1e+01, C=8.00
- Fold06: degree=2, scale=1e+01, C=8.00
+ Fold06: degree=3, scale=1e+01, C=8.00
- Fold06: degree=3, scale=1e+01, C=8.00
+ Fold06: degree=1, scale=1e+02, C=8.00
- Fold06: degree=1, scale=1e+02, C=8.00
+ Fold06: degree=2, scale=1e+02, C=8.00
- Fold06: degree=2, scale=1e+02, C=8.00
+ Fold06: degree=3, scale=1e+02, C=8.00
- Fold06: degree=3, scale=1e+02, C=8.00
+ Fold07: degree=1, scale=1e-03, C=0.25
- Fold07: degree=1, scale=1e-03, C=0.25
+ Fold07: degree=2, scale=1e-03, C=0.25
- Fold07: degree=2, scale=1e-03, C=0.25
+ Fold07: degree=3, scale=1e-03, C=0.25
- Fold07: degree=3, scale=1e-03, C=0.25
+ Fold07: degree=1, scale=1e-02, C=0.25
```

```
- Fold07: degree=1, scale=1e-02, C=0.25
+ Fold07: degree=2, scale=1e-02, C=0.25
- Fold07: degree=2, scale=1e-02, C=0.25
+ Fold07: degree=3, scale=1e-02, C=0.25
- Fold07: degree=3, scale=1e-02, C=0.25
+ Fold07: degree=1, scale=1e-01, C=0.25
- Fold07: degree=1, scale=1e-01, C=0.25
+ Fold07: degree=2, scale=1e-01, C=0.25
- Fold07: degree=2, scale=1e-01, C=0.25
+ Fold07: degree=3, scale=1e-01, C=0.25
- Fold07: degree=3, scale=1e-01, C=0.25
+ Fold07: degree=1, scale=1e+00, C=0.25
- Fold07: degree=1, scale=1e+00, C=0.25
+ Fold07: degree=2, scale=1e+00, C=0.25
- Fold07: degree=2, scale=1e+00, C=0.25
+ Fold07: degree=3, scale=1e+00, C=0.25
- Fold07: degree=3, scale=1e+00, C=0.25
+ Fold07: degree=1, scale=1e+01, C=0.25
- Fold07: degree=1, scale=1e+01, C=0.25
+ Fold07: degree=2, scale=1e+01, C=0.25
- Fold07: degree=2, scale=1e+01, C=0.25
+ Fold07: degree=3, scale=1e+01, C=0.25
- Fold07: degree=3, scale=1e+01, C=0.25
+ Fold07: degree=1, scale=1e+02, C=0.25
- Fold07: degree=1, scale=1e+02, C=0.25
+ Fold07: degree=2, scale=1e+02, C=0.25
- Fold07: degree=2, scale=1e+02, C=0.25
+ Fold07: degree=3, scale=1e+02, C=0.25
- Fold07: degree=3, scale=1e+02, C=0.25
+ Fold07: degree=1, scale=1e-03, C=0.50
- Fold07: degree=1, scale=1e-03, C=0.50
+ Fold07: degree=2, scale=1e-03, C=0.50
- Fold07: degree=2, scale=1e-03, C=0.50
+ Fold07: degree=3, scale=1e-03, C=0.50
- Fold07: degree=3, scale=1e-03, C=0.50
+ Fold07: degree=1, scale=1e-02, C=0.50
- Fold07: degree=1, scale=1e-02, C=0.50
+ Fold07: degree=2, scale=1e-02, C=0.50
- Fold07: degree=2, scale=1e-02, C=0.50
+ Fold07: degree=3, scale=1e-02, C=0.50
- Fold07: degree=3, scale=1e-02, C=0.50
+ Fold07: degree=1, scale=1e-01, C=0.50
- Fold07: degree=1, scale=1e-01, C=0.50
+ Fold07: degree=2, scale=1e-01, C=0.50
- Fold07: degree=2, scale=1e-01, C=0.50
+ Fold07: degree=3, scale=1e-01, C=0.50
- Fold07: degree=3, scale=1e-01, C=0.50
+ Fold07: degree=1, scale=1e+00, C=0.50
- Fold07: degree=1, scale=1e+00, C=0.50
+ Fold07: degree=2, scale=1e+00, C=0.50
- Fold07: degree=2, scale=1e+00, C=0.50
+ Fold07: degree=3, scale=1e+00, C=0.50
- Fold07: degree=3, scale=1e+00, C=0.50
+ Fold07: degree=1, scale=1e+01, C=0.50
```

```
- Fold07: degree=1, scale=1e+01, C=0.50
+ Fold07: degree=2, scale=1e+01, C=0.50
- Fold07: degree=2, scale=1e+01, C=0.50
+ Fold07: degree=3, scale=1e+01, C=0.50
- Fold07: degree=3, scale=1e+01, C=0.50
+ Fold07: degree=1, scale=1e+02, C=0.50
- Fold07: degree=1, scale=1e+02, C=0.50
+ Fold07: degree=2, scale=1e+02, C=0.50
- Fold07: degree=2, scale=1e+02, C=0.50
+ Fold07: degree=3, scale=1e+02, C=0.50
- Fold07: degree=3, scale=1e+02, C=0.50
+ Fold07: degree=1, scale=1e-03, C=1.00
- Fold07: degree=1, scale=1e-03, C=1.00
+ Fold07: degree=2, scale=1e-03, C=1.00
- Fold07: degree=2, scale=1e-03, C=1.00
+ Fold07: degree=3, scale=1e-03, C=1.00
- Fold07: degree=3, scale=1e-03, C=1.00
+ Fold07: degree=1, scale=1e-02, C=1.00
- Fold07: degree=1, scale=1e-02, C=1.00
+ Fold07: degree=2, scale=1e-02, C=1.00
- Fold07: degree=2, scale=1e-02, C=1.00
+ Fold07: degree=3, scale=1e-02, C=1.00
- Fold07: degree=3, scale=1e-02, C=1.00
+ Fold07: degree=1, scale=1e-01, C=1.00
- Fold07: degree=1, scale=1e-01, C=1.00
+ Fold07: degree=2, scale=1e-01, C=1.00
- Fold07: degree=2, scale=1e-01, C=1.00
+ Fold07: degree=3, scale=1e-01, C=1.00
- Fold07: degree=3, scale=1e-01, C=1.00
+ Fold07: degree=1, scale=1e+00, C=1.00
- Fold07: degree=1, scale=1e+00, C=1.00
+ Fold07: degree=2, scale=1e+00, C=1.00
- Fold07: degree=2, scale=1e+00, C=1.00
+ Fold07: degree=3, scale=1e+00, C=1.00
- Fold07: degree=3, scale=1e+00, C=1.00
+ Fold07: degree=1, scale=1e+01, C=1.00
- Fold07: degree=1, scale=1e+01, C=1.00
+ Fold07: degree=2, scale=1e+01, C=1.00
- Fold07: degree=2, scale=1e+01, C=1.00
+ Fold07: degree=3, scale=1e+01, C=1.00
- Fold07: degree=3, scale=1e+01, C=1.00
+ Fold07: degree=1, scale=1e+02, C=1.00
- Fold07: degree=1, scale=1e+02, C=1.00
+ Fold07: degree=2, scale=1e+02, C=1.00
- Fold07: degree=2, scale=1e+02, C=1.00
+ Fold07: degree=3, scale=1e+02, C=1.00
- Fold07: degree=3, scale=1e+02, C=1.00
+ Fold07: degree=1, scale=1e-03, C=2.00
- Fold07: degree=1, scale=1e-03, C=2.00
+ Fold07: degree=2, scale=1e-03, C=2.00
- Fold07: degree=2, scale=1e-03, C=2.00
+ Fold07: degree=3, scale=1e-03, C=2.00
- Fold07: degree=3, scale=1e-03, C=2.00
+ Fold07: degree=1, scale=1e-02, C=2.00
```

```
- Fold07: degree=1, scale=1e-02, C=2.00
+ Fold07: degree=2, scale=1e-02, C=2.00
- Fold07: degree=2, scale=1e-02, C=2.00
+ Fold07: degree=3, scale=1e-02, C=2.00
- Fold07: degree=3, scale=1e-02, C=2.00
+ Fold07: degree=1, scale=1e-01, C=2.00
- Fold07: degree=1, scale=1e-01, C=2.00
+ Fold07: degree=2, scale=1e-01, C=2.00
- Fold07: degree=2, scale=1e-01, C=2.00
+ Fold07: degree=3, scale=1e-01, C=2.00
- Fold07: degree=3, scale=1e-01, C=2.00
+ Fold07: degree=1, scale=1e+00, C=2.00
- Fold07: degree=1, scale=1e+00, C=2.00
+ Fold07: degree=2, scale=1e+00, C=2.00
- Fold07: degree=2, scale=1e+00, C=2.00
+ Fold07: degree=3, scale=1e+00, C=2.00
- Fold07: degree=3, scale=1e+00, C=2.00
+ Fold07: degree=1, scale=1e+01, C=2.00
- Fold07: degree=1, scale=1e+01, C=2.00
+ Fold07: degree=2, scale=1e+01, C=2.00
- Fold07: degree=2, scale=1e+01, C=2.00
+ Fold07: degree=3, scale=1e+01, C=2.00
- Fold07: degree=3, scale=1e+01, C=2.00
+ Fold07: degree=1, scale=1e+02, C=2.00
- Fold07: degree=1, scale=1e+02, C=2.00
+ Fold07: degree=2, scale=1e+02, C=2.00
- Fold07: degree=2, scale=1e+02, C=2.00
+ Fold07: degree=3, scale=1e+02, C=2.00
- Fold07: degree=3, scale=1e+02, C=2.00
+ Fold07: degree=1, scale=1e-03, C=4.00
- Fold07: degree=1, scale=1e-03, C=4.00
+ Fold07: degree=2, scale=1e-03, C=4.00
- Fold07: degree=2, scale=1e-03, C=4.00
+ Fold07: degree=3, scale=1e-03, C=4.00
- Fold07: degree=3, scale=1e-03, C=4.00
+ Fold07: degree=1, scale=1e-02, C=4.00
- Fold07: degree=1, scale=1e-02, C=4.00
+ Fold07: degree=2, scale=1e-02, C=4.00
- Fold07: degree=2, scale=1e-02, C=4.00
+ Fold07: degree=3, scale=1e-02, C=4.00
- Fold07: degree=3, scale=1e-02, C=4.00
+ Fold07: degree=1, scale=1e-01, C=4.00
- Fold07: degree=1, scale=1e-01, C=4.00
+ Fold07: degree=2, scale=1e-01, C=4.00
- Fold07: degree=2, scale=1e-01, C=4.00
+ Fold07: degree=3, scale=1e-01, C=4.00
- Fold07: degree=3, scale=1e-01, C=4.00
+ Fold07: degree=1, scale=1e+00, C=4.00
- Fold07: degree=1, scale=1e+00, C=4.00
+ Fold07: degree=2, scale=1e+00, C=4.00
- Fold07: degree=2, scale=1e+00, C=4.00
+ Fold07: degree=3, scale=1e+00, C=4.00
- Fold07: degree=3, scale=1e+00, C=4.00
+ Fold07: degree=1, scale=1e+01, C=4.00
```

```
- Fold07: degree=1, scale=1e+01, C=4.00
+ Fold07: degree=2, scale=1e+01, C=4.00
- Fold07: degree=2, scale=1e+01, C=4.00
+ Fold07: degree=3, scale=1e+01, C=4.00
- Fold07: degree=3, scale=1e+01, C=4.00
+ Fold07: degree=1, scale=1e+02, C=4.00
- Fold07: degree=1, scale=1e+02, C=4.00
+ Fold07: degree=2, scale=1e+02, C=4.00
- Fold07: degree=2, scale=1e+02, C=4.00
+ Fold07: degree=3, scale=1e+02, C=4.00
- Fold07: degree=3, scale=1e+02, C=4.00
+ Fold07: degree=1, scale=1e-03, C=8.00
- Fold07: degree=1, scale=1e-03, C=8.00
+ Fold07: degree=2, scale=1e-03, C=8.00
- Fold07: degree=2, scale=1e-03, C=8.00
+ Fold07: degree=3, scale=1e-03, C=8.00
- Fold07: degree=3, scale=1e-03, C=8.00
+ Fold07: degree=1, scale=1e-02, C=8.00
- Fold07: degree=1, scale=1e-02, C=8.00
+ Fold07: degree=2, scale=1e-02, C=8.00
- Fold07: degree=2, scale=1e-02, C=8.00
+ Fold07: degree=3, scale=1e-02, C=8.00
- Fold07: degree=3, scale=1e-02, C=8.00
+ Fold07: degree=1, scale=1e-01, C=8.00
- Fold07: degree=1, scale=1e-01, C=8.00
+ Fold07: degree=2, scale=1e-01, C=8.00
- Fold07: degree=2, scale=1e-01, C=8.00
+ Fold07: degree=3, scale=1e-01, C=8.00
- Fold07: degree=3, scale=1e-01, C=8.00
+ Fold07: degree=1, scale=1e+00, C=8.00
- Fold07: degree=1, scale=1e+00, C=8.00
+ Fold07: degree=2, scale=1e+00, C=8.00
- Fold07: degree=2, scale=1e+00, C=8.00
+ Fold07: degree=3, scale=1e+00, C=8.00
- Fold07: degree=3, scale=1e+00, C=8.00
+ Fold07: degree=1, scale=1e+01, C=8.00
- Fold07: degree=1, scale=1e+01, C=8.00
+ Fold07: degree=2, scale=1e+01, C=8.00
- Fold07: degree=2, scale=1e+01, C=8.00
+ Fold07: degree=3, scale=1e+01, C=8.00
- Fold07: degree=3, scale=1e+01, C=8.00
+ Fold07: degree=1, scale=1e+02, C=8.00
- Fold07: degree=1, scale=1e+02, C=8.00
+ Fold07: degree=2, scale=1e+02, C=8.00
- Fold07: degree=2, scale=1e+02, C=8.00
+ Fold07: degree=3, scale=1e+02, C=8.00
- Fold07: degree=3, scale=1e+02, C=8.00
+ Fold08: degree=1, scale=1e-03, C=0.25
- Fold08: degree=1, scale=1e-03, C=0.25
+ Fold08: degree=2, scale=1e-03, C=0.25
- Fold08: degree=2, scale=1e-03, C=0.25
+ Fold08: degree=3, scale=1e-03, C=0.25
- Fold08: degree=3, scale=1e-03, C=0.25
+ Fold08: degree=1, scale=1e-02, C=0.25
```

```
- Fold08: degree=1, scale=1e-02, C=0.25
+ Fold08: degree=2, scale=1e-02, C=0.25
- Fold08: degree=2, scale=1e-02, C=0.25
+ Fold08: degree=3, scale=1e-02, C=0.25
- Fold08: degree=3, scale=1e-02, C=0.25
+ Fold08: degree=1, scale=1e-01, C=0.25
- Fold08: degree=1, scale=1e-01, C=0.25
+ Fold08: degree=2, scale=1e-01, C=0.25
- Fold08: degree=2, scale=1e-01, C=0.25
+ Fold08: degree=3, scale=1e-01, C=0.25
- Fold08: degree=3, scale=1e-01, C=0.25
+ Fold08: degree=1, scale=1e+00, C=0.25
- Fold08: degree=1, scale=1e+00, C=0.25
+ Fold08: degree=2, scale=1e+00, C=0.25
- Fold08: degree=2, scale=1e+00, C=0.25
+ Fold08: degree=3, scale=1e+00, C=0.25
- Fold08: degree=3, scale=1e+00, C=0.25
+ Fold08: degree=1, scale=1e+01, C=0.25
- Fold08: degree=1, scale=1e+01, C=0.25
+ Fold08: degree=2, scale=1e+01, C=0.25
- Fold08: degree=2, scale=1e+01, C=0.25
+ Fold08: degree=3, scale=1e+01, C=0.25
- Fold08: degree=3, scale=1e+01, C=0.25
+ Fold08: degree=1, scale=1e+02, C=0.25
- Fold08: degree=1, scale=1e+02, C=0.25
+ Fold08: degree=2, scale=1e+02, C=0.25
- Fold08: degree=2, scale=1e+02, C=0.25
+ Fold08: degree=3, scale=1e+02, C=0.25
- Fold08: degree=3, scale=1e+02, C=0.25
+ Fold08: degree=1, scale=1e-03, C=0.50
- Fold08: degree=1, scale=1e-03, C=0.50
+ Fold08: degree=2, scale=1e-03, C=0.50
- Fold08: degree=2, scale=1e-03, C=0.50
+ Fold08: degree=3, scale=1e-03, C=0.50
- Fold08: degree=3, scale=1e-03, C=0.50
+ Fold08: degree=1, scale=1e-02, C=0.50
- Fold08: degree=1, scale=1e-02, C=0.50
+ Fold08: degree=2, scale=1e-02, C=0.50
- Fold08: degree=2, scale=1e-02, C=0.50
+ Fold08: degree=3, scale=1e-02, C=0.50
- Fold08: degree=3, scale=1e-02, C=0.50
+ Fold08: degree=1, scale=1e-01, C=0.50
- Fold08: degree=1, scale=1e-01, C=0.50
+ Fold08: degree=2, scale=1e-01, C=0.50
- Fold08: degree=2, scale=1e-01, C=0.50
+ Fold08: degree=3, scale=1e-01, C=0.50
- Fold08: degree=3, scale=1e-01, C=0.50
+ Fold08: degree=1, scale=1e+00, C=0.50
- Fold08: degree=1, scale=1e+00, C=0.50
+ Fold08: degree=2, scale=1e+00, C=0.50
- Fold08: degree=2, scale=1e+00, C=0.50
+ Fold08: degree=3, scale=1e+00, C=0.50
- Fold08: degree=3, scale=1e+00, C=0.50
+ Fold08: degree=1, scale=1e+01, C=0.50
```

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- Fold08: degree=1, scale=1e+01, C=0.50
+ Fold08: degree=2, scale=1e+01, C=0.50
- Fold08: degree=2, scale=1e+01, C=0.50
+ Fold08: degree=3, scale=1e+01, C=0.50
- Fold08: degree=3, scale=1e+01, C=0.50
+ Fold08: degree=1, scale=1e+02, C=0.50
- Fold08: degree=1, scale=1e+02, C=0.50
+ Fold08: degree=2, scale=1e+02, C=0.50
- Fold08: degree=2, scale=1e+02, C=0.50
+ Fold08: degree=3, scale=1e+02, C=0.50
- Fold08: degree=3, scale=1e+02, C=0.50
+ Fold08: degree=1, scale=1e-03, C=1.00
- Fold08: degree=1, scale=1e-03, C=1.00
+ Fold08: degree=2, scale=1e-03, C=1.00
- Fold08: degree=2, scale=1e-03, C=1.00
+ Fold08: degree=3, scale=1e-03, C=1.00
- Fold08: degree=3, scale=1e-03, C=1.00
+ Fold08: degree=1, scale=1e-02, C=1.00
- Fold08: degree=1, scale=1e-02, C=1.00
+ Fold08: degree=2, scale=1e-02, C=1.00
- Fold08: degree=2, scale=1e-02, C=1.00
+ Fold08: degree=3, scale=1e-02, C=1.00
- Fold08: degree=3, scale=1e-02, C=1.00
+ Fold08: degree=1, scale=1e-01, C=1.00
- Fold08: degree=1, scale=1e-01, C=1.00
+ Fold08: degree=2, scale=1e-01, C=1.00
- Fold08: degree=2, scale=1e-01, C=1.00
+ Fold08: degree=3, scale=1e-01, C=1.00
- Fold08: degree=3, scale=1e-01, C=1.00
+ Fold08: degree=1, scale=1e+00, C=1.00
- Fold08: degree=1, scale=1e+00, C=1.00
+ Fold08: degree=2, scale=1e+00, C=1.00
- Fold08: degree=2, scale=1e+00, C=1.00
+ Fold08: degree=3, scale=1e+00, C=1.00
- Fold08: degree=3, scale=1e+00, C=1.00
+ Fold08: degree=1, scale=1e+01, C=1.00
- Fold08: degree=1, scale=1e+01, C=1.00
+ Fold08: degree=2, scale=1e+01, C=1.00
- Fold08: degree=2, scale=1e+01, C=1.00
+ Fold08: degree=3, scale=1e+01, C=1.00
- Fold08: degree=3, scale=1e+01, C=1.00
+ Fold08: degree=1, scale=1e+02, C=1.00
- Fold08: degree=1, scale=1e+02, C=1.00
+ Fold08: degree=2, scale=1e+02, C=1.00
- Fold08: degree=2, scale=1e+02, C=1.00
+ Fold08: degree=3, scale=1e+02, C=1.00
- Fold08: degree=3, scale=1e+02, C=1.00
+ Fold08: degree=1, scale=1e-03, C=2.00
- Fold08: degree=1, scale=1e-03, C=2.00
+ Fold08: degree=2, scale=1e-03, C=2.00
- Fold08: degree=2, scale=1e-03, C=2.00
+ Fold08: degree=3, scale=1e-03, C=2.00
- Fold08: degree=3, scale=1e-03, C=2.00
+ Fold08: degree=1, scale=1e-02, C=2.00
```

```
- Fold08: degree=1, scale=1e-02, C=2.00
+ Fold08: degree=2, scale=1e-02, C=2.00
- Fold08: degree=2, scale=1e-02, C=2.00
+ Fold08: degree=3, scale=1e-02, C=2.00
- Fold08: degree=3, scale=1e-02, C=2.00
+ Fold08: degree=1, scale=1e-01, C=2.00
- Fold08: degree=1, scale=1e-01, C=2.00
+ Fold08: degree=2, scale=1e-01, C=2.00
- Fold08: degree=2, scale=1e-01, C=2.00
+ Fold08: degree=3, scale=1e-01, C=2.00
- Fold08: degree=3, scale=1e-01, C=2.00
+ Fold08: degree=1, scale=1e+00, C=2.00
- Fold08: degree=1, scale=1e+00, C=2.00
+ Fold08: degree=2, scale=1e+00, C=2.00
- Fold08: degree=2, scale=1e+00, C=2.00
+ Fold08: degree=3, scale=1e+00, C=2.00
- Fold08: degree=3, scale=1e+00, C=2.00
+ Fold08: degree=1, scale=1e+01, C=2.00
- Fold08: degree=1, scale=1e+01, C=2.00
+ Fold08: degree=2, scale=1e+01, C=2.00
- Fold08: degree=2, scale=1e+01, C=2.00
+ Fold08: degree=3, scale=1e+01, C=2.00
- Fold08: degree=3, scale=1e+01, C=2.00
+ Fold08: degree=1, scale=1e+02, C=2.00
- Fold08: degree=1, scale=1e+02, C=2.00
+ Fold08: degree=2, scale=1e+02, C=2.00
- Fold08: degree=2, scale=1e+02, C=2.00
+ Fold08: degree=3, scale=1e+02, C=2.00
- Fold08: degree=3, scale=1e+02, C=2.00
+ Fold08: degree=1, scale=1e-03, C=4.00
- Fold08: degree=1, scale=1e-03, C=4.00
+ Fold08: degree=2, scale=1e-03, C=4.00
- Fold08: degree=2, scale=1e-03, C=4.00
+ Fold08: degree=3, scale=1e-03, C=4.00
- Fold08: degree=3, scale=1e-03, C=4.00
+ Fold08: degree=1, scale=1e-02, C=4.00
- Fold08: degree=1, scale=1e-02, C=4.00
+ Fold08: degree=2, scale=1e-02, C=4.00
- Fold08: degree=2, scale=1e-02, C=4.00
+ Fold08: degree=3, scale=1e-02, C=4.00
- Fold08: degree=3, scale=1e-02, C=4.00
+ Fold08: degree=1, scale=1e-01, C=4.00
- Fold08: degree=1, scale=1e-01, C=4.00
+ Fold08: degree=2, scale=1e-01, C=4.00
- Fold08: degree=2, scale=1e-01, C=4.00
+ Fold08: degree=3, scale=1e-01, C=4.00
- Fold08: degree=3, scale=1e-01, C=4.00
+ Fold08: degree=1, scale=1e+00, C=4.00
- Fold08: degree=1, scale=1e+00, C=4.00
+ Fold08: degree=2, scale=1e+00, C=4.00
- Fold08: degree=2, scale=1e+00, C=4.00
+ Fold08: degree=3, scale=1e+00, C=4.00
- Fold08: degree=3, scale=1e+00, C=4.00
+ Fold08: degree=1, scale=1e+01, C=4.00
```

```
- Fold08: degree=1, scale=1e+01, C=4.00
+ Fold08: degree=2, scale=1e+01, C=4.00
- Fold08: degree=2, scale=1e+01, C=4.00
+ Fold08: degree=3, scale=1e+01, C=4.00
- Fold08: degree=3, scale=1e+01, C=4.00
+ Fold08: degree=1, scale=1e+02, C=4.00
- Fold08: degree=1, scale=1e+02, C=4.00
+ Fold08: degree=2, scale=1e+02, C=4.00
- Fold08: degree=2, scale=1e+02, C=4.00
+ Fold08: degree=3, scale=1e+02, C=4.00
- Fold08: degree=3, scale=1e+02, C=4.00
+ Fold08: degree=1, scale=1e-03, C=8.00
- Fold08: degree=1, scale=1e-03, C=8.00
+ Fold08: degree=2, scale=1e-03, C=8.00
- Fold08: degree=2, scale=1e-03, C=8.00
+ Fold08: degree=3, scale=1e-03, C=8.00
- Fold08: degree=3, scale=1e-03, C=8.00
+ Fold08: degree=1, scale=1e-02, C=8.00
- Fold08: degree=1, scale=1e-02, C=8.00
+ Fold08: degree=2, scale=1e-02, C=8.00
- Fold08: degree=2, scale=1e-02, C=8.00
+ Fold08: degree=3, scale=1e-02, C=8.00
- Fold08: degree=3, scale=1e-02, C=8.00
+ Fold08: degree=1, scale=1e-01, C=8.00
- Fold08: degree=1, scale=1e-01, C=8.00
+ Fold08: degree=2, scale=1e-01, C=8.00
- Fold08: degree=2, scale=1e-01, C=8.00
+ Fold08: degree=3, scale=1e-01, C=8.00
- Fold08: degree=3, scale=1e-01, C=8.00
+ Fold08: degree=1, scale=1e+00, C=8.00
- Fold08: degree=1, scale=1e+00, C=8.00
+ Fold08: degree=2, scale=1e+00, C=8.00
- Fold08: degree=2, scale=1e+00, C=8.00
+ Fold08: degree=3, scale=1e+00, C=8.00
- Fold08: degree=3, scale=1e+00, C=8.00
+ Fold08: degree=1, scale=1e+01, C=8.00
- Fold08: degree=1, scale=1e+01, C=8.00
+ Fold08: degree=2, scale=1e+01, C=8.00
- Fold08: degree=2, scale=1e+01, C=8.00
+ Fold08: degree=3, scale=1e+01, C=8.00
- Fold08: degree=3, scale=1e+01, C=8.00
+ Fold08: degree=1, scale=1e+02, C=8.00
- Fold08: degree=1, scale=1e+02, C=8.00
+ Fold08: degree=2, scale=1e+02, C=8.00
- Fold08: degree=2, scale=1e+02, C=8.00
+ Fold08: degree=3, scale=1e+02, C=8.00
- Fold08: degree=3, scale=1e+02, C=8.00
+ Fold09: degree=1, scale=1e-03, C=0.25
- Fold09: degree=1, scale=1e-03, C=0.25
+ Fold09: degree=2, scale=1e-03, C=0.25
- Fold09: degree=2, scale=1e-03, C=0.25
+ Fold09: degree=3, scale=1e-03, C=0.25
- Fold09: degree=3, scale=1e-03, C=0.25
+ Fold09: degree=1, scale=1e-02, C=0.25
```

```
- Fold09: degree=1, scale=1e-02, C=0.25
+ Fold09: degree=2, scale=1e-02, C=0.25
- Fold09: degree=2, scale=1e-02, C=0.25
+ Fold09: degree=3, scale=1e-02, C=0.25
- Fold09: degree=3, scale=1e-02, C=0.25
+ Fold09: degree=1, scale=1e-01, C=0.25
- Fold09: degree=1, scale=1e-01, C=0.25
+ Fold09: degree=2, scale=1e-01, C=0.25
- Fold09: degree=2, scale=1e-01, C=0.25
+ Fold09: degree=3, scale=1e-01, C=0.25
- Fold09: degree=3, scale=1e-01, C=0.25
+ Fold09: degree=1, scale=1e+00, C=0.25
- Fold09: degree=1, scale=1e+00, C=0.25
+ Fold09: degree=2, scale=1e+00, C=0.25
- Fold09: degree=2, scale=1e+00, C=0.25
+ Fold09: degree=3, scale=1e+00, C=0.25
- Fold09: degree=3, scale=1e+00, C=0.25
+ Fold09: degree=1, scale=1e+01, C=0.25
- Fold09: degree=1, scale=1e+01, C=0.25
+ Fold09: degree=2, scale=1e+01, C=0.25
- Fold09: degree=2, scale=1e+01, C=0.25
+ Fold09: degree=3, scale=1e+01, C=0.25
- Fold09: degree=3, scale=1e+01, C=0.25
+ Fold09: degree=1, scale=1e+02, C=0.25
- Fold09: degree=1, scale=1e+02, C=0.25
+ Fold09: degree=2, scale=1e+02, C=0.25
- Fold09: degree=2, scale=1e+02, C=0.25
+ Fold09: degree=3, scale=1e+02, C=0.25
- Fold09: degree=3, scale=1e+02, C=0.25
+ Fold09: degree=1, scale=1e-03, C=0.50
- Fold09: degree=1, scale=1e-03, C=0.50
+ Fold09: degree=2, scale=1e-03, C=0.50
- Fold09: degree=2, scale=1e-03, C=0.50
+ Fold09: degree=3, scale=1e-03, C=0.50
- Fold09: degree=3, scale=1e-03, C=0.50
+ Fold09: degree=1, scale=1e-02, C=0.50
- Fold09: degree=1, scale=1e-02, C=0.50
+ Fold09: degree=2, scale=1e-02, C=0.50
- Fold09: degree=2, scale=1e-02, C=0.50
+ Fold09: degree=3, scale=1e-02, C=0.50
- Fold09: degree=3, scale=1e-02, C=0.50
+ Fold09: degree=1, scale=1e-01, C=0.50
- Fold09: degree=1, scale=1e-01, C=0.50
+ Fold09: degree=2, scale=1e-01, C=0.50
- Fold09: degree=2, scale=1e-01, C=0.50
+ Fold09: degree=3, scale=1e-01, C=0.50
- Fold09: degree=3, scale=1e-01, C=0.50
+ Fold09: degree=1, scale=1e+00, C=0.50
- Fold09: degree=1, scale=1e+00, C=0.50
+ Fold09: degree=2, scale=1e+00, C=0.50
- Fold09: degree=2, scale=1e+00, C=0.50
+ Fold09: degree=3, scale=1e+00, C=0.50
- Fold09: degree=3, scale=1e+00, C=0.50
+ Fold09: degree=1, scale=1e+01, C=0.50
```

```
- Fold09: degree=1, scale=1e+01, C=0.50
+ Fold09: degree=2, scale=1e+01, C=0.50
- Fold09: degree=2, scale=1e+01, C=0.50
+ Fold09: degree=3, scale=1e+01, C=0.50
- Fold09: degree=3, scale=1e+01, C=0.50
+ Fold09: degree=1, scale=1e+02, C=0.50
- Fold09: degree=1, scale=1e+02, C=0.50
+ Fold09: degree=2, scale=1e+02, C=0.50
- Fold09: degree=2, scale=1e+02, C=0.50
+ Fold09: degree=3, scale=1e+02, C=0.50
- Fold09: degree=3, scale=1e+02, C=0.50
+ Fold09: degree=1, scale=1e-03, C=1.00
- Fold09: degree=1, scale=1e-03, C=1.00
+ Fold09: degree=2, scale=1e-03, C=1.00
- Fold09: degree=2, scale=1e-03, C=1.00
+ Fold09: degree=3, scale=1e-03, C=1.00
- Fold09: degree=3, scale=1e-03, C=1.00
+ Fold09: degree=1, scale=1e-02, C=1.00
- Fold09: degree=1, scale=1e-02, C=1.00
+ Fold09: degree=2, scale=1e-02, C=1.00
- Fold09: degree=2, scale=1e-02, C=1.00
+ Fold09: degree=3, scale=1e-02, C=1.00
- Fold09: degree=3, scale=1e-02, C=1.00
+ Fold09: degree=1, scale=1e-01, C=1.00
- Fold09: degree=1, scale=1e-01, C=1.00
+ Fold09: degree=2, scale=1e-01, C=1.00
- Fold09: degree=2, scale=1e-01, C=1.00
+ Fold09: degree=3, scale=1e-01, C=1.00
- Fold09: degree=3, scale=1e-01, C=1.00
+ Fold09: degree=1, scale=1e+00, C=1.00
- Fold09: degree=1, scale=1e+00, C=1.00
+ Fold09: degree=2, scale=1e+00, C=1.00
- Fold09: degree=2, scale=1e+00, C=1.00
+ Fold09: degree=3, scale=1e+00, C=1.00
- Fold09: degree=3, scale=1e+00, C=1.00
+ Fold09: degree=1, scale=1e+01, C=1.00
- Fold09: degree=1, scale=1e+01, C=1.00
+ Fold09: degree=2, scale=1e+01, C=1.00
- Fold09: degree=2, scale=1e+01, C=1.00
+ Fold09: degree=3, scale=1e+01, C=1.00
- Fold09: degree=3, scale=1e+01, C=1.00
+ Fold09: degree=1, scale=1e+02, C=1.00
- Fold09: degree=1, scale=1e+02, C=1.00
+ Fold09: degree=2, scale=1e+02, C=1.00
- Fold09: degree=2, scale=1e+02, C=1.00
+ Fold09: degree=3, scale=1e+02, C=1.00
- Fold09: degree=3, scale=1e+02, C=1.00
+ Fold09: degree=1, scale=1e-03, C=2.00
- Fold09: degree=1, scale=1e-03, C=2.00
+ Fold09: degree=2, scale=1e-03, C=2.00
- Fold09: degree=2, scale=1e-03, C=2.00
+ Fold09: degree=3, scale=1e-03, C=2.00
- Fold09: degree=3, scale=1e-03, C=2.00
+ Fold09: degree=1, scale=1e-02, C=2.00
```

- Fold09: degree=1, scale=1e-02, C=2.00
+ Fold09: degree=2, scale=1e-02, C=2.00
- Fold09: degree=2, scale=1e-02, C=2.00
+ Fold09: degree=3, scale=1e-02, C=2.00
- Fold09: degree=3, scale=1e-02, C=2.00
+ Fold09: degree=1, scale=1e-01, C=2.00
- Fold09: degree=1, scale=1e-01, C=2.00
+ Fold09: degree=2, scale=1e-01, C=2.00
- Fold09: degree=2, scale=1e-01, C=2.00
+ Fold09: degree=3, scale=1e-01, C=2.00
- Fold09: degree=3, scale=1e-01, C=2.00
+ Fold09: degree=1, scale=1e+00, C=2.00
- Fold09: degree=1, scale=1e+00, C=2.00
+ Fold09: degree=2, scale=1e+00, C=2.00
- Fold09: degree=2, scale=1e+00, C=2.00
+ Fold09: degree=3, scale=1e+00, C=2.00
- Fold09: degree=3, scale=1e+00, C=2.00
+ Fold09: degree=1, scale=1e+01, C=2.00
- Fold09: degree=1, scale=1e+01, C=2.00
+ Fold09: degree=2, scale=1e+01, C=2.00
- Fold09: degree=2, scale=1e+01, C=2.00
+ Fold09: degree=3, scale=1e+01, C=2.00
- Fold09: degree=3, scale=1e+01, C=2.00
+ Fold09: degree=1, scale=1e+02, C=2.00
- Fold09: degree=1, scale=1e+02, C=2.00
+ Fold09: degree=2, scale=1e+02, C=2.00
- Fold09: degree=2, scale=1e+02, C=2.00
+ Fold09: degree=3, scale=1e+02, C=2.00
- Fold09: degree=3, scale=1e+02, C=2.00
+ Fold09: degree=1, scale=1e-03, C=4.00
- Fold09: degree=1, scale=1e-03, C=4.00
+ Fold09: degree=2, scale=1e-03, C=4.00
- Fold09: degree=2, scale=1e-03, C=4.00
+ Fold09: degree=3, scale=1e-03, C=4.00
- Fold09: degree=3, scale=1e-03, C=4.00
+ Fold09: degree=1, scale=1e-02, C=4.00
- Fold09: degree=1, scale=1e-02, C=4.00
+ Fold09: degree=2, scale=1e-02, C=4.00
- Fold09: degree=2, scale=1e-02, C=4.00
+ Fold09: degree=3, scale=1e-02, C=4.00
- Fold09: degree=3, scale=1e-02, C=4.00
+ Fold09: degree=1, scale=1e-01, C=4.00
- Fold09: degree=1, scale=1e-01, C=4.00
+ Fold09: degree=2, scale=1e-01, C=4.00
- Fold09: degree=2, scale=1e-01, C=4.00
+ Fold09: degree=3, scale=1e-01, C=4.00
- Fold09: degree=3, scale=1e-01, C=4.00
+ Fold09: degree=1, scale=1e+00, C=4.00
- Fold09: degree=1, scale=1e+00, C=4.00
+ Fold09: degree=2, scale=1e+00, C=4.00
- Fold09: degree=2, scale=1e+00, C=4.00
+ Fold09: degree=3, scale=1e+00, C=4.00
- Fold09: degree=3, scale=1e+00, C=4.00
+ Fold09: degree=1, scale=1e+01, C=4.00

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- Fold09: degree=1, scale=1e+01, C=4.00
+ Fold09: degree=2, scale=1e+01, C=4.00
- Fold09: degree=2, scale=1e+01, C=4.00
+ Fold09: degree=3, scale=1e+01, C=4.00
- Fold09: degree=3, scale=1e+01, C=4.00
+ Fold09: degree=1, scale=1e+02, C=4.00
- Fold09: degree=1, scale=1e+02, C=4.00
+ Fold09: degree=2, scale=1e+02, C=4.00
- Fold09: degree=2, scale=1e+02, C=4.00
+ Fold09: degree=3, scale=1e+02, C=4.00
- Fold09: degree=3, scale=1e+02, C=4.00
+ Fold09: degree=1, scale=1e-03, C=8.00
- Fold09: degree=1, scale=1e-03, C=8.00
+ Fold09: degree=2, scale=1e-03, C=8.00
- Fold09: degree=2, scale=1e-03, C=8.00
+ Fold09: degree=3, scale=1e-03, C=8.00
- Fold09: degree=3, scale=1e-03, C=8.00
+ Fold09: degree=1, scale=1e-02, C=8.00
- Fold09: degree=1, scale=1e-02, C=8.00
+ Fold09: degree=2, scale=1e-02, C=8.00
- Fold09: degree=2, scale=1e-02, C=8.00
+ Fold09: degree=3, scale=1e-02, C=8.00
- Fold09: degree=3, scale=1e-02, C=8.00
+ Fold09: degree=1, scale=1e-01, C=8.00
- Fold09: degree=1, scale=1e-01, C=8.00
+ Fold09: degree=2, scale=1e-01, C=8.00
- Fold09: degree=2, scale=1e-01, C=8.00
+ Fold09: degree=3, scale=1e-01, C=8.00
- Fold09: degree=3, scale=1e-01, C=8.00
+ Fold09: degree=1, scale=1e+00, C=8.00
- Fold09: degree=1, scale=1e+00, C=8.00
+ Fold09: degree=2, scale=1e+00, C=8.00
- Fold09: degree=2, scale=1e+00, C=8.00
+ Fold09: degree=3, scale=1e+00, C=8.00
- Fold09: degree=3, scale=1e+00, C=8.00
+ Fold09: degree=1, scale=1e+01, C=8.00
- Fold09: degree=1, scale=1e+01, C=8.00
+ Fold09: degree=2, scale=1e+01, C=8.00
- Fold09: degree=2, scale=1e+01, C=8.00
+ Fold09: degree=3, scale=1e+01, C=8.00
- Fold09: degree=3, scale=1e+01, C=8.00
+ Fold09: degree=1, scale=1e+02, C=8.00
- Fold09: degree=1, scale=1e+02, C=8.00
+ Fold09: degree=2, scale=1e+02, C=8.00
- Fold09: degree=2, scale=1e+02, C=8.00
+ Fold09: degree=3, scale=1e+02, C=8.00
- Fold09: degree=3, scale=1e+02, C=8.00
+ Fold10: degree=1, scale=1e-03, C=0.25
- Fold10: degree=1, scale=1e-03, C=0.25
+ Fold10: degree=2, scale=1e-03, C=0.25
- Fold10: degree=2, scale=1e-03, C=0.25
+ Fold10: degree=3, scale=1e-03, C=0.25
- Fold10: degree=3, scale=1e-03, C=0.25
+ Fold10: degree=1, scale=1e-02, C=0.25
```

```
- Fold10: degree=1, scale=1e-02, C=0.25
+ Fold10: degree=2, scale=1e-02, C=0.25
- Fold10: degree=2, scale=1e-02, C=0.25
+ Fold10: degree=3, scale=1e-02, C=0.25
- Fold10: degree=3, scale=1e-02, C=0.25
+ Fold10: degree=1, scale=1e-01, C=0.25
- Fold10: degree=1, scale=1e-01, C=0.25
+ Fold10: degree=2, scale=1e-01, C=0.25
- Fold10: degree=2, scale=1e-01, C=0.25
+ Fold10: degree=3, scale=1e-01, C=0.25
- Fold10: degree=3, scale=1e-01, C=0.25
+ Fold10: degree=1, scale=1e+00, C=0.25
- Fold10: degree=1, scale=1e+00, C=0.25
+ Fold10: degree=2, scale=1e+00, C=0.25
- Fold10: degree=2, scale=1e+00, C=0.25
+ Fold10: degree=3, scale=1e+00, C=0.25
- Fold10: degree=3, scale=1e+00, C=0.25
+ Fold10: degree=1, scale=1e+01, C=0.25
- Fold10: degree=1, scale=1e+01, C=0.25
+ Fold10: degree=2, scale=1e+01, C=0.25
- Fold10: degree=2, scale=1e+01, C=0.25
+ Fold10: degree=3, scale=1e+01, C=0.25
- Fold10: degree=3, scale=1e+01, C=0.25
+ Fold10: degree=1, scale=1e+02, C=0.25
- Fold10: degree=1, scale=1e+02, C=0.25
+ Fold10: degree=2, scale=1e+02, C=0.25
- Fold10: degree=2, scale=1e+02, C=0.25
+ Fold10: degree=3, scale=1e+02, C=0.25
- Fold10: degree=3, scale=1e+02, C=0.25
+ Fold10: degree=1, scale=1e-03, C=0.50
- Fold10: degree=1, scale=1e-03, C=0.50
+ Fold10: degree=2, scale=1e-03, C=0.50
- Fold10: degree=2, scale=1e-03, C=0.50
+ Fold10: degree=3, scale=1e-03, C=0.50
- Fold10: degree=3, scale=1e-03, C=0.50
+ Fold10: degree=1, scale=1e-02, C=0.50
- Fold10: degree=1, scale=1e-02, C=0.50
+ Fold10: degree=2, scale=1e-02, C=0.50
- Fold10: degree=2, scale=1e-02, C=0.50
+ Fold10: degree=3, scale=1e-02, C=0.50
- Fold10: degree=3, scale=1e-02, C=0.50
+ Fold10: degree=1, scale=1e-01, C=0.50
- Fold10: degree=1, scale=1e-01, C=0.50
+ Fold10: degree=2, scale=1e-01, C=0.50
- Fold10: degree=2, scale=1e-01, C=0.50
+ Fold10: degree=3, scale=1e-01, C=0.50
- Fold10: degree=3, scale=1e-01, C=0.50
+ Fold10: degree=1, scale=1e+00, C=0.50
- Fold10: degree=1, scale=1e+00, C=0.50
+ Fold10: degree=2, scale=1e+00, C=0.50
- Fold10: degree=2, scale=1e+00, C=0.50
+ Fold10: degree=3, scale=1e+00, C=0.50
- Fold10: degree=3, scale=1e+00, C=0.50
+ Fold10: degree=1, scale=1e+01, C=0.50
```

```
- Fold10: degree=1, scale=1e+01, C=0.50
+ Fold10: degree=2, scale=1e+01, C=0.50
- Fold10: degree=2, scale=1e+01, C=0.50
+ Fold10: degree=3, scale=1e+01, C=0.50
- Fold10: degree=3, scale=1e+01, C=0.50
+ Fold10: degree=1, scale=1e+02, C=0.50
- Fold10: degree=1, scale=1e+02, C=0.50
+ Fold10: degree=2, scale=1e+02, C=0.50
- Fold10: degree=2, scale=1e+02, C=0.50
+ Fold10: degree=3, scale=1e+02, C=0.50
- Fold10: degree=3, scale=1e+02, C=0.50
+ Fold10: degree=1, scale=1e-03, C=1.00
- Fold10: degree=1, scale=1e-03, C=1.00
+ Fold10: degree=2, scale=1e-03, C=1.00
- Fold10: degree=2, scale=1e-03, C=1.00
+ Fold10: degree=3, scale=1e-03, C=1.00
- Fold10: degree=3, scale=1e-03, C=1.00
+ Fold10: degree=1, scale=1e-02, C=1.00
- Fold10: degree=1, scale=1e-02, C=1.00
+ Fold10: degree=2, scale=1e-02, C=1.00
- Fold10: degree=2, scale=1e-02, C=1.00
+ Fold10: degree=3, scale=1e-02, C=1.00
- Fold10: degree=3, scale=1e-02, C=1.00
+ Fold10: degree=1, scale=1e-01, C=1.00
- Fold10: degree=1, scale=1e-01, C=1.00
+ Fold10: degree=2, scale=1e-01, C=1.00
- Fold10: degree=2, scale=1e-01, C=1.00
+ Fold10: degree=3, scale=1e-01, C=1.00
- Fold10: degree=3, scale=1e-01, C=1.00
+ Fold10: degree=1, scale=1e+00, C=1.00
- Fold10: degree=1, scale=1e+00, C=1.00
+ Fold10: degree=2, scale=1e+00, C=1.00
- Fold10: degree=2, scale=1e+00, C=1.00
+ Fold10: degree=3, scale=1e+00, C=1.00
- Fold10: degree=3, scale=1e+00, C=1.00
+ Fold10: degree=1, scale=1e+01, C=1.00
- Fold10: degree=1, scale=1e+01, C=1.00
+ Fold10: degree=2, scale=1e+01, C=1.00
- Fold10: degree=2, scale=1e+01, C=1.00
+ Fold10: degree=3, scale=1e+01, C=1.00
- Fold10: degree=3, scale=1e+01, C=1.00
+ Fold10: degree=1, scale=1e+02, C=1.00
- Fold10: degree=1, scale=1e+02, C=1.00
+ Fold10: degree=2, scale=1e+02, C=1.00
- Fold10: degree=2, scale=1e+02, C=1.00
+ Fold10: degree=3, scale=1e+02, C=1.00
- Fold10: degree=3, scale=1e+02, C=1.00
+ Fold10: degree=1, scale=1e-03, C=2.00
- Fold10: degree=1, scale=1e-03, C=2.00
+ Fold10: degree=2, scale=1e-03, C=2.00
- Fold10: degree=2, scale=1e-03, C=2.00
+ Fold10: degree=3, scale=1e-03, C=2.00
- Fold10: degree=3, scale=1e-03, C=2.00
+ Fold10: degree=1, scale=1e-02, C=2.00
```

```
- Fold10: degree=1, scale=1e-02, C=2.00
+ Fold10: degree=2, scale=1e-02, C=2.00
- Fold10: degree=2, scale=1e-02, C=2.00
+ Fold10: degree=3, scale=1e-02, C=2.00
- Fold10: degree=3, scale=1e-02, C=2.00
+ Fold10: degree=1, scale=1e-01, C=2.00
- Fold10: degree=1, scale=1e-01, C=2.00
+ Fold10: degree=2, scale=1e-01, C=2.00
- Fold10: degree=2, scale=1e-01, C=2.00
+ Fold10: degree=3, scale=1e-01, C=2.00
- Fold10: degree=3, scale=1e-01, C=2.00
+ Fold10: degree=1, scale=1e+00, C=2.00
- Fold10: degree=1, scale=1e+00, C=2.00
+ Fold10: degree=2, scale=1e+00, C=2.00
- Fold10: degree=2, scale=1e+00, C=2.00
+ Fold10: degree=3, scale=1e+00, C=2.00
- Fold10: degree=3, scale=1e+00, C=2.00
+ Fold10: degree=1, scale=1e+01, C=2.00
- Fold10: degree=1, scale=1e+01, C=2.00
+ Fold10: degree=2, scale=1e+01, C=2.00
- Fold10: degree=2, scale=1e+01, C=2.00
+ Fold10: degree=3, scale=1e+01, C=2.00
- Fold10: degree=3, scale=1e+01, C=2.00
+ Fold10: degree=1, scale=1e+02, C=2.00
- Fold10: degree=1, scale=1e+02, C=2.00
+ Fold10: degree=2, scale=1e+02, C=2.00
- Fold10: degree=2, scale=1e+02, C=2.00
+ Fold10: degree=3, scale=1e+02, C=2.00
- Fold10: degree=3, scale=1e+02, C=2.00
+ Fold10: degree=1, scale=1e-03, C=4.00
- Fold10: degree=1, scale=1e-03, C=4.00
+ Fold10: degree=2, scale=1e-03, C=4.00
- Fold10: degree=2, scale=1e-03, C=4.00
+ Fold10: degree=3, scale=1e-03, C=4.00
- Fold10: degree=3, scale=1e-03, C=4.00
+ Fold10: degree=1, scale=1e-02, C=4.00
- Fold10: degree=1, scale=1e-02, C=4.00
+ Fold10: degree=2, scale=1e-02, C=4.00
- Fold10: degree=2, scale=1e-02, C=4.00
+ Fold10: degree=3, scale=1e-02, C=4.00
- Fold10: degree=3, scale=1e-02, C=4.00
+ Fold10: degree=1, scale=1e-01, C=4.00
- Fold10: degree=1, scale=1e-01, C=4.00
+ Fold10: degree=2, scale=1e-01, C=4.00
- Fold10: degree=2, scale=1e-01, C=4.00
+ Fold10: degree=3, scale=1e-01, C=4.00
- Fold10: degree=3, scale=1e-01, C=4.00
+ Fold10: degree=1, scale=1e+00, C=4.00
- Fold10: degree=1, scale=1e+00, C=4.00
+ Fold10: degree=2, scale=1e+00, C=4.00
- Fold10: degree=2, scale=1e+00, C=4.00
+ Fold10: degree=3, scale=1e+00, C=4.00
- Fold10: degree=3, scale=1e+00, C=4.00
+ Fold10: degree=1, scale=1e+01, C=4.00
```

```
- Fold10: degree=1, scale=1e+01, C=4.00
+ Fold10: degree=2, scale=1e+01, C=4.00
- Fold10: degree=2, scale=1e+01, C=4.00
+ Fold10: degree=3, scale=1e+01, C=4.00
- Fold10: degree=3, scale=1e+01, C=4.00
+ Fold10: degree=1, scale=1e+02, C=4.00
- Fold10: degree=1, scale=1e+02, C=4.00
+ Fold10: degree=2, scale=1e+02, C=4.00
- Fold10: degree=2, scale=1e+02, C=4.00
+ Fold10: degree=3, scale=1e+02, C=4.00
- Fold10: degree=3, scale=1e+02, C=4.00
+ Fold10: degree=1, scale=1e-03, C=8.00
- Fold10: degree=1, scale=1e-03, C=8.00
+ Fold10: degree=2, scale=1e-03, C=8.00
- Fold10: degree=2, scale=1e-03, C=8.00
+ Fold10: degree=3, scale=1e-03, C=8.00
- Fold10: degree=3, scale=1e-03, C=8.00
+ Fold10: degree=1, scale=1e-02, C=8.00
- Fold10: degree=1, scale=1e-02, C=8.00
+ Fold10: degree=2, scale=1e-02, C=8.00
- Fold10: degree=2, scale=1e-02, C=8.00
+ Fold10: degree=3, scale=1e-02, C=8.00
- Fold10: degree=3, scale=1e-02, C=8.00
+ Fold10: degree=1, scale=1e-01, C=8.00
- Fold10: degree=1, scale=1e-01, C=8.00
+ Fold10: degree=2, scale=1e-01, C=8.00
- Fold10: degree=2, scale=1e-01, C=8.00
+ Fold10: degree=3, scale=1e-01, C=8.00
- Fold10: degree=3, scale=1e-01, C=8.00
+ Fold10: degree=1, scale=1e+00, C=8.00
- Fold10: degree=1, scale=1e+00, C=8.00
+ Fold10: degree=2, scale=1e+00, C=8.00
- Fold10: degree=2, scale=1e+00, C=8.00
+ Fold10: degree=3, scale=1e+00, C=8.00
- Fold10: degree=3, scale=1e+00, C=8.00
+ Fold10: degree=1, scale=1e+01, C=8.00
- Fold10: degree=1, scale=1e+01, C=8.00
+ Fold10: degree=2, scale=1e+01, C=8.00
- Fold10: degree=2, scale=1e+01, C=8.00
+ Fold10: degree=3, scale=1e+01, C=8.00
- Fold10: degree=3, scale=1e+01, C=8.00
+ Fold10: degree=1, scale=1e+02, C=8.00
- Fold10: degree=1, scale=1e+02, C=8.00
+ Fold10: degree=2, scale=1e+02, C=8.00
- Fold10: degree=2, scale=1e+02, C=8.00
+ Fold10: degree=3, scale=1e+02, C=8.00
- Fold10: degree=3, scale=1e+02, C=8.00
Aggregating results
Selecting tuning parameters
Fitting degree = 3, scale = 0.01, C = 2 on full training set
```

Se grafican los desempeños de las distintas configuraciones probadas

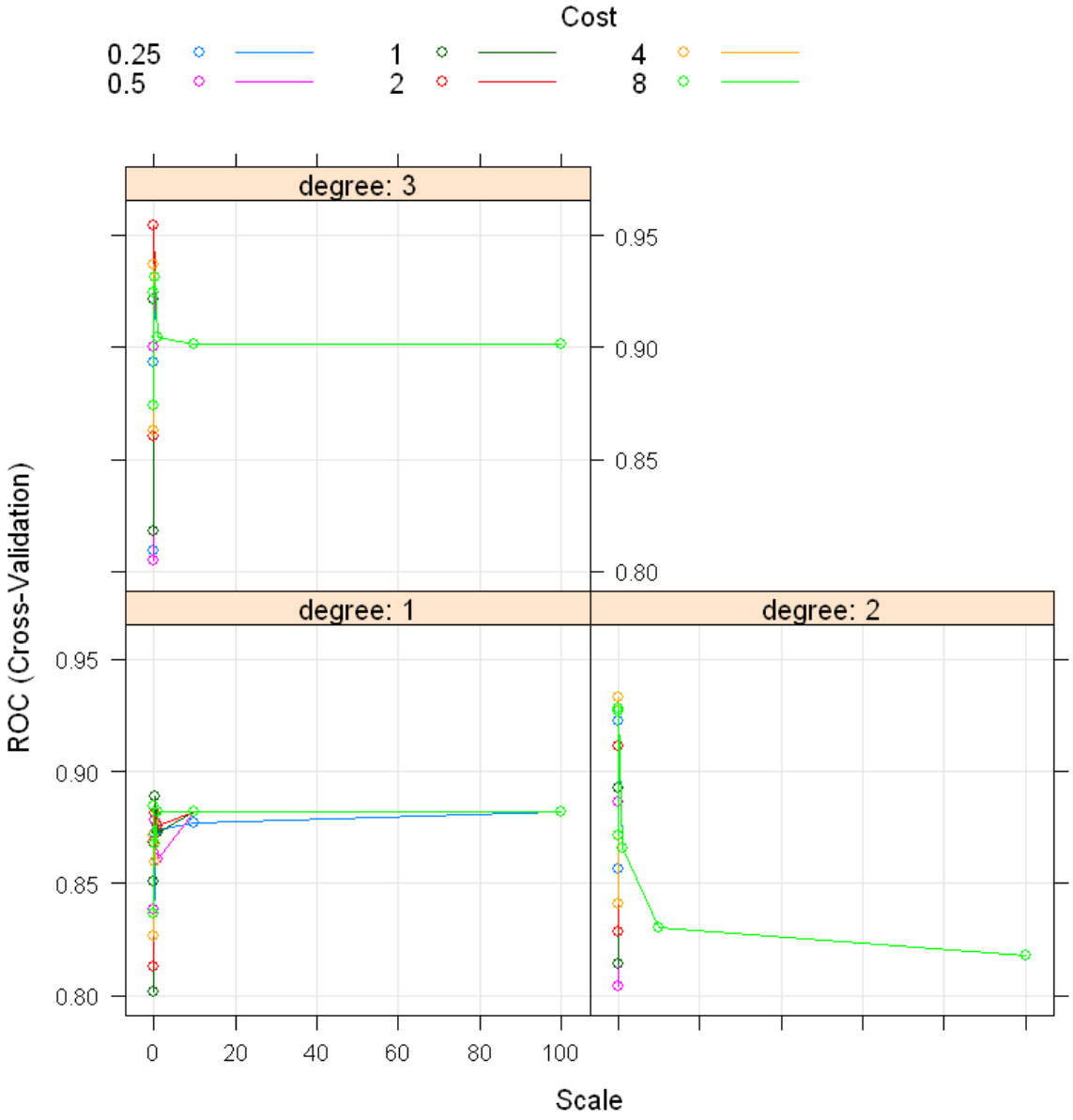
Cost
0.25
0.5
1
2
4
8
degree: 3
degree: 1
degree: 2
ROC (Cross-Validation)
0.80
0.85
0.90
0.95
0
20
40
60
80
100
Scale

Figure 7: png

```r
plot(model_SVM_AG)
```

Se imprime las métricas de las distintas combinaciones de parámetros

```r
print(model_SVM_AG)
```

```
Support Vector Machines with Polynomial Kernel

146 samples
 60 predictor
  2 classes: 'M', 'R'

No pre-processing
Resampling: Cross-Validated (10 fold)
Summary of sample sizes: 131, 132, 131, 131, 131, 131, ...
Resampling results across tuning parameters:

  degree  scale  C     ROC        Sens       Spec
  1       1e-03  0.25  0.8016582  0.5250000  0.8547619
  1       1e-03  0.50  0.8016582  0.5125000  0.8547619
  1       1e-03  1.00  0.8016582  0.4750000  0.8547619
  1       1e-03  2.00  0.8127551  0.7285714  0.7285714
  1       1e-03  4.00  0.8265306  0.7285714  0.7000000
  1       1e-03  8.00  0.8364371  0.7928571  0.7285714
  1       1e-02  0.25  0.8130952  0.7553571  0.7142857
  1       1e-02  0.50  0.8384354  0.7428571  0.7571429
  1       1e-02  1.00  0.8507228  0.7678571  0.7285714
  1       1e-02  2.00  0.8682398  0.7821429  0.7904762
  1       1e-02  4.00  0.8711735  0.7964286  0.7928571
  1       1e-02  8.00  0.8844813  0.8482143  0.7928571
  1       1e-01  0.25  0.8718112  0.7964286  0.7904762
  1       1e-01  0.50  0.8783163  0.8071429  0.8071429
  1       1e-01  1.00  0.8886480  0.8482143  0.7904762
  1       1e-01  2.00  0.8812500  0.8214286  0.8500000
  1       1e-01  4.00  0.8595238  0.8107143  0.7595238
  1       1e-01  8.00  0.8677721  0.7857143  0.7452381
  1       1e+00  0.25  0.8741071  0.8232143  0.7738095
  1       1e+00  0.50  0.8610119  0.7857143  0.7619048
  1       1e+00  1.00  0.8725340  0.7839286  0.7428571
  1       1e+00  2.00  0.8754677  0.7839286  0.7761905
  1       1e+00  4.00  0.8819303  0.8339286  0.7452381
  1       1e+00  8.00  0.8819303  0.8214286  0.7452381
  1       1e+01  0.25  0.8772534  0.8339286  0.7619048
  1       1e+01  0.50  0.8819303  0.8214286  0.7595238
  1       1e+01  1.00  0.8819303  0.8214286  0.7452381
  1       1e+01  2.00  0.8819303  0.8214286  0.7476190
  1       1e+01  4.00  0.8819303  0.8339286  0.7476190
  1       1e+01  8.00  0.8819303  0.8339286  0.7309524
  1       1e+02  0.25  0.8819303  0.8589286  0.7000000
  1       1e+02  0.50  0.8819303  0.8339286  0.7309524
  1       1e+02  1.00  0.8819303  0.8339286  0.7285714
  1       1e+02  2.00  0.8819303  0.8339286  0.7309524
  1       1e+02  4.00  0.8819303  0.8339286  0.7476190
  1       1e+02  8.00  0.8819303  0.8089286  0.7595238
```

2	1e-03	0.25	0.8040391	0.5125000	0.8547619
2	1e-03	0.50	0.8040391	0.5000000	0.8380952
2	1e-03	1.00	0.8142007	0.7303571	0.7285714
2	1e-03	2.00	0.8283163	0.7285714	0.7285714
2	1e-03	4.00	0.8406037	0.8196429	0.7285714
2	1e-03	8.00	0.8712160	0.7696429	0.7904762
2	1e-02	0.25	0.8562500	0.7803571	0.7738095
2	1e-02	0.50	0.8866071	0.8446429	0.7452381
2	1e-02	1.00	0.8928571	0.8589286	0.7904762
2	1e-02	2.00	0.9111820	0.8482143	0.8476190
2	1e-02	4.00	0.9331633	0.8714286	0.8476190
2	1e-02	8.00	0.9281463	0.8714286	0.8190476
2	1e-01	0.25	0.9227891	0.8857143	0.8333333
2	1e-01	0.50	0.9269558	0.8714286	0.8476190
2	1e-01	1.00	0.9269558	0.8839286	0.8333333
2	1e-01	2.00	0.9269558	0.8839286	0.8333333
2	1e-01	4.00	0.9269558	0.8982143	0.8333333
2	1e-01	8.00	0.9269558	0.8839286	0.8333333
2	1e+00	0.25	0.8659014	0.8464286	0.6571429
2	1e+00	0.50	0.8659014	0.8464286	0.6738095
2	1e+00	1.00	0.8659014	0.8464286	0.6738095
2	1e+00	2.00	0.8659014	0.8464286	0.6452381
2	1e+00	4.00	0.8659014	0.8339286	0.6738095
2	1e+00	8.00	0.8659014	0.8464286	0.6880952
2	1e+01	0.25	0.8303571	0.8071429	0.6452381
2	1e+01	0.50	0.8303571	0.7946429	0.6595238
2	1e+01	1.00	0.8303571	0.8321429	0.6452381
2	1e+01	2.00	0.8303571	0.7821429	0.6738095
2	1e+01	4.00	0.8303571	0.8071429	0.6595238
2	1e+01	8.00	0.8303571	0.7803571	0.6166667
2	1e+02	0.25	0.8176020	0.7678571	0.6595238
2	1e+02	0.50	0.8176020	0.7946429	0.6595238
2	1e+02	1.00	0.8176020	0.7678571	0.6595238
2	1e+02	2.00	0.8176020	0.7946429	0.6309524
2	1e+02	4.00	0.8176020	0.7821429	0.6738095
2	1e+02	8.00	0.8176020	0.7946429	0.6452381
3	1e-03	0.25	0.8093963	0.5142857	0.8547619
3	1e-03	0.50	0.8049320	0.5750000	0.8047619
3	1e-03	1.00	0.8178571	0.7303571	0.7142857
3	1e-03	2.00	0.8601616	0.7928571	0.7428571
3	1e-03	4.00	0.8629252	0.8071429	0.7619048
3	1e-03	8.00	0.8738946	0.8339286	0.8071429
3	1e-02	0.25	0.8933673	0.8464286	0.7904762
3	1e-02	0.50	0.9002126	0.8589286	0.8047619
3	1e-02	1.00	0.9210459	0.8714286	0.8047619
3	1e-02	2.00	0.9545918	0.9089286	0.8333333
3	1e-02	4.00	0.9367347	0.8964286	0.8190476
3	1e-02	8.00	0.9242347	0.8839286	0.8357143
3	1e-01	0.25	0.9312925	0.9089286	0.8071429
3	1e-01	0.50	0.9312925	0.9089286	0.8095238
3	1e-01	1.00	0.9312925	0.9214286	0.7738095
3	1e-01	2.00	0.9312925	0.9214286	0.7619048
3	1e-01	4.00	0.9312925	0.9089286	0.8666667
3	1e-01	8.00	0.9312925	0.8964286	0.8047619

```
  3       1e+00  0.25  0.9043367  0.8839286  0.7761905
  3       1e+00  0.50  0.9043367  0.9214286  0.7619048
  3       1e+00  1.00  0.9043367  0.9232143  0.7595238
  3       1e+00  2.00  0.9043367  0.9107143  0.7738095
  3       1e+00  4.00  0.9043367  0.9107143  0.7738095
  3       1e+00  8.00  0.9043367  0.9089286  0.7761905
  3       1e+01  0.25  0.9013605  0.8964286  0.8357143
  3       1e+01  0.50  0.9013605  0.8964286  0.8190476
  3       1e+01  1.00  0.9013605  0.8714286  0.8214286
  3       1e+01  2.00  0.9013605  0.8857143  0.7880952
  3       1e+01  4.00  0.9013605  0.8964286  0.8214286
  3       1e+01  8.00  0.9013605  0.8964286  0.8190476
  3       1e+02  0.25  0.9013605  0.8982143  0.7738095
  3       1e+02  0.50  0.9013605  0.9232143  0.7880952
  3       1e+02  1.00  0.9013605  0.8964286  0.8190476
  3       1e+02  2.00  0.9013605  0.8964286  0.8047619
  3       1e+02  4.00  0.9013605  0.8964286  0.8357143
  3       1e+02  8.00  0.9013605  0.9089286  0.7738095

ROC was used to select the optimal model using the largest value.
The final values used for the model were degree = 3, scale = 0.01 and C = 2.
```

La mejor configuración del modelo con automatic grid es **degree = 3, scale = 0.01 and C = 2**

```
model_SVM <- train(
  Class ~ ., training,
  method = "svmPoly",
    metric ="ROC",
  trControl = trainControl(
    method = "cv", number = 10,
    verboseIter = TRUE,
      summaryFunction = twoClassSummary,
                        classProbs = TRUE
  )
)
```

```
+ Fold01: degree=1, scale=0.001, C=0.25
- Fold01: degree=1, scale=0.001, C=0.25
+ Fold01: degree=2, scale=0.001, C=0.25
- Fold01: degree=2, scale=0.001, C=0.25
+ Fold01: degree=3, scale=0.001, C=0.25
- Fold01: degree=3, scale=0.001, C=0.25
+ Fold01: degree=1, scale=0.010, C=0.25
- Fold01: degree=1, scale=0.010, C=0.25
+ Fold01: degree=2, scale=0.010, C=0.25
- Fold01: degree=2, scale=0.010, C=0.25
+ Fold01: degree=3, scale=0.010, C=0.25
- Fold01: degree=3, scale=0.010, C=0.25
+ Fold01: degree=1, scale=0.100, C=0.25
- Fold01: degree=1, scale=0.100, C=0.25
+ Fold01: degree=2, scale=0.100, C=0.25
- Fold01: degree=2, scale=0.100, C=0.25
+ Fold01: degree=3, scale=0.100, C=0.25
- Fold01: degree=3, scale=0.100, C=0.25
```

```
+ Fold01: degree=1, scale=0.001, C=0.50
- Fold01: degree=1, scale=0.001, C=0.50
+ Fold01: degree=2, scale=0.001, C=0.50
- Fold01: degree=2, scale=0.001, C=0.50
+ Fold01: degree=3, scale=0.001, C=0.50
- Fold01: degree=3, scale=0.001, C=0.50
+ Fold01: degree=1, scale=0.010, C=0.50
- Fold01: degree=1, scale=0.010, C=0.50
+ Fold01: degree=2, scale=0.010, C=0.50
- Fold01: degree=2, scale=0.010, C=0.50
+ Fold01: degree=3, scale=0.010, C=0.50
- Fold01: degree=3, scale=0.010, C=0.50
+ Fold01: degree=1, scale=0.100, C=0.50
- Fold01: degree=1, scale=0.100, C=0.50
+ Fold01: degree=2, scale=0.100, C=0.50
- Fold01: degree=2, scale=0.100, C=0.50
+ Fold01: degree=3, scale=0.100, C=0.50
- Fold01: degree=3, scale=0.100, C=0.50
+ Fold01: degree=1, scale=0.001, C=1.00
- Fold01: degree=1, scale=0.001, C=1.00
+ Fold01: degree=2, scale=0.001, C=1.00
- Fold01: degree=2, scale=0.001, C=1.00
+ Fold01: degree=3, scale=0.001, C=1.00
- Fold01: degree=3, scale=0.001, C=1.00
+ Fold01: degree=1, scale=0.010, C=1.00
- Fold01: degree=1, scale=0.010, C=1.00
+ Fold01: degree=2, scale=0.010, C=1.00
- Fold01: degree=2, scale=0.010, C=1.00
+ Fold01: degree=3, scale=0.010, C=1.00
- Fold01: degree=3, scale=0.010, C=1.00
+ Fold01: degree=1, scale=0.100, C=1.00
- Fold01: degree=1, scale=0.100, C=1.00
+ Fold01: degree=2, scale=0.100, C=1.00
- Fold01: degree=2, scale=0.100, C=1.00
+ Fold01: degree=3, scale=0.100, C=1.00
- Fold01: degree=3, scale=0.100, C=1.00
+ Fold02: degree=1, scale=0.001, C=0.25
- Fold02: degree=1, scale=0.001, C=0.25
+ Fold02: degree=2, scale=0.001, C=0.25
- Fold02: degree=2, scale=0.001, C=0.25
+ Fold02: degree=3, scale=0.001, C=0.25
- Fold02: degree=3, scale=0.001, C=0.25
+ Fold02: degree=1, scale=0.010, C=0.25
- Fold02: degree=1, scale=0.010, C=0.25
+ Fold02: degree=2, scale=0.010, C=0.25
- Fold02: degree=2, scale=0.010, C=0.25
+ Fold02: degree=3, scale=0.010, C=0.25
- Fold02: degree=3, scale=0.010, C=0.25
+ Fold02: degree=1, scale=0.100, C=0.25
- Fold02: degree=1, scale=0.100, C=0.25
+ Fold02: degree=2, scale=0.100, C=0.25
- Fold02: degree=2, scale=0.100, C=0.25
+ Fold02: degree=3, scale=0.100, C=0.25
- Fold02: degree=3, scale=0.100, C=0.25
```

```
+ Fold02: degree=1, scale=0.001, C=0.50
- Fold02: degree=1, scale=0.001, C=0.50
+ Fold02: degree=2, scale=0.001, C=0.50
- Fold02: degree=2, scale=0.001, C=0.50
+ Fold02: degree=3, scale=0.001, C=0.50
- Fold02: degree=3, scale=0.001, C=0.50
+ Fold02: degree=1, scale=0.010, C=0.50
- Fold02: degree=1, scale=0.010, C=0.50
+ Fold02: degree=2, scale=0.010, C=0.50
- Fold02: degree=2, scale=0.010, C=0.50
+ Fold02: degree=3, scale=0.010, C=0.50
- Fold02: degree=3, scale=0.010, C=0.50
+ Fold02: degree=1, scale=0.100, C=0.50
- Fold02: degree=1, scale=0.100, C=0.50
+ Fold02: degree=2, scale=0.100, C=0.50
- Fold02: degree=2, scale=0.100, C=0.50
+ Fold02: degree=3, scale=0.100, C=0.50
- Fold02: degree=3, scale=0.100, C=0.50
+ Fold02: degree=1, scale=0.001, C=1.00
- Fold02: degree=1, scale=0.001, C=1.00
+ Fold02: degree=2, scale=0.001, C=1.00
- Fold02: degree=2, scale=0.001, C=1.00
+ Fold02: degree=3, scale=0.001, C=1.00
- Fold02: degree=3, scale=0.001, C=1.00
+ Fold02: degree=1, scale=0.010, C=1.00
- Fold02: degree=1, scale=0.010, C=1.00
+ Fold02: degree=2, scale=0.010, C=1.00
- Fold02: degree=2, scale=0.010, C=1.00
+ Fold02: degree=3, scale=0.010, C=1.00
- Fold02: degree=3, scale=0.010, C=1.00
+ Fold02: degree=1, scale=0.100, C=1.00
- Fold02: degree=1, scale=0.100, C=1.00
+ Fold02: degree=2, scale=0.100, C=1.00
- Fold02: degree=2, scale=0.100, C=1.00
+ Fold02: degree=3, scale=0.100, C=1.00
- Fold02: degree=3, scale=0.100, C=1.00
+ Fold03: degree=1, scale=0.001, C=0.25
- Fold03: degree=1, scale=0.001, C=0.25
+ Fold03: degree=2, scale=0.001, C=0.25
- Fold03: degree=2, scale=0.001, C=0.25
+ Fold03: degree=3, scale=0.001, C=0.25
- Fold03: degree=3, scale=0.001, C=0.25
+ Fold03: degree=1, scale=0.010, C=0.25
- Fold03: degree=1, scale=0.010, C=0.25
+ Fold03: degree=2, scale=0.010, C=0.25
- Fold03: degree=2, scale=0.010, C=0.25
+ Fold03: degree=3, scale=0.010, C=0.25
- Fold03: degree=3, scale=0.010, C=0.25
+ Fold03: degree=1, scale=0.100, C=0.25
- Fold03: degree=1, scale=0.100, C=0.25
+ Fold03: degree=2, scale=0.100, C=0.25
- Fold03: degree=2, scale=0.100, C=0.25
+ Fold03: degree=3, scale=0.100, C=0.25
- Fold03: degree=3, scale=0.100, C=0.25
```

```
+ Fold03: degree=1, scale=0.001, C=0.50
- Fold03: degree=1, scale=0.001, C=0.50
+ Fold03: degree=2, scale=0.001, C=0.50
- Fold03: degree=2, scale=0.001, C=0.50
+ Fold03: degree=3, scale=0.001, C=0.50
- Fold03: degree=3, scale=0.001, C=0.50
+ Fold03: degree=1, scale=0.010, C=0.50
- Fold03: degree=1, scale=0.010, C=0.50
+ Fold03: degree=2, scale=0.010, C=0.50
- Fold03: degree=2, scale=0.010, C=0.50
+ Fold03: degree=3, scale=0.010, C=0.50
- Fold03: degree=3, scale=0.010, C=0.50
+ Fold03: degree=1, scale=0.100, C=0.50
- Fold03: degree=1, scale=0.100, C=0.50
+ Fold03: degree=2, scale=0.100, C=0.50
- Fold03: degree=2, scale=0.100, C=0.50
+ Fold03: degree=3, scale=0.100, C=0.50
- Fold03: degree=3, scale=0.100, C=0.50
+ Fold03: degree=1, scale=0.001, C=1.00
- Fold03: degree=1, scale=0.001, C=1.00
+ Fold03: degree=2, scale=0.001, C=1.00
- Fold03: degree=2, scale=0.001, C=1.00
+ Fold03: degree=3, scale=0.001, C=1.00
- Fold03: degree=3, scale=0.001, C=1.00
+ Fold03: degree=1, scale=0.010, C=1.00
- Fold03: degree=1, scale=0.010, C=1.00
+ Fold03: degree=2, scale=0.010, C=1.00
- Fold03: degree=2, scale=0.010, C=1.00
+ Fold03: degree=3, scale=0.010, C=1.00
- Fold03: degree=3, scale=0.010, C=1.00
+ Fold03: degree=1, scale=0.100, C=1.00
- Fold03: degree=1, scale=0.100, C=1.00
+ Fold03: degree=2, scale=0.100, C=1.00
- Fold03: degree=2, scale=0.100, C=1.00
+ Fold03: degree=3, scale=0.100, C=1.00
- Fold03: degree=3, scale=0.100, C=1.00
+ Fold04: degree=1, scale=0.001, C=0.25
- Fold04: degree=1, scale=0.001, C=0.25
+ Fold04: degree=2, scale=0.001, C=0.25
- Fold04: degree=2, scale=0.001, C=0.25
+ Fold04: degree=3, scale=0.001, C=0.25
- Fold04: degree=3, scale=0.001, C=0.25
+ Fold04: degree=1, scale=0.010, C=0.25
- Fold04: degree=1, scale=0.010, C=0.25
+ Fold04: degree=2, scale=0.010, C=0.25
- Fold04: degree=2, scale=0.010, C=0.25
+ Fold04: degree=3, scale=0.010, C=0.25
- Fold04: degree=3, scale=0.010, C=0.25
+ Fold04: degree=1, scale=0.100, C=0.25
- Fold04: degree=1, scale=0.100, C=0.25
+ Fold04: degree=2, scale=0.100, C=0.25
- Fold04: degree=2, scale=0.100, C=0.25
+ Fold04: degree=3, scale=0.100, C=0.25
- Fold04: degree=3, scale=0.100, C=0.25
```

```
+ Fold04: degree=1, scale=0.001, C=0.50
- Fold04: degree=1, scale=0.001, C=0.50
+ Fold04: degree=2, scale=0.001, C=0.50
- Fold04: degree=2, scale=0.001, C=0.50
+ Fold04: degree=3, scale=0.001, C=0.50
- Fold04: degree=3, scale=0.001, C=0.50
+ Fold04: degree=1, scale=0.010, C=0.50
- Fold04: degree=1, scale=0.010, C=0.50
+ Fold04: degree=2, scale=0.010, C=0.50
- Fold04: degree=2, scale=0.010, C=0.50
+ Fold04: degree=3, scale=0.010, C=0.50
- Fold04: degree=3, scale=0.010, C=0.50
+ Fold04: degree=1, scale=0.100, C=0.50
- Fold04: degree=1, scale=0.100, C=0.50
+ Fold04: degree=2, scale=0.100, C=0.50
- Fold04: degree=2, scale=0.100, C=0.50
+ Fold04: degree=3, scale=0.100, C=0.50
- Fold04: degree=3, scale=0.100, C=0.50
+ Fold04: degree=1, scale=0.001, C=1.00
- Fold04: degree=1, scale=0.001, C=1.00
+ Fold04: degree=2, scale=0.001, C=1.00
- Fold04: degree=2, scale=0.001, C=1.00
+ Fold04: degree=3, scale=0.001, C=1.00
- Fold04: degree=3, scale=0.001, C=1.00
+ Fold04: degree=1, scale=0.010, C=1.00
- Fold04: degree=1, scale=0.010, C=1.00
+ Fold04: degree=2, scale=0.010, C=1.00
- Fold04: degree=2, scale=0.010, C=1.00
+ Fold04: degree=3, scale=0.010, C=1.00
- Fold04: degree=3, scale=0.010, C=1.00
+ Fold04: degree=1, scale=0.100, C=1.00
- Fold04: degree=1, scale=0.100, C=1.00
+ Fold04: degree=2, scale=0.100, C=1.00
- Fold04: degree=2, scale=0.100, C=1.00
+ Fold04: degree=3, scale=0.100, C=1.00
- Fold04: degree=3, scale=0.100, C=1.00
+ Fold05: degree=1, scale=0.001, C=0.25
- Fold05: degree=1, scale=0.001, C=0.25
+ Fold05: degree=2, scale=0.001, C=0.25
- Fold05: degree=2, scale=0.001, C=0.25
+ Fold05: degree=3, scale=0.001, C=0.25
- Fold05: degree=3, scale=0.001, C=0.25
+ Fold05: degree=1, scale=0.010, C=0.25
- Fold05: degree=1, scale=0.010, C=0.25
+ Fold05: degree=2, scale=0.010, C=0.25
- Fold05: degree=2, scale=0.010, C=0.25
+ Fold05: degree=3, scale=0.010, C=0.25
- Fold05: degree=3, scale=0.010, C=0.25
+ Fold05: degree=1, scale=0.100, C=0.25
- Fold05: degree=1, scale=0.100, C=0.25
+ Fold05: degree=2, scale=0.100, C=0.25
- Fold05: degree=2, scale=0.100, C=0.25
+ Fold05: degree=3, scale=0.100, C=0.25
- Fold05: degree=3, scale=0.100, C=0.25
```

```
+ Fold05: degree=1, scale=0.001, C=0.50
- Fold05: degree=1, scale=0.001, C=0.50
+ Fold05: degree=2, scale=0.001, C=0.50
- Fold05: degree=2, scale=0.001, C=0.50
+ Fold05: degree=3, scale=0.001, C=0.50
- Fold05: degree=3, scale=0.001, C=0.50
+ Fold05: degree=1, scale=0.010, C=0.50
- Fold05: degree=1, scale=0.010, C=0.50
+ Fold05: degree=2, scale=0.010, C=0.50
- Fold05: degree=2, scale=0.010, C=0.50
+ Fold05: degree=3, scale=0.010, C=0.50
- Fold05: degree=3, scale=0.010, C=0.50
+ Fold05: degree=1, scale=0.100, C=0.50
- Fold05: degree=1, scale=0.100, C=0.50
+ Fold05: degree=2, scale=0.100, C=0.50
- Fold05: degree=2, scale=0.100, C=0.50
+ Fold05: degree=3, scale=0.100, C=0.50
- Fold05: degree=3, scale=0.100, C=0.50
+ Fold05: degree=1, scale=0.001, C=1.00
- Fold05: degree=1, scale=0.001, C=1.00
+ Fold05: degree=2, scale=0.001, C=1.00
- Fold05: degree=2, scale=0.001, C=1.00
+ Fold05: degree=3, scale=0.001, C=1.00
- Fold05: degree=3, scale=0.001, C=1.00
+ Fold05: degree=1, scale=0.010, C=1.00
- Fold05: degree=1, scale=0.010, C=1.00
+ Fold05: degree=2, scale=0.010, C=1.00
- Fold05: degree=2, scale=0.010, C=1.00
+ Fold05: degree=3, scale=0.010, C=1.00
- Fold05: degree=3, scale=0.010, C=1.00
+ Fold05: degree=1, scale=0.100, C=1.00
- Fold05: degree=1, scale=0.100, C=1.00
+ Fold05: degree=2, scale=0.100, C=1.00
- Fold05: degree=2, scale=0.100, C=1.00
+ Fold05: degree=3, scale=0.100, C=1.00
- Fold05: degree=3, scale=0.100, C=1.00
+ Fold06: degree=1, scale=0.001, C=0.25
- Fold06: degree=1, scale=0.001, C=0.25
+ Fold06: degree=2, scale=0.001, C=0.25
- Fold06: degree=2, scale=0.001, C=0.25
+ Fold06: degree=3, scale=0.001, C=0.25
- Fold06: degree=3, scale=0.001, C=0.25
+ Fold06: degree=1, scale=0.010, C=0.25
- Fold06: degree=1, scale=0.010, C=0.25
+ Fold06: degree=2, scale=0.010, C=0.25
- Fold06: degree=2, scale=0.010, C=0.25
+ Fold06: degree=3, scale=0.010, C=0.25
- Fold06: degree=3, scale=0.010, C=0.25
+ Fold06: degree=1, scale=0.100, C=0.25
- Fold06: degree=1, scale=0.100, C=0.25
+ Fold06: degree=2, scale=0.100, C=0.25
- Fold06: degree=2, scale=0.100, C=0.25
+ Fold06: degree=3, scale=0.100, C=0.25
- Fold06: degree=3, scale=0.100, C=0.25
```

```
+ Fold06: degree=1, scale=0.001, C=0.50
- Fold06: degree=1, scale=0.001, C=0.50
+ Fold06: degree=2, scale=0.001, C=0.50
- Fold06: degree=2, scale=0.001, C=0.50
+ Fold06: degree=3, scale=0.001, C=0.50
- Fold06: degree=3, scale=0.001, C=0.50
+ Fold06: degree=1, scale=0.010, C=0.50
- Fold06: degree=1, scale=0.010, C=0.50
+ Fold06: degree=2, scale=0.010, C=0.50
- Fold06: degree=2, scale=0.010, C=0.50
+ Fold06: degree=3, scale=0.010, C=0.50
- Fold06: degree=3, scale=0.010, C=0.50
+ Fold06: degree=1, scale=0.100, C=0.50
- Fold06: degree=1, scale=0.100, C=0.50
+ Fold06: degree=2, scale=0.100, C=0.50
- Fold06: degree=2, scale=0.100, C=0.50
+ Fold06: degree=3, scale=0.100, C=0.50
- Fold06: degree=3, scale=0.100, C=0.50
+ Fold06: degree=1, scale=0.001, C=1.00
- Fold06: degree=1, scale=0.001, C=1.00
+ Fold06: degree=2, scale=0.001, C=1.00
- Fold06: degree=2, scale=0.001, C=1.00
+ Fold06: degree=3, scale=0.001, C=1.00
- Fold06: degree=3, scale=0.001, C=1.00
+ Fold06: degree=1, scale=0.010, C=1.00
- Fold06: degree=1, scale=0.010, C=1.00
+ Fold06: degree=2, scale=0.010, C=1.00
- Fold06: degree=2, scale=0.010, C=1.00
+ Fold06: degree=3, scale=0.010, C=1.00
- Fold06: degree=3, scale=0.010, C=1.00
+ Fold06: degree=1, scale=0.100, C=1.00
- Fold06: degree=1, scale=0.100, C=1.00
+ Fold06: degree=2, scale=0.100, C=1.00
- Fold06: degree=2, scale=0.100, C=1.00
+ Fold06: degree=3, scale=0.100, C=1.00
- Fold06: degree=3, scale=0.100, C=1.00
+ Fold07: degree=1, scale=0.001, C=0.25
- Fold07: degree=1, scale=0.001, C=0.25
+ Fold07: degree=2, scale=0.001, C=0.25
- Fold07: degree=2, scale=0.001, C=0.25
+ Fold07: degree=3, scale=0.001, C=0.25
- Fold07: degree=3, scale=0.001, C=0.25
+ Fold07: degree=1, scale=0.010, C=0.25
- Fold07: degree=1, scale=0.010, C=0.25
+ Fold07: degree=2, scale=0.010, C=0.25
- Fold07: degree=2, scale=0.010, C=0.25
+ Fold07: degree=3, scale=0.010, C=0.25
- Fold07: degree=3, scale=0.010, C=0.25
+ Fold07: degree=1, scale=0.100, C=0.25
- Fold07: degree=1, scale=0.100, C=0.25
+ Fold07: degree=2, scale=0.100, C=0.25
- Fold07: degree=2, scale=0.100, C=0.25
+ Fold07: degree=3, scale=0.100, C=0.25
- Fold07: degree=3, scale=0.100, C=0.25
```

```
+ Fold07: degree=1, scale=0.001, C=0.50
- Fold07: degree=1, scale=0.001, C=0.50
+ Fold07: degree=2, scale=0.001, C=0.50
- Fold07: degree=2, scale=0.001, C=0.50
+ Fold07: degree=3, scale=0.001, C=0.50
- Fold07: degree=3, scale=0.001, C=0.50
+ Fold07: degree=1, scale=0.010, C=0.50
- Fold07: degree=1, scale=0.010, C=0.50
+ Fold07: degree=2, scale=0.010, C=0.50
- Fold07: degree=2, scale=0.010, C=0.50
+ Fold07: degree=3, scale=0.010, C=0.50
- Fold07: degree=3, scale=0.010, C=0.50
+ Fold07: degree=1, scale=0.100, C=0.50
- Fold07: degree=1, scale=0.100, C=0.50
+ Fold07: degree=2, scale=0.100, C=0.50
- Fold07: degree=2, scale=0.100, C=0.50
+ Fold07: degree=3, scale=0.100, C=0.50
- Fold07: degree=3, scale=0.100, C=0.50
+ Fold07: degree=1, scale=0.001, C=1.00
- Fold07: degree=1, scale=0.001, C=1.00
+ Fold07: degree=2, scale=0.001, C=1.00
- Fold07: degree=2, scale=0.001, C=1.00
+ Fold07: degree=3, scale=0.001, C=1.00
- Fold07: degree=3, scale=0.001, C=1.00
+ Fold07: degree=1, scale=0.010, C=1.00
- Fold07: degree=1, scale=0.010, C=1.00
+ Fold07: degree=2, scale=0.010, C=1.00
- Fold07: degree=2, scale=0.010, C=1.00
+ Fold07: degree=3, scale=0.010, C=1.00
- Fold07: degree=3, scale=0.010, C=1.00
+ Fold07: degree=1, scale=0.100, C=1.00
- Fold07: degree=1, scale=0.100, C=1.00
+ Fold07: degree=2, scale=0.100, C=1.00
- Fold07: degree=2, scale=0.100, C=1.00
+ Fold07: degree=3, scale=0.100, C=1.00
- Fold07: degree=3, scale=0.100, C=1.00
+ Fold08: degree=1, scale=0.001, C=0.25
- Fold08: degree=1, scale=0.001, C=0.25
+ Fold08: degree=2, scale=0.001, C=0.25
- Fold08: degree=2, scale=0.001, C=0.25
+ Fold08: degree=3, scale=0.001, C=0.25
- Fold08: degree=3, scale=0.001, C=0.25
+ Fold08: degree=1, scale=0.010, C=0.25
- Fold08: degree=1, scale=0.010, C=0.25
+ Fold08: degree=2, scale=0.010, C=0.25
- Fold08: degree=2, scale=0.010, C=0.25
+ Fold08: degree=3, scale=0.010, C=0.25
- Fold08: degree=3, scale=0.010, C=0.25
+ Fold08: degree=1, scale=0.100, C=0.25
- Fold08: degree=1, scale=0.100, C=0.25
+ Fold08: degree=2, scale=0.100, C=0.25
- Fold08: degree=2, scale=0.100, C=0.25
+ Fold08: degree=3, scale=0.100, C=0.25
- Fold08: degree=3, scale=0.100, C=0.25
```

```
+ Fold08: degree=1, scale=0.001, C=0.50
- Fold08: degree=1, scale=0.001, C=0.50
+ Fold08: degree=2, scale=0.001, C=0.50
- Fold08: degree=2, scale=0.001, C=0.50
+ Fold08: degree=3, scale=0.001, C=0.50
- Fold08: degree=3, scale=0.001, C=0.50
+ Fold08: degree=1, scale=0.010, C=0.50
- Fold08: degree=1, scale=0.010, C=0.50
+ Fold08: degree=2, scale=0.010, C=0.50
- Fold08: degree=2, scale=0.010, C=0.50
+ Fold08: degree=3, scale=0.010, C=0.50
- Fold08: degree=3, scale=0.010, C=0.50
+ Fold08: degree=1, scale=0.100, C=0.50
- Fold08: degree=1, scale=0.100, C=0.50
+ Fold08: degree=2, scale=0.100, C=0.50
- Fold08: degree=2, scale=0.100, C=0.50
+ Fold08: degree=3, scale=0.100, C=0.50
- Fold08: degree=3, scale=0.100, C=0.50
+ Fold08: degree=1, scale=0.001, C=1.00
- Fold08: degree=1, scale=0.001, C=1.00
+ Fold08: degree=2, scale=0.001, C=1.00
- Fold08: degree=2, scale=0.001, C=1.00
+ Fold08: degree=3, scale=0.001, C=1.00
- Fold08: degree=3, scale=0.001, C=1.00
+ Fold08: degree=1, scale=0.010, C=1.00
- Fold08: degree=1, scale=0.010, C=1.00
+ Fold08: degree=2, scale=0.010, C=1.00
- Fold08: degree=2, scale=0.010, C=1.00
+ Fold08: degree=3, scale=0.010, C=1.00
- Fold08: degree=3, scale=0.010, C=1.00
+ Fold08: degree=1, scale=0.100, C=1.00
- Fold08: degree=1, scale=0.100, C=1.00
+ Fold08: degree=2, scale=0.100, C=1.00
- Fold08: degree=2, scale=0.100, C=1.00
+ Fold08: degree=3, scale=0.100, C=1.00
- Fold08: degree=3, scale=0.100, C=1.00
+ Fold09: degree=1, scale=0.001, C=0.25
- Fold09: degree=1, scale=0.001, C=0.25
+ Fold09: degree=2, scale=0.001, C=0.25
- Fold09: degree=2, scale=0.001, C=0.25
+ Fold09: degree=3, scale=0.001, C=0.25
- Fold09: degree=3, scale=0.001, C=0.25
+ Fold09: degree=1, scale=0.010, C=0.25
- Fold09: degree=1, scale=0.010, C=0.25
+ Fold09: degree=2, scale=0.010, C=0.25
- Fold09: degree=2, scale=0.010, C=0.25
+ Fold09: degree=3, scale=0.010, C=0.25
- Fold09: degree=3, scale=0.010, C=0.25
+ Fold09: degree=1, scale=0.100, C=0.25
- Fold09: degree=1, scale=0.100, C=0.25
+ Fold09: degree=2, scale=0.100, C=0.25
- Fold09: degree=2, scale=0.100, C=0.25
+ Fold09: degree=3, scale=0.100, C=0.25
- Fold09: degree=3, scale=0.100, C=0.25
```

```
+ Fold09: degree=1, scale=0.001, C=0.50
- Fold09: degree=1, scale=0.001, C=0.50
+ Fold09: degree=2, scale=0.001, C=0.50
- Fold09: degree=2, scale=0.001, C=0.50
+ Fold09: degree=3, scale=0.001, C=0.50
- Fold09: degree=3, scale=0.001, C=0.50
+ Fold09: degree=1, scale=0.010, C=0.50
- Fold09: degree=1, scale=0.010, C=0.50
+ Fold09: degree=2, scale=0.010, C=0.50
- Fold09: degree=2, scale=0.010, C=0.50
+ Fold09: degree=3, scale=0.010, C=0.50
- Fold09: degree=3, scale=0.010, C=0.50
+ Fold09: degree=1, scale=0.100, C=0.50
- Fold09: degree=1, scale=0.100, C=0.50
+ Fold09: degree=2, scale=0.100, C=0.50
- Fold09: degree=2, scale=0.100, C=0.50
+ Fold09: degree=3, scale=0.100, C=0.50
- Fold09: degree=3, scale=0.100, C=0.50
+ Fold09: degree=1, scale=0.001, C=1.00
- Fold09: degree=1, scale=0.001, C=1.00
+ Fold09: degree=2, scale=0.001, C=1.00
- Fold09: degree=2, scale=0.001, C=1.00
+ Fold09: degree=3, scale=0.001, C=1.00
- Fold09: degree=3, scale=0.001, C=1.00
+ Fold09: degree=1, scale=0.010, C=1.00
- Fold09: degree=1, scale=0.010, C=1.00
+ Fold09: degree=2, scale=0.010, C=1.00
- Fold09: degree=2, scale=0.010, C=1.00
+ Fold09: degree=3, scale=0.010, C=1.00
- Fold09: degree=3, scale=0.010, C=1.00
+ Fold09: degree=1, scale=0.100, C=1.00
- Fold09: degree=1, scale=0.100, C=1.00
+ Fold09: degree=2, scale=0.100, C=1.00
- Fold09: degree=2, scale=0.100, C=1.00
+ Fold09: degree=3, scale=0.100, C=1.00
- Fold09: degree=3, scale=0.100, C=1.00
+ Fold10: degree=1, scale=0.001, C=0.25
- Fold10: degree=1, scale=0.001, C=0.25
+ Fold10: degree=2, scale=0.001, C=0.25
- Fold10: degree=2, scale=0.001, C=0.25
+ Fold10: degree=3, scale=0.001, C=0.25
- Fold10: degree=3, scale=0.001, C=0.25
+ Fold10: degree=1, scale=0.010, C=0.25
- Fold10: degree=1, scale=0.010, C=0.25
+ Fold10: degree=2, scale=0.010, C=0.25
- Fold10: degree=2, scale=0.010, C=0.25
+ Fold10: degree=3, scale=0.010, C=0.25
- Fold10: degree=3, scale=0.010, C=0.25
+ Fold10: degree=1, scale=0.100, C=0.25
- Fold10: degree=1, scale=0.100, C=0.25
+ Fold10: degree=2, scale=0.100, C=0.25
- Fold10: degree=2, scale=0.100, C=0.25
+ Fold10: degree=3, scale=0.100, C=0.25
- Fold10: degree=3, scale=0.100, C=0.25
```

```
+ Fold10: degree=1, scale=0.001, C=0.50
- Fold10: degree=1, scale=0.001, C=0.50
+ Fold10: degree=2, scale=0.001, C=0.50
- Fold10: degree=2, scale=0.001, C=0.50
+ Fold10: degree=3, scale=0.001, C=0.50
- Fold10: degree=3, scale=0.001, C=0.50
+ Fold10: degree=1, scale=0.010, C=0.50
- Fold10: degree=1, scale=0.010, C=0.50
+ Fold10: degree=2, scale=0.010, C=0.50
- Fold10: degree=2, scale=0.010, C=0.50
+ Fold10: degree=3, scale=0.010, C=0.50
- Fold10: degree=3, scale=0.010, C=0.50
+ Fold10: degree=1, scale=0.100, C=0.50
- Fold10: degree=1, scale=0.100, C=0.50
+ Fold10: degree=2, scale=0.100, C=0.50
- Fold10: degree=2, scale=0.100, C=0.50
+ Fold10: degree=3, scale=0.100, C=0.50
- Fold10: degree=3, scale=0.100, C=0.50
+ Fold10: degree=1, scale=0.001, C=1.00
- Fold10: degree=1, scale=0.001, C=1.00
+ Fold10: degree=2, scale=0.001, C=1.00
- Fold10: degree=2, scale=0.001, C=1.00
+ Fold10: degree=3, scale=0.001, C=1.00
- Fold10: degree=3, scale=0.001, C=1.00
+ Fold10: degree=1, scale=0.010, C=1.00
- Fold10: degree=1, scale=0.010, C=1.00
+ Fold10: degree=2, scale=0.010, C=1.00
- Fold10: degree=2, scale=0.010, C=1.00
+ Fold10: degree=3, scale=0.010, C=1.00
- Fold10: degree=3, scale=0.010, C=1.00
+ Fold10: degree=1, scale=0.100, C=1.00
- Fold10: degree=1, scale=0.100, C=1.00
+ Fold10: degree=2, scale=0.100, C=1.00
- Fold10: degree=2, scale=0.100, C=1.00
+ Fold10: degree=3, scale=0.100, C=1.00
- Fold10: degree=3, scale=0.100, C=1.00
Aggregating results
Selecting tuning parameters
Fitting degree = 2, scale = 0.1, C = 0.25 on full training set
```

```r
#Aplicar el modelo en la base testing
print("MODELO NORMAL")
SVMprediction <-predict(model_SVM, testing)
cmSVM <-confusionMatrix(SVMprediction,testing$Class)
print(cmSVM)
print("MODELO CON AUTOMATIC GRID")
SVM_AG_predict <-predict(model_SVM_AG, testing)
cmSVM_AG1 <-confusionMatrix(SVM_AG_predict,testing$Class)
print(cmSVM_AG1)
```

```
[1] "MODELO NORMAL"
Confusion Matrix and Statistics

          Reference
Prediction  M  R
```

```
         M 29  6
         R  4 23

               Accuracy : 0.8387
                 95% CI : (0.7233, 0.9198)
    No Information Rate : 0.5323
    P-Value [Acc > NIR] : 3.903e-07

                  Kappa : 0.6747

 Mcnemar's Test P-Value : 0.7518

            Sensitivity : 0.8788
            Specificity : 0.7931
         Pos Pred Value : 0.8286
         Neg Pred Value : 0.8519
             Prevalence : 0.5323
         Detection Rate : 0.4677
   Detection Prevalence : 0.5645
      Balanced Accuracy : 0.8359

       'Positive' Class : M

[1] "MODELO CON AUTOMATIC GRID"
Confusion Matrix and Statistics

          Reference
Prediction  M  R
         M 30  6
         R  3 23

               Accuracy : 0.8548
                 95% CI : (0.7422, 0.9314)
    No Information Rate : 0.5323
    P-Value [Acc > NIR] : 8.133e-08

                  Kappa : 0.7066

 Mcnemar's Test P-Value : 0.505

            Sensitivity : 0.9091
            Specificity : 0.7931
         Pos Pred Value : 0.8333
         Neg Pred Value : 0.8846
             Prevalence : 0.5323
         Detection Rate : 0.4839
   Detection Prevalence : 0.5806
      Balanced Accuracy : 0.8511

       'Positive' Class : M
```

Como podemos notar el modelo con automatic grid tiene una mejor performance

MODELO DECISSION TREE

- A diferencia del modelo SVM ahora compararemos dos modelos DT, uno sin GridSearch y uno con GridSearch
- Parametros del DT C50 son trials, model, winnow

Primero definimos los fold y las repeticiones del crossvalidation Usaremos el método **repeatedcv** que es un cross validation repetido segun la cantidad de **repeats** ingresadas.

```
Control_DT_c50 <- trainControl(method = "repeatedcv",
                           number = 10,
                           repeats = 3,verboseIter = TRUE,
                           summaryFunction = twoClassSummary,
                           classProbs = TRUE)
```

```
#Modelo DT Original
model_DT <- train(
  Class ~ ., training,
  method = "C5.0",
  metric = "ROC",
  trControl = trainControl(
    method = "cv", number = 10,
    verboseIter = TRUE,
    summaryFunction = twoClassSummary,
    classProbs = TRUE))

#Modelo DT con GridSearch
model_DT_1 <- train(
  Class ~ ., training,
  method = "C5.0",
  trControl = Control_DT_c50,
  tuneLength = 10,
  metric ="ROC")
```

```
+ Fold01: model=tree, winnow=FALSE, trials=20
- Fold01: model=tree, winnow=FALSE, trials=20
+ Fold01: model=tree, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"

- Fold01: model=tree, winnow= TRUE, trials=20
+ Fold01: model=rules, winnow=FALSE, trials=20
- Fold01: model=rules, winnow=FALSE, trials=20
+ Fold01: model=rules, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"

- Fold01: model=rules, winnow= TRUE, trials=20
+ Fold02: model=tree, winnow=FALSE, trials=20
```

```
Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold02: model=tree, winnow=FALSE, trials=20
+ Fold02: model=tree, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 8 for this object. Predictions generated using 8 trials"Warning message:
"'trials' should be <= 8 for this object. Predictions generated using 8 trials"

- Fold02: model=tree, winnow= TRUE, trials=20
+ Fold02: model=rules, winnow=FALSE, trials=20
- Fold02: model=rules, winnow=FALSE, trials=20
+ Fold02: model=rules, winnow= TRUE, trials=20
- Fold02: model=rules, winnow= TRUE, trials=20
+ Fold03: model=tree, winnow=FALSE, trials=20
- Fold03: model=tree, winnow=FALSE, trials=20
+ Fold03: model=tree, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold03: model=tree, winnow= TRUE, trials=20
+ Fold03: model=rules, winnow=FALSE, trials=20
- Fold03: model=rules, winnow=FALSE, trials=20
+ Fold03: model=rules, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold03: model=rules, winnow= TRUE, trials=20
+ Fold04: model=tree, winnow=FALSE, trials=20
- Fold04: model=tree, winnow=FALSE, trials=20
+ Fold04: model=tree, winnow= TRUE, trials=20
- Fold04: model=tree, winnow= TRUE, trials=20
+ Fold04: model=rules, winnow=FALSE, trials=20
- Fold04: model=rules, winnow=FALSE, trials=20
+ Fold04: model=rules, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"

- Fold04: model=rules, winnow= TRUE, trials=20
+ Fold05: model=tree, winnow=FALSE, trials=20
```

```
- Fold05: model=tree, winnow=FALSE, trials=20
+ Fold05: model=tree, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"

- Fold05: model=tree, winnow= TRUE, trials=20
+ Fold05: model=rules, winnow=FALSE, trials=20
- Fold05: model=rules, winnow=FALSE, trials=20
+ Fold05: model=rules, winnow= TRUE, trials=20
- Fold05: model=rules, winnow= TRUE, trials=20
+ Fold06: model=tree, winnow=FALSE, trials=20
- Fold06: model=tree, winnow=FALSE, trials=20
+ Fold06: model=tree, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold06: model=tree, winnow= TRUE, trials=20
+ Fold06: model=rules, winnow=FALSE, trials=20
- Fold06: model=rules, winnow=FALSE, trials=20
+ Fold06: model=rules, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold06: model=rules, winnow= TRUE, trials=20
+ Fold07: model=tree, winnow=FALSE, trials=20
- Fold07: model=tree, winnow=FALSE, trials=20
+ Fold07: model=tree, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold07: model=tree, winnow= TRUE, trials=20
+ Fold07: model=rules, winnow=FALSE, trials=20
- Fold07: model=rules, winnow=FALSE, trials=20
+ Fold07: model=rules, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold07: model=rules, winnow= TRUE, trials=20
+ Fold08: model=tree, winnow=FALSE, trials=20
```

```
- Fold08: model=tree, winnow=FALSE, trials=20
+ Fold08: model=tree, winnow= TRUE, trials=20
- Fold08: model=tree, winnow= TRUE, trials=20
+ Fold08: model=rules, winnow=FALSE, trials=20
- Fold08: model=rules, winnow=FALSE, trials=20
+ Fold08: model=rules, winnow= TRUE, trials=20
- Fold08: model=rules, winnow= TRUE, trials=20
+ Fold09: model=tree, winnow=FALSE, trials=20
- Fold09: model=tree, winnow=FALSE, trials=20
+ Fold09: model=tree, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"

- Fold09: model=tree, winnow= TRUE, trials=20
+ Fold09: model=rules, winnow=FALSE, trials=20
- Fold09: model=rules, winnow=FALSE, trials=20
+ Fold09: model=rules, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"

- Fold09: model=rules, winnow= TRUE, trials=20
+ Fold10: model=tree, winnow=FALSE, trials=20
- Fold10: model=tree, winnow=FALSE, trials=20
+ Fold10: model=tree, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold10: model=tree, winnow= TRUE, trials=20
+ Fold10: model=rules, winnow=FALSE, trials=20
- Fold10: model=rules, winnow=FALSE, trials=20
+ Fold10: model=rules, winnow= TRUE, trials=20


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold10: model=rules, winnow= TRUE, trials=20
Aggregating results
Selecting tuning parameters
Fitting trials = 10, model = tree, winnow = FALSE on full training set
+ Fold01.Rep1: model=tree, winnow=FALSE, trials=90
- Fold01.Rep1: model=tree, winnow=FALSE, trials=90
+ Fold01.Rep1: model=tree, winnow= TRUE, trials=90
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Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
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"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold01.Rep1: model=tree, winnow= TRUE, trials=90
+ Fold01.Rep1: model=rules, winnow=FALSE, trials=90
- Fold01.Rep1: model=rules, winnow=FALSE, trials=90
+ Fold01.Rep1: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
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"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold01.Rep1: model=rules, winnow= TRUE, trials=90
+ Fold02.Rep1: model=tree, winnow=FALSE, trials=90
- Fold02.Rep1: model=tree, winnow=FALSE, trials=90
+ Fold02.Rep1: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold02.Rep1: model=tree, winnow= TRUE, trials=90
+ Fold02.Rep1: model=rules, winnow=FALSE, trials=90
- Fold02.Rep1: model=rules, winnow=FALSE, trials=90
+ Fold02.Rep1: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold02.Rep1: model=rules, winnow= TRUE, trials=90
+ Fold03.Rep1: model=tree, winnow=FALSE, trials=90
- Fold03.Rep1: model=tree, winnow=FALSE, trials=90
+ Fold03.Rep1: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
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"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold03.Rep1: model=tree, winnow= TRUE, trials=90
+ Fold03.Rep1: model=rules, winnow=FALSE, trials=90
- Fold03.Rep1: model=rules, winnow=FALSE, trials=90
+ Fold03.Rep1: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
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"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold03.Rep1: model=rules, winnow= TRUE, trials=90
+ Fold04.Rep1: model=tree, winnow=FALSE, trials=90
- Fold04.Rep1: model=tree, winnow=FALSE, trials=90
+ Fold04.Rep1: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
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"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"

- Fold04.Rep1: model=tree, winnow= TRUE, trials=90
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+ Fold04.Rep1: model=rules, winnow=FALSE, trials=90
- Fold04.Rep1: model=rules, winnow=FALSE, trials=90
+ Fold04.Rep1: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
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"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"

- Fold04.Rep1: model=rules, winnow= TRUE, trials=90
+ Fold05.Rep1: model=tree, winnow=FALSE, trials=90
- Fold05.Rep1: model=tree, winnow=FALSE, trials=90
+ Fold05.Rep1: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
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"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"

- Fold05.Rep1: model=tree, winnow= TRUE, trials=90
+ Fold05.Rep1: model=rules, winnow=FALSE, trials=90
- Fold05.Rep1: model=rules, winnow=FALSE, trials=90
+ Fold05.Rep1: model=rules, winnow= TRUE, trials=90


Warning message:
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"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
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"'trials' should be <= 4 for this object. Predictions generated using 4 trials"

- Fold05.Rep1: model=rules, winnow= TRUE, trials=90
+ Fold06.Rep1: model=tree, winnow=FALSE, trials=90
- Fold06.Rep1: model=tree, winnow=FALSE, trials=90
+ Fold06.Rep1: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
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"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"

- Fold06.Rep1: model=tree, winnow= TRUE, trials=90
+ Fold06.Rep1: model=rules, winnow=FALSE, trials=90
- Fold06.Rep1: model=rules, winnow=FALSE, trials=90
+ Fold06.Rep1: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
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"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"

- Fold06.Rep1: model=rules, winnow= TRUE, trials=90
+ Fold07.Rep1: model=tree, winnow=FALSE, trials=90
- Fold07.Rep1: model=tree, winnow=FALSE, trials=90
+ Fold07.Rep1: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
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"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"

- Fold07.Rep1: model=tree, winnow= TRUE, trials=90
+ Fold07.Rep1: model=rules, winnow=FALSE, trials=90
- Fold07.Rep1: model=rules, winnow=FALSE, trials=90
+ Fold07.Rep1: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
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"'trials' should be <= 6 for this object. Predictions generated using 6 trials"

- Fold07.Rep1: model=rules, winnow= TRUE, trials=90
+ Fold08.Rep1: model=tree, winnow=FALSE, trials=90
- Fold08.Rep1: model=tree, winnow=FALSE, trials=90
+ Fold08.Rep1: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 30 for this object. Predictions generated using 30 trials"Warning message:
"'trials' should be <= 30 for this object. Predictions generated using 30 trials"Warning message:
"'trials' should be <= 30 for this object. Predictions generated using 30 trials"Warning message:
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"'trials' should be <= 30 for this object. Predictions generated using 30 trials"Warning message:
"'trials' should be <= 30 for this object. Predictions generated using 30 trials"Warning message:
"'trials' should be <= 30 for this object. Predictions generated using 30 trials"

- Fold08.Rep1: model=tree, winnow= TRUE, trials=90
+ Fold08.Rep1: model=rules, winnow=FALSE, trials=90
- Fold08.Rep1: model=rules, winnow=FALSE, trials=90
+ Fold08.Rep1: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 15 for this object. Predictions generated using 15 trials"Warning message:
"'trials' should be <= 15 for this object. Predictions generated using 15 trials"Warning message:
"'trials' should be <= 15 for this object. Predictions generated using 15 trials"Warning message:
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"'trials' should be <= 15 for this object. Predictions generated using 15 trials"Warning message:
"'trials' should be <= 15 for this object. Predictions generated using 15 trials"Warning message:
"'trials' should be <= 15 for this object. Predictions generated using 15 trials"

- Fold08.Rep1: model=rules, winnow= TRUE, trials=90
+ Fold09.Rep1: model=tree, winnow=FALSE, trials=90
- Fold09.Rep1: model=tree, winnow=FALSE, trials=90
+ Fold09.Rep1: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold09.Rep1: model=tree, winnow= TRUE, trials=90
+ Fold09.Rep1: model=rules, winnow=FALSE, trials=90
- Fold09.Rep1: model=rules, winnow=FALSE, trials=90
+ Fold09.Rep1: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold09.Rep1: model=rules, winnow= TRUE, trials=90
+ Fold10.Rep1: model=tree, winnow=FALSE, trials=90
- Fold10.Rep1: model=tree, winnow=FALSE, trials=90
+ Fold10.Rep1: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 13 for this object. Predictions generated using 13 trials"Warning message:
"'trials' should be <= 13 for this object. Predictions generated using 13 trials"Warning message:
"'trials' should be <= 13 for this object. Predictions generated using 13 trials"Warning message:
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"'trials' should be <= 13 for this object. Predictions generated using 13 trials"Warning message:
"'trials' should be <= 13 for this object. Predictions generated using 13 trials"

- Fold10.Rep1: model=tree, winnow= TRUE, trials=90
+ Fold10.Rep1: model=rules, winnow=FALSE, trials=90
- Fold10.Rep1: model=rules, winnow=FALSE, trials=90
+ Fold10.Rep1: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
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"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"

- Fold10.Rep1: model=rules, winnow= TRUE, trials=90
+ Fold01.Rep2: model=tree, winnow=FALSE, trials=90
- Fold01.Rep2: model=tree, winnow=FALSE, trials=90
+ Fold01.Rep2: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
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"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"
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- Fold01.Rep2: model=tree, winnow= TRUE, trials=90
+ Fold01.Rep2: model=rules, winnow=FALSE, trials=90
- Fold01.Rep2: model=rules, winnow=FALSE, trials=90
+ Fold01.Rep2: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
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"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"

- Fold01.Rep2: model=rules, winnow= TRUE, trials=90
+ Fold02.Rep2: model=tree, winnow=FALSE, trials=90
- Fold02.Rep2: model=tree, winnow=FALSE, trials=90
+ Fold02.Rep2: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold02.Rep2: model=tree, winnow= TRUE, trials=90
+ Fold02.Rep2: model=rules, winnow=FALSE, trials=90
- Fold02.Rep2: model=rules, winnow=FALSE, trials=90
+ Fold02.Rep2: model=rules, winnow= TRUE, trials=90
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Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold02.Rep2: model=rules, winnow= TRUE, trials=90
+ Fold03.Rep2: model=tree, winnow=FALSE, trials=90
- Fold03.Rep2: model=tree, winnow=FALSE, trials=90
+ Fold03.Rep2: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 15 for this object. Predictions generated using 15 trials"Warning message:
"'trials' should be <= 15 for this object. Predictions generated using 15 trials"Warning message:
"'trials' should be <= 15 for this object. Predictions generated using 15 trials"Warning message:
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"'trials' should be <= 15 for this object. Predictions generated using 15 trials"Warning message:
"'trials' should be <= 15 for this object. Predictions generated using 15 trials"

- Fold03.Rep2: model=tree, winnow= TRUE, trials=90
+ Fold03.Rep2: model=rules, winnow=FALSE, trials=90
- Fold03.Rep2: model=rules, winnow=FALSE, trials=90
+ Fold03.Rep2: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
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"'trials' should be <= 9 for this object. Predictions generated using 9 trials"Warning message:
"'trials' should be <= 9 for this object. Predictions generated using 9 trials"

- Fold03.Rep2: model=rules, winnow= TRUE, trials=90
+ Fold04.Rep2: model=tree, winnow=FALSE, trials=90
- Fold04.Rep2: model=tree, winnow=FALSE, trials=90
+ Fold04.Rep2: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
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"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"

- Fold04.Rep2: model=tree, winnow= TRUE, trials=90
+ Fold04.Rep2: model=rules, winnow=FALSE, trials=90
- Fold04.Rep2: model=rules, winnow=FALSE, trials=90
+ Fold04.Rep2: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
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"'trials' should be <= 6 for this object. Predictions generated using 6 trials"

- Fold04.Rep2: model=rules, winnow= TRUE, trials=90
+ Fold05.Rep2: model=tree, winnow=FALSE, trials=90
- Fold05.Rep2: model=tree, winnow=FALSE, trials=90
+ Fold05.Rep2: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
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"'trials' should be <= 7 for this object. Predictions generated using 7 trials"

- Fold05.Rep2: model=tree, winnow= TRUE, trials=90
+ Fold05.Rep2: model=rules, winnow=FALSE, trials=90
- Fold05.Rep2: model=rules, winnow=FALSE, trials=90
+ Fold05.Rep2: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
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"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"

- Fold05.Rep2: model=rules, winnow= TRUE, trials=90
+ Fold06.Rep2: model=tree, winnow=FALSE, trials=90
- Fold06.Rep2: model=tree, winnow=FALSE, trials=90
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+ Fold06.Rep2: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
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"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold06.Rep2: model=tree, winnow= TRUE, trials=90
+ Fold06.Rep2: model=rules, winnow=FALSE, trials=90
- Fold06.Rep2: model=rules, winnow=FALSE, trials=90
+ Fold06.Rep2: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
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"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold06.Rep2: model=rules, winnow= TRUE, trials=90
+ Fold07.Rep2: model=tree, winnow=FALSE, trials=90
- Fold07.Rep2: model=tree, winnow=FALSE, trials=90
+ Fold07.Rep2: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
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"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"

- Fold07.Rep2: model=tree, winnow= TRUE, trials=90
+ Fold07.Rep2: model=rules, winnow=FALSE, trials=90
- Fold07.Rep2: model=rules, winnow=FALSE, trials=90
+ Fold07.Rep2: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
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"'trials' should be <= 7 for this object. Predictions generated using 7 trials"Warning message:
"'trials' should be <= 7 for this object. Predictions generated using 7 trials"

- Fold07.Rep2: model=rules, winnow= TRUE, trials=90
+ Fold08.Rep2: model=tree, winnow=FALSE, trials=90
- Fold08.Rep2: model=tree, winnow=FALSE, trials=90
+ Fold08.Rep2: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold08.Rep2: model=tree, winnow= TRUE, trials=90
+ Fold08.Rep2: model=rules, winnow=FALSE, trials=90
- Fold08.Rep2: model=rules, winnow=FALSE, trials=90
+ Fold08.Rep2: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold08.Rep2: model=rules, winnow= TRUE, trials=90
+ Fold09.Rep2: model=tree, winnow=FALSE, trials=90
- Fold09.Rep2: model=tree, winnow=FALSE, trials=90
+ Fold09.Rep2: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
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"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
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"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"

- Fold09.Rep2: model=tree, winnow= TRUE, trials=90
+ Fold09.Rep2: model=rules, winnow=FALSE, trials=90
- Fold09.Rep2: model=rules, winnow=FALSE, trials=90
+ Fold09.Rep2: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
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"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"

- Fold09.Rep2: model=rules, winnow= TRUE, trials=90
+ Fold10.Rep2: model=tree, winnow=FALSE, trials=90
- Fold10.Rep2: model=tree, winnow=FALSE, trials=90
+ Fold10.Rep2: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 13 for this object. Predictions generated using 13 trials"Warning message:
"'trials' should be <= 13 for this object. Predictions generated using 13 trials"Warning message:
"'trials' should be <= 13 for this object. Predictions generated using 13 trials"Warning message:
"'trials' should be <= 13 for this object. Predictions generated using 13 trials"Warning message:
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"'trials' should be <= 13 for this object. Predictions generated using 13 trials"Warning message:
"'trials' should be <= 13 for this object. Predictions generated using 13 trials"Warning message:
"'trials' should be <= 13 for this object. Predictions generated using 13 trials"

- Fold10.Rep2: model=tree, winnow= TRUE, trials=90
+ Fold10.Rep2: model=rules, winnow=FALSE, trials=90
- Fold10.Rep2: model=rules, winnow=FALSE, trials=90
+ Fold10.Rep2: model=rules, winnow= TRUE, trials=90
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Warning message:
"'trials' should be <= 44 for this object. Predictions generated using 44 trials"Warning message:
"'trials' should be <= 44 for this object. Predictions generated using 44 trials"Warning message:
"'trials' should be <= 44 for this object. Predictions generated using 44 trials"Warning message:
"'trials' should be <= 44 for this object. Predictions generated using 44 trials"Warning message:
"'trials' should be <= 44 for this object. Predictions generated using 44 trials"Warning message:
"'trials' should be <= 44 for this object. Predictions generated using 44 trials"Warning message:
"'trials' should be <= 44 for this object. Predictions generated using 44 trials"Warning message:
"'trials' should be <= 44 for this object. Predictions generated using 44 trials"

- Fold10.Rep2: model=rules, winnow= TRUE, trials=90
+ Fold01.Rep3: model=tree, winnow=FALSE, trials=90
- Fold01.Rep3: model=tree, winnow=FALSE, trials=90
+ Fold01.Rep3: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
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"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"

- Fold01.Rep3: model=tree, winnow= TRUE, trials=90
+ Fold01.Rep3: model=rules, winnow=FALSE, trials=90
- Fold01.Rep3: model=rules, winnow=FALSE, trials=90
+ Fold01.Rep3: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
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"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"

- Fold01.Rep3: model=rules, winnow= TRUE, trials=90
+ Fold02.Rep3: model=tree, winnow=FALSE, trials=90
- Fold02.Rep3: model=tree, winnow=FALSE, trials=90
+ Fold02.Rep3: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
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"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"

- Fold02.Rep3: model=tree, winnow= TRUE, trials=90
+ Fold02.Rep3: model=rules, winnow=FALSE, trials=90
- Fold02.Rep3: model=rules, winnow=FALSE, trials=90
+ Fold02.Rep3: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
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"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"

- Fold02.Rep3: model=rules, winnow= TRUE, trials=90
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+ Fold03.Rep3: model=tree, winnow=FALSE, trials=90
- Fold03.Rep3: model=tree, winnow=FALSE, trials=90
+ Fold03.Rep3: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 14 for this object. Predictions generated using 14 trials"Warning message:
"'trials' should be <= 14 for this object. Predictions generated using 14 trials"Warning message:
"'trials' should be <= 14 for this object. Predictions generated using 14 trials"Warning message:
"'trials' should be <= 14 for this object. Predictions generated using 14 trials"Warning message:
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"'trials' should be <= 14 for this object. Predictions generated using 14 trials"Warning message:
"'trials' should be <= 14 for this object. Predictions generated using 14 trials"Warning message:
"'trials' should be <= 14 for this object. Predictions generated using 14 trials"

- Fold03.Rep3: model=tree, winnow= TRUE, trials=90
+ Fold03.Rep3: model=rules, winnow=FALSE, trials=90
- Fold03.Rep3: model=rules, winnow=FALSE, trials=90
+ Fold03.Rep3: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 12 for this object. Predictions generated using 12 trials"Warning message:
"'trials' should be <= 12 for this object. Predictions generated using 12 trials"Warning message:
"'trials' should be <= 12 for this object. Predictions generated using 12 trials"Warning message:
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"'trials' should be <= 12 for this object. Predictions generated using 12 trials"Warning message:
"'trials' should be <= 12 for this object. Predictions generated using 12 trials"Warning message:
"'trials' should be <= 12 for this object. Predictions generated using 12 trials"

- Fold03.Rep3: model=rules, winnow= TRUE, trials=90
+ Fold04.Rep3: model=tree, winnow=FALSE, trials=90
- Fold04.Rep3: model=tree, winnow=FALSE, trials=90
+ Fold04.Rep3: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
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"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"

- Fold04.Rep3: model=tree, winnow= TRUE, trials=90
+ Fold04.Rep3: model=rules, winnow=FALSE, trials=90
- Fold04.Rep3: model=rules, winnow=FALSE, trials=90
+ Fold04.Rep3: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold04.Rep3: model=rules, winnow= TRUE, trials=90
+ Fold05.Rep3: model=tree, winnow=FALSE, trials=90
- Fold05.Rep3: model=tree, winnow=FALSE, trials=90
+ Fold05.Rep3: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold05.Rep3: model=tree, winnow= TRUE, trials=90
+ Fold05.Rep3: model=rules, winnow=FALSE, trials=90
- Fold05.Rep3: model=rules, winnow=FALSE, trials=90
+ Fold05.Rep3: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
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"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"Warning message:
"'trials' should be <= 3 for this object. Predictions generated using 3 trials"

- Fold05.Rep3: model=rules, winnow= TRUE, trials=90
+ Fold06.Rep3: model=tree, winnow=FALSE, trials=90
- Fold06.Rep3: model=tree, winnow=FALSE, trials=90
+ Fold06.Rep3: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
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"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"Warning message:
"'trials' should be <= 11 for this object. Predictions generated using 11 trials"

- Fold06.Rep3: model=tree, winnow= TRUE, trials=90
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+ Fold06.Rep3: model=rules, winnow=FALSE, trials=90
- Fold06.Rep3: model=rules, winnow=FALSE, trials=90
+ Fold06.Rep3: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
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"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"

- Fold06.Rep3: model=rules, winnow= TRUE, trials=90
+ Fold07.Rep3: model=tree, winnow=FALSE, trials=90
- Fold07.Rep3: model=tree, winnow=FALSE, trials=90
+ Fold07.Rep3: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
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"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
"'trials' should be <= 1 for this object. Predictions generated using 1 trials"

- Fold07.Rep3: model=tree, winnow= TRUE, trials=90
+ Fold07.Rep3: model=rules, winnow=FALSE, trials=90
- Fold07.Rep3: model=rules, winnow=FALSE, trials=90
+ Fold07.Rep3: model=rules, winnow= TRUE, trials=90


Warning message:
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"'trials' should be <= 1 for this object. Predictions generated using 1 trials"Warning message:
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- Fold07.Rep3: model=rules, winnow= TRUE, trials=90
+ Fold08.Rep3: model=tree, winnow=FALSE, trials=90
- Fold08.Rep3: model=tree, winnow=FALSE, trials=90
+ Fold08.Rep3: model=tree, winnow= TRUE, trials=90


Warning message:
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- Fold08.Rep3: model=tree, winnow= TRUE, trials=90
+ Fold08.Rep3: model=rules, winnow=FALSE, trials=90
- Fold08.Rep3: model=rules, winnow=FALSE, trials=90
+ Fold08.Rep3: model=rules, winnow= TRUE, trials=90


Warning message:
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- Fold08.Rep3: model=rules, winnow= TRUE, trials=90
+ Fold09.Rep3: model=tree, winnow=FALSE, trials=90
- Fold09.Rep3: model=tree, winnow=FALSE, trials=90
+ Fold09.Rep3: model=tree, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 20 for this object. Predictions generated using 20 trials"Warning message:
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"'trials' should be <= 20 for this object. Predictions generated using 20 trials"Warning message:
"'trials' should be <= 20 for this object. Predictions generated using 20 trials"

- Fold09.Rep3: model=tree, winnow= TRUE, trials=90
+ Fold09.Rep3: model=rules, winnow=FALSE, trials=90
- Fold09.Rep3: model=rules, winnow=FALSE, trials=90
+ Fold09.Rep3: model=rules, winnow= TRUE, trials=90


Warning message:
"'trials' should be <= 6 for this object. Predictions generated using 6 trials"Warning message:
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```
- Fold09.Rep3: model=rules, winnow= TRUE, trials=90
+ Fold10.Rep3: model=tree, winnow=FALSE, trials=90
- Fold10.Rep3: model=tree, winnow=FALSE, trials=90
+ Fold10.Rep3: model=tree, winnow= TRUE, trials=90


Warning message:
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- Fold10.Rep3: model=tree, winnow= TRUE, trials=90
+ Fold10.Rep3: model=rules, winnow=FALSE, trials=90
- Fold10.Rep3: model=rules, winnow=FALSE, trials=90
+ Fold10.Rep3: model=rules, winnow= TRUE, trials=90


Warning message:
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"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"

- Fold10.Rep3: model=rules, winnow= TRUE, trials=90
Aggregating results
Selecting tuning parameters
Fitting trials = 30, model = tree, winnow = FALSE on full training set
```

```r
print("MODELO ORIGINAL")
DTprediction <-predict(model_DT, testing)
cmDT <-confusionMatrix(DTprediction,testing$Class)
print(cmDT)
print("MODELO CON AUTOMATIC GRID")
DTprediction_GD <-predict(model_DT_1, testing)
cmDT_GD <-confusionMatrix(DTprediction_GD,testing$Class)
print(cmDT_GD)
```

```
[1] "MODELO ORIGINAL"
Confusion Matrix and Statistics

          Reference
Prediction  M  R
         M 27  6
         R  6 23

               Accuracy : 0.8065
                 95% CI : (0.6863, 0.8958)
    No Information Rate : 0.5323
    P-Value [Acc > NIR] : 6.468e-06

                  Kappa : 0.6113

 Mcnemar's Test P-Value : 1

            Sensitivity : 0.8182
            Specificity : 0.7931
         Pos Pred Value : 0.8182
         Neg Pred Value : 0.7931
             Prevalence : 0.5323
         Detection Rate : 0.4355
   Detection Prevalence : 0.5323
      Balanced Accuracy : 0.8056

       'Positive' Class : M

[1] "MODELO CON AUTOMATIC GRID"
Confusion Matrix and Statistics

          Reference
Prediction  M  R
         M 29  7
         R  4 22

               Accuracy : 0.8226
                 95% CI : (0.7047, 0.908)
    No Information Rate : 0.5323
    P-Value [Acc > NIR] : 1.674e-06

                  Kappa : 0.6414

 Mcnemar's Test P-Value : 0.5465
```

```
            Sensitivity : 0.8788
            Specificity : 0.7586
         Pos Pred Value : 0.8056
         Neg Pred Value : 0.8462
             Prevalence : 0.5323
         Detection Rate : 0.4677
   Detection Prevalence : 0.5806
      Balanced Accuracy : 0.8187

       'Positive' Class : M
```

Podemos notar que el modelo con automitcgrid tiene una mejor performance

Segunda opción es Grid Search: Manual Grid

- La segunda forma de buscar parámetros de algoritmo es especificar una grilla de sintonización manualmente.
- En la grilla cada parámetro del algoritmo se puede especificar como un vector de posibles valores.
- Estos vectores se combinan para definir todas las combinaciones posibles para probar.

```
#primero definimos los fold y las repeticiones del crossvalidation
Control_DT_c50 <- trainControl(method = "repeatedcv",
                               number = 10,
                               repeats = 3,verboseIter = FALSE,
                              summaryFunction = twoClassSummary,
                               classProbs = TRUE)
#Segundo definimos la grilla mediante vectores

grid_DT <- expand.grid( .winnow = c(TRUE,FALSE), .trials=c(7,15,17,18,20), .model="tree" )

model_DT_2 <- train(
  Class ~ ., training,
  tuneGrid=grid_DT,
  method = "C5.0",
    metric ="ROC",
  trControl = Control_DT_c50)
```

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Warning message:
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"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:

```
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
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"'trials' should be <= 5 for this object. Predictions generated using 5 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
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"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 8 for this object. Predictions generated using 8 trials"Warning message:
"'trials' should be <= 8 for this object. Predictions generated using 8 trials"Warning message:
"'trials' should be <= 8 for this object. Predictions generated using 8 trials"Warning message:
"'trials' should be <= 8 for this object. Predictions generated using 8 trials"Warning message:
"'trials' should be <= 8 for this object. Predictions generated using 8 trials"Warning message:
"'trials' should be <= 8 for this object. Predictions generated using 8 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"Warning message:
"'trials' should be <= 4 for this object. Predictions generated using 4 trials"
```

```
plot(model_DT_2)
print(model_DT_2)
#Aplicar el modelo en la base testing
```

```
C5.0

146 samples
 60 predictor
  2 classes: 'M', 'R'

No pre-processing
Resampling: Cross-Validated (10 fold, repeated 3 times)
Summary of sample sizes: 131, 132, 132, 131, 131, 132, ...
Resampling results across tuning parameters:

  winnow  trials  ROC        Sens       Spec
  FALSE    7      0.8380882  0.7755952  0.7206349
  FALSE   15      0.8619756  0.8303571  0.7365079
  FALSE   17      0.8647817  0.8261905  0.7166667
  FALSE   18      0.8591128  0.8220238  0.7285714
  FALSE   20      0.8620323  0.8136905  0.7404762
   TRUE    7      0.7463152  0.7178571  0.6817460
   TRUE   15      0.7459325  0.7220238  0.6674603
   TRUE   17      0.7466128  0.7220238  0.6674603
   TRUE   18      0.7466128  0.7261905  0.6674603
```

```
   TRUE   20      0.7466128  0.7261905  0.6674603

Tuning parameter 'model' was held constant at a value of tree
ROC was used to select the optimal model using the largest value.
The final values used for the model were trials = 17, model = tree and winnow
 = FALSE.
```

El método de munualGrid obtiene mejores resultados que el modelo normal, pero requiere de ir probando valores para ir acotando el resultado

```
print("MODELO ORIGINAL")
print(cmDT)
print("MODELO MANUAL GRID")
DTprediction_MG <-predict(model_DT_2, testing)
cmDT_MG <-confusionMatrix(DTprediction_MG,testing$Class)
print(cmDT_MG)
```

```
[1] "MODELO ORIGINAL"
Confusion Matrix and Statistics

          Reference
Prediction  M  R
         M 27  6
         R  6 23

               Accuracy : 0.8065
                 95% CI : (0.6863, 0.8958)
    No Information Rate : 0.5323
    P-Value [Acc > NIR] : 6.468e-06

                  Kappa : 0.6113

 Mcnemar's Test P-Value : 1

            Sensitivity : 0.8182
            Specificity : 0.7931
         Pos Pred Value : 0.8182
         Neg Pred Value : 0.7931
             Prevalence : 0.5323
         Detection Rate : 0.4355
   Detection Prevalence : 0.5323
      Balanced Accuracy : 0.8056

       'Positive' Class : M

[1] "MODELO MANUAL GRID"
Confusion Matrix and Statistics

          Reference
Prediction  M  R
         M 28  6
         R  5 23

               Accuracy : 0.8226
                 95% CI : (0.7047, 0.908)
```

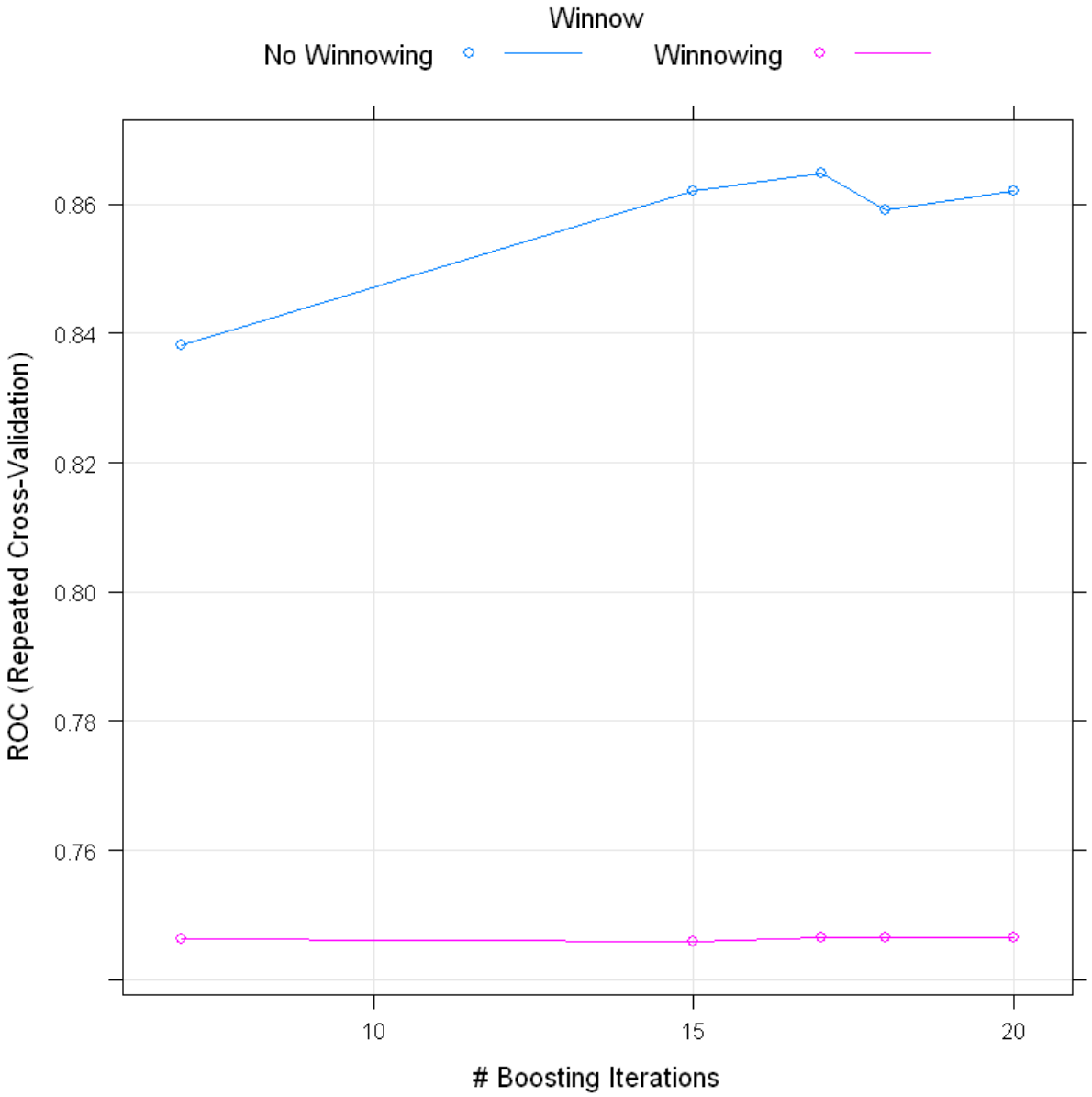
Winnow
No Winnowing
Winnowing
ROC (Repeated Cross-Validation)
0.86
0.84
0.82
0.80
0.78
0.76
10
15
20
Boosting Iterations

Figure 8: png

```
    No Information Rate : 0.5323
    P-Value [Acc > NIR] : 1.674e-06

                  Kappa : 0.6429

 Mcnemar's Test P-Value : 1

            Sensitivity : 0.8485
            Specificity : 0.7931
         Pos Pred Value : 0.8235
         Neg Pred Value : 0.8214
             Prevalence : 0.5323
         Detection Rate : 0.4516
   Detection Prevalence : 0.5484
      Balanced Accuracy : 0.8208

       'Positive' Class : M
```

RANDOM FOREST

El siguiente Random Forest tiene 2 hiperparámetros para configurar: - mtry: Número de variables muestreadas al azar como candidatos en cada división. - ntree: Número de árboles para crecer que viene definido por default en 500

Cargamos la libreria para el modelo

```
#install.packages("randomForest")
library(randomForest)
```

```
#Definimos la configuración de entrenamiento como un cross validation 10 fold con 3 repeticiones
control_rf <- trainControl(method="repeatedcv", number=10, repeats=3, summaryFunction = twoClassSummary
                           classProbs = TRUE)
# definimos los valores para mtry seran del 1 al 20
grid_rf <- expand.grid(.mtry=c(1:20))
rf <- train(Class~., data=training, method="rf", metric="ROC", tuneGrid=grid_rf, trControl=control_rf)
print(rf)
plot(rf)
```

```
Random Forest

146 samples
 60 predictor
  2 classes: 'M', 'R'

No pre-processing
Resampling: Cross-Validated (10 fold, repeated 3 times)
Summary of sample sizes: 131, 131, 132, 132, 131, 132, ...
Resampling results across tuning parameters:

  mtry  ROC        Sens       Spec
   1    0.9303005  0.9065476  0.7174603
   2    0.9355726  0.8982143  0.7603175
   3    0.9332625  0.8815476  0.7555556
   4    0.9266156  0.8773810  0.7404762
```

```
   5    0.9290604  0.8732143  0.7452381
   6    0.9267574  0.8726190  0.7555556
   7    0.9214994  0.8732143  0.7555556
   8    0.9287273  0.8684524  0.7603175
   9    0.9147109  0.8690476  0.7507937
  10    0.9226190  0.8773810  0.7547619
  11    0.9071854  0.8553571  0.7595238
  12    0.9120465  0.8553571  0.7460317
  13    0.9195011  0.8607143  0.7603175
  14    0.9090774  0.8684524  0.7603175
  15    0.8998937  0.8690476  0.7595238
  16    0.9031817  0.8559524  0.7500000
  17    0.9062642  0.8684524  0.7404762
  18    0.9036139  0.8553571  0.7595238
  19    0.9059099  0.8559524  0.7349206
  20    0.8981293  0.8553571  0.7349206

ROC was used to select the optimal model using the largest value.
The final value used for the model was mtry = 2.
```

El numero óptimo para mtry es 2

Confuguración del ntree

```
#Definimos la configuración de entrenamiento como un cross validation 10 fold sin repeticiones
control_rf_2 <- trainControl(method="cv", number=10, summaryFunction = twoClassSummary,
                             classProbs = TRUE)
# definimos los valores para mtry seran del 1 al 20
rf_grid2 <- expand.grid(.mtry=c(1:20))

#creamos una lista vacia para ir guardando los distintos modelos
rf_list <- list()

# mediante un loop vamos probando los distintos valores de ntree.
## estos van desde el 100 al 500 cada 50. Es decir 100 - 150 - 200 - 250 .......- 400 - 450 - 500
for (i in seq(200, 600, by = 50)) {
  set.seed(1)
  rf4 <- train(Class ~.,
               data = training,
               method = "rf",
               metric = "ROC",
               tuneGrid = rf_grid2,
               ntree = i,
               trControl = control_rf_2)
  key <- toString(i)
  rf_list[[key]] <- rf4

}
```

Comparamos los resultados

```
bosques <- resamples(rf_list)
summary(bosques)
```

```
Call:
summary.resamples(object = bosques)
```

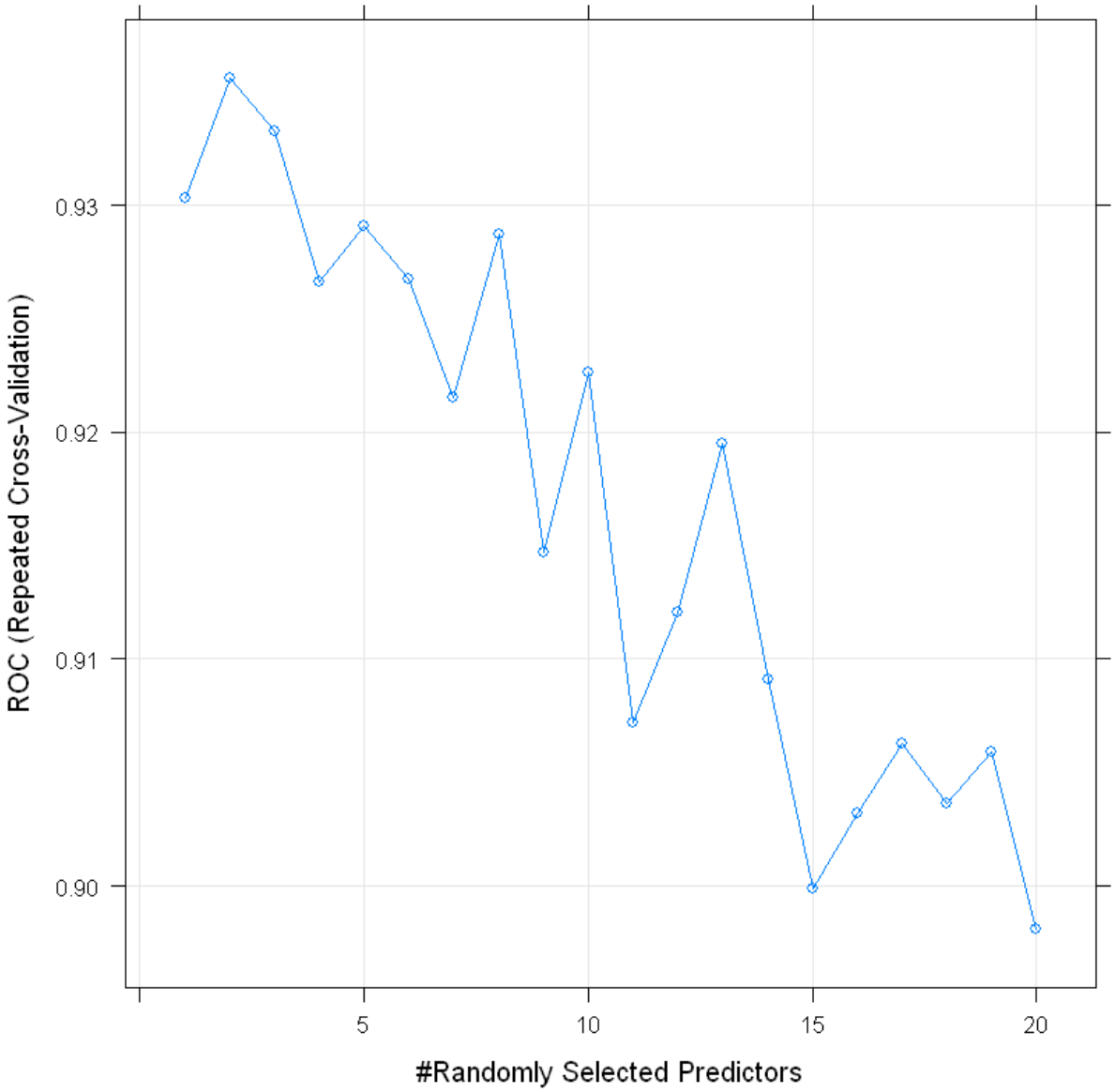
ROC (Repeated Cross-Validation)
0.93
0.92
0.91
0.90
5
10
15
20
#Randomly Selected Predictors

Figure 9: png

```
Models: 200, 250, 300, 350, 400, 450, 500, 550, 600
Number of resamples: 10

ROC
         Min.   1st Qu.    Median      Mean   3rd Qu. Max. NA's
200 0.7500000 0.9183673 0.9375000 0.9289116 0.9813988    1    0
250 0.8214286 0.8973214 0.9136905 0.9250425 0.9794855    1    0
300 0.7678571 0.8921131 0.9336735 0.9249150 0.9741709    1    0
350 0.7500000 0.9129464 0.9808673 0.9339711 0.9955357    1    0
400 0.7500000 0.9129464 0.9808673 0.9339711 0.9955357    1    0
450 0.7500000 0.9151786 0.9808673 0.9366497 0.9955357    1    0
500 0.7500000 0.9167730 0.9808673 0.9346088 0.9821429    1    0
550 0.7500000 0.9167730 0.9808673 0.9355017 0.9821429    1    0
600 0.7500000 0.9084821 0.9795918 0.9301446 0.9821429    1    0

Sens
     Min.   1st Qu. Median      Mean 3rd Qu. Max. NA's
200 0.500 0.8750000 0.9375 0.8982143   1.000    1    0
250 0.625 0.8616071 0.8750 0.8571429   0.875    1    0
300 0.625 0.7767857 0.8750 0.8446429   0.875    1    0
350 0.750 0.8750000 0.9375 0.9125000   1.000    1    0
400 0.750 0.8750000 0.9375 0.9125000   1.000    1    0
450 0.750 0.8750000 1.0000 0.9250000   1.000    1    0
500 0.750 0.8750000 1.0000 0.9250000   1.000    1    0
550 0.750 0.8616071 0.9375 0.9107143   1.000    1    0
600 0.750 0.8616071 0.8750 0.8982143   1.000    1    0

Spec
         Min.   1st Qu.    Median      Mean   3rd Qu.      Max. NA's
200 0.5714286 0.5952381 0.7142857 0.7214286 0.8511905 0.8571429    0
250 0.6666667 0.7142857 0.7142857 0.7642857 0.8511905 0.8571429    0
300 0.5714286 0.5952381 0.7738095 0.7357143 0.8571429 0.8571429    0
350 0.4285714 0.6785714 0.7142857 0.7380952 0.8571429 1.0000000    0
400 0.5714286 0.5952381 0.7142857 0.7071429 0.8035714 0.8571429    0
450 0.4285714 0.5952381 0.7142857 0.6928571 0.8035714 0.8571429    0
500 0.4285714 0.5952381 0.7142857 0.7071429 0.8511905 0.8571429    0
550 0.4285714 0.5952381 0.7142857 0.7071429 0.8511905 0.8571429    0
600 0.4285714 0.5952381 0.7142857 0.6928571 0.8035714 0.8571429    0
```

```
dotplot(results)
```

Podemos notar que el mejor resultado ROC lo tiene el **ntree = 500**

Ahora a partir de **ntree =500** buscamos el óptimo para **mtry**

```
rf_list$`500`$bestTune
```

A data.frame: 1 × 1

mtry

<int>

1

Lista de los resultados para el ntree=500

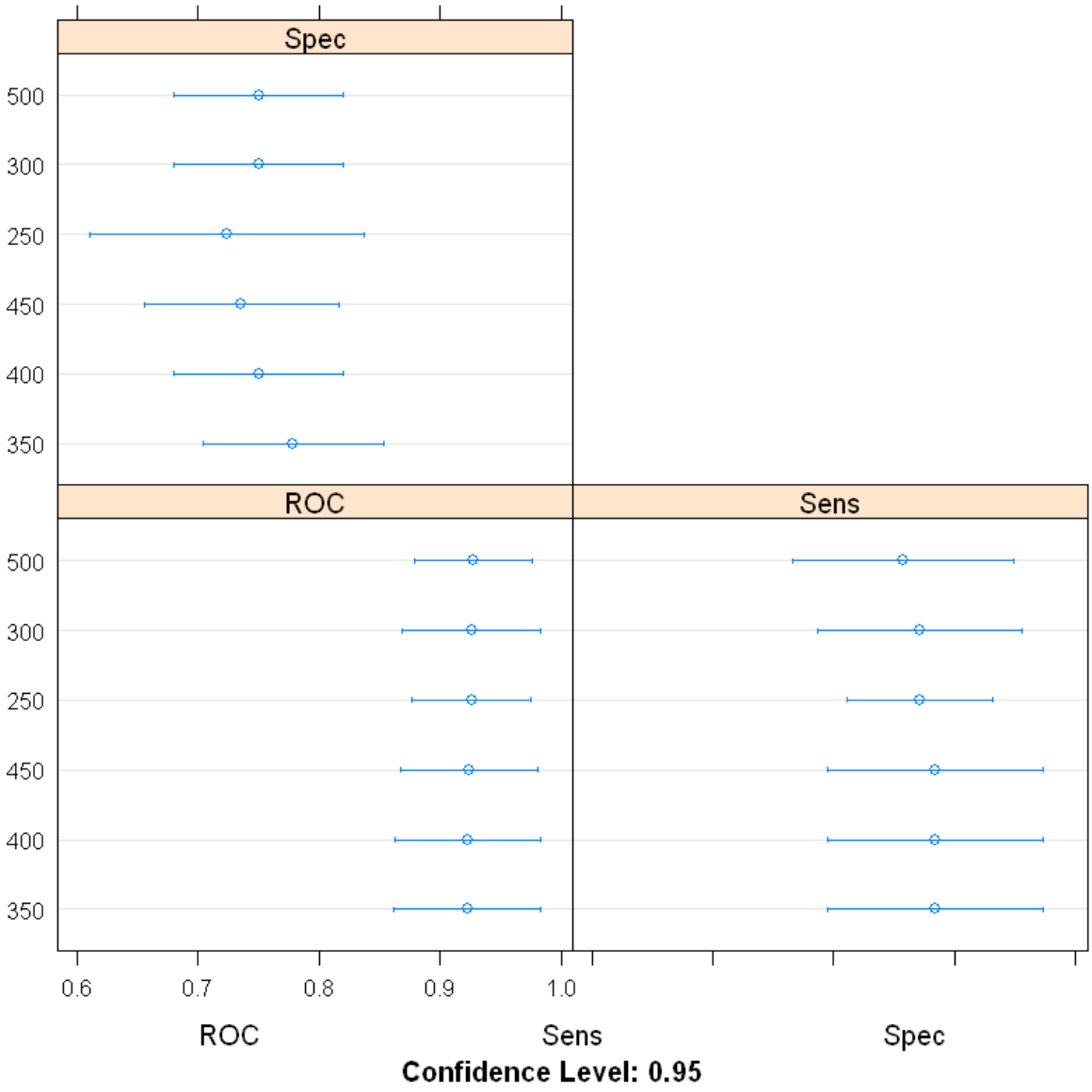

Figure 10: png

```
rf_list$`500`$results
```

A data.frame: 20 × 7

mtry

ROC

Sens

Spec

ROCSD

SensSD

SpecSD

<int>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

<dbl>

1

0.9346088

0.9250000

0.7071429

0.09101394

0.10540926

0.14892324

2

0.9149660

0.8982143

0.7523810

0.09055424

0.09926387

0.13801311

3

0.9232143

0.8857143

0.7214286

0.07220362

0.12463097

0.14110477

4

0.9119898

0.8571429

0.7642857

0.07617100

0.12821821

0.10191539

5

0.9244898

0.8714286

0.7523810

0.07212095

0.10233942

0.13801311

6

0.9136905

0.8464286

0.7380952

0.07677823

0.11424851

0.13327663

7

0.9250000

0.8303571

0.7500000

0.06360970

0.14217346

0.09736384

8

0.9214286

0.8571429

0.7357143

0.06751859

0.12821821

0.13110861

9
0.9102041
0.8446429
0.7666667
0.07345805
0.11846584
0.12387056
10
0.9201531
0.8446429
0.7214286
0.06638731
0.11846584
0.10411658
11
0.9229592
0.8446429
0.7500000
0.06562872
0.11846584
0.09736384
12
0.9066752
0.8446429
0.7214286
0.06961063
0.11846584
0.12399762
13
0.9131378
0.8446429
0.7357143
0.07488441
0.11846584
0.09010646
14

0.9097151

0.8446429

0.7357143

0.06800891

0.11846584

0.11249143

15

0.8980867

0.8446429

0.7214286

0.06515670

0.11846584

0.10411658

16

0.9061224

0.8446429

0.7500000

0.06337548

0.11846584

0.09736384

17

0.9016582

0.8428571

0.7666667

0.06593444

0.13979861

0.12387056

18

0.8903912

0.8446429

0.7500000

0.06514614

0.11846584

0.09736384

19

0.8980442

0.8446429

0.7500000

0.07201633

0.11846584

0.09736384

20

0.8978741

0.8303571

0.7500000

0.07291189

0.14217346

0.09736384

Grafico de los distintos valores de **mtry** para ntree=500

```
rf_list$`500` %>%
  plot()
```

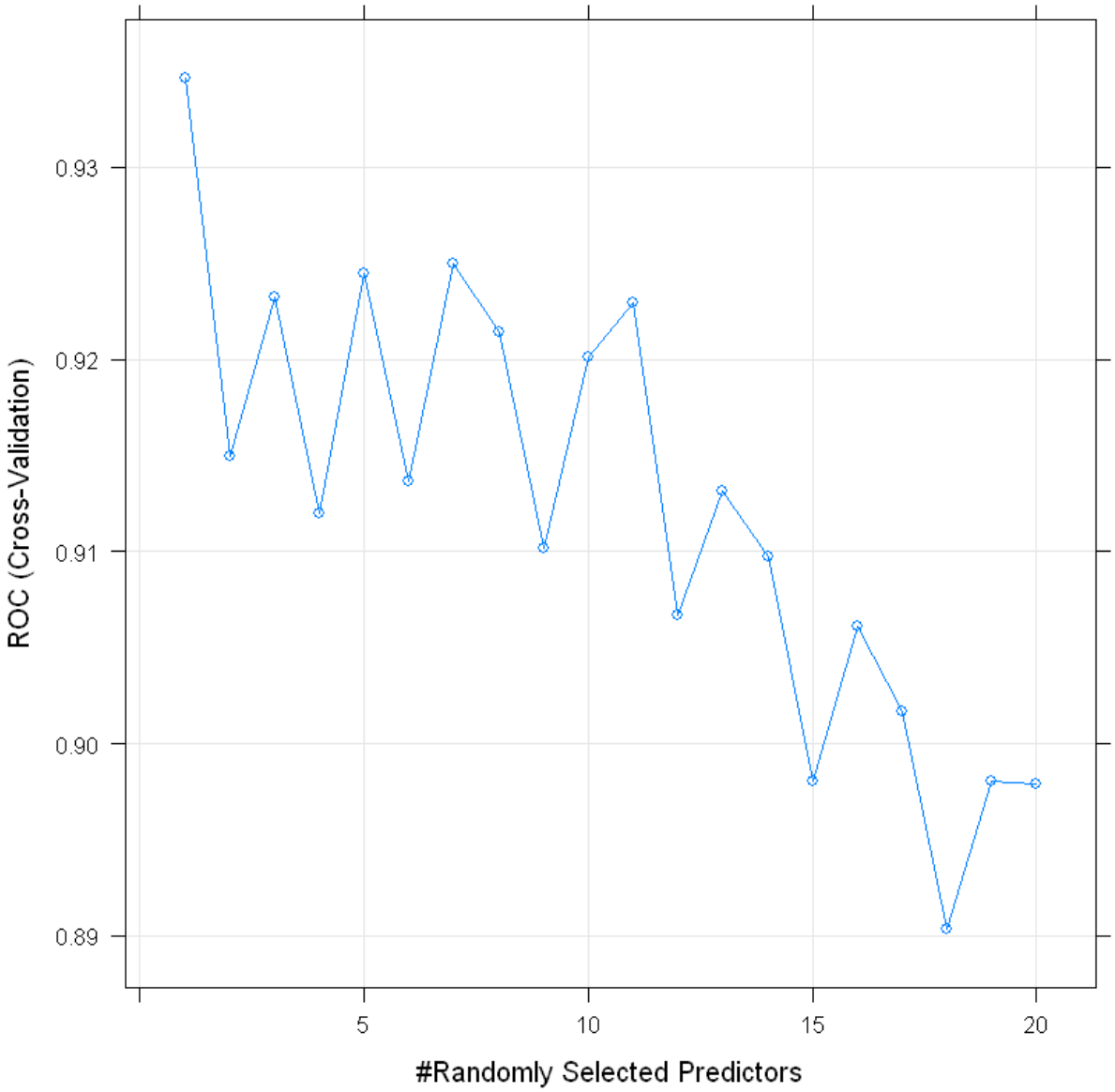

Figure 11: png