CS6140 Assignment 4

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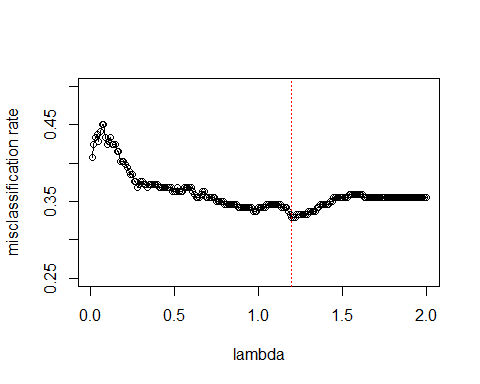
### 1. JWHT Chapter 7, Problem 1

### 2. JWHT Chapter 7, Problem 3

set.seed(123)  
Rawdata <- read.table("SouthAfricanHeartDisease.txt", sep=",",   
 stringsAsFactors = FALSE, header = TRUE)  
#Rawdata[,11] <- as.factor(Rawdata[,11])  
Mydata <- Rawdata[,-6]  
Mydata <- Mydata[,-1]  
  
# for naive bayes  
predictors <- Mydata[,1:8]  
means <- apply(predictors, 2, mean)  
sds <- apply(predictors, 2, sd)  
  
predictors <- t(apply(predictors, 1, function(x) (x-means)/sds))  
response <- Mydata[,9]  
  
train <- sample(x=1:nrow(Mydata), size=nrow(Mydata)/2)  
trainResponse <- response[train]  
testResponse <- response[-train]  
  
trainPredictors <- predictors[train,]  
testPredictors <- predictors[-train,]  
  
# for others  
Mydata <- Rawdata[,-1]  
Mydata[,5][Mydata[,5]=="Present"] <- 1  
Mydata[,5][Mydata[,5]=="Absent"] <- 0  
Mydata[,5] <- as.integer(Mydata[,5])  
trainSet <- Mydata[train,]  
testSet <- Mydata[-train,]

### problem 3. Naive Bayes classifier

# leave-one-out cross validation  
# only support response contains 0 and 1  
naive.bayes.cv <- function(lambda.seq, predictors, response){  
 miscl <- rep(NA, length(lambda.seq))  
 missd <- rep(NA, length(lambda.seq))  
 for (k in 1:length(lambda.seq)) {  
 lambda <- lambda.seq[k]  
 n <- length(response)  
 naiveBayes.raw <- rep(NA, n)  
 for (i in 1:n) {  
 data.tr.predictors <- predictors[-i,]  
 data.tr.response <- response[-i]  
 data.test.predictors <- predictors[i,]  
 data.test.response <- response[i]  
 density <- dnorm(abs(data.test.predictors - data.tr.predictors)/lambda, mean = 0, sd=1)  
 #print(density)  
 ones <- which(data.tr.response %in% c(1))  
 response.ones <- which(response %in% c(1))  
   
 len.ones <- length(response.ones)  
 len.zeros <- n - len.ones  
 prior.ones <- len.ones/n  
 prior.zeros <- len.zeros/n  
   
 density.ones <- density[ones,]  
 density.zeros <- density[-ones,]  
   
 density.one <- prod(apply(density.ones, 2, sum)/len.ones)  
 density.zero <- prod(apply(density.zeros, 2, sum)/len.zeros)  
   
 prob.one <- prior.ones \* density.one / (prior.ones \* density.one + prior.zeros \* density.zero)  
 naiveBayes.raw[i] <- prob.one   
 }  
 cl <- sapply(naiveBayes.raw, function(x) x>0.5)  
 miscl[k] <- 1-mean(cl == response)  
 missd[k] <- sd(cl == response)  
 }  
 plot(lambda.seq, miscl, ylim=c(0.25, 0.5), ylab="misclassification rate", xlab="lambda")  
 lines(lambda.seq, miscl)  
 abline(v=lambda.seq[which.min(miscl)], col="red", lty=3)  
 cat("Best lambda is :", lambda.seq[which.min(miscl)],"\n")  
}  
  
lambda.seq <- seq(0.01, 2, 0.01)  
naive.bayes.cv(lambda.seq, trainPredictors, trainResponse)

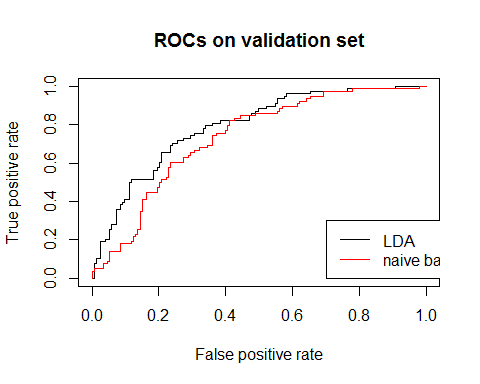


## Best lambda is : 1.2

# using train dataset  
naive.bayes.cl <- function(lambda, predictors, response, trainPredictors) {  
 n <- length(response)  
 naiveBayes.raw <- rep(NA, n)  
 for (i in 1:n) {  
  
 data.test.predictors <- predictors[i,]  
 density <- dnorm(abs(data.test.predictors - trainPredictors)/lambda, mean = 0, sd=1)  
  
 ones <- which(trainResponse %in% c(1))  
 response.ones <- which(trainResponse %in% c(1))  
   
 len.ones <- length(response.ones)  
 len.zeros <- length(trainResponse) - len.ones  
 prior.ones <- len.ones/length(trainResponse)  
 prior.zeros <- len.zeros/length(trainResponse)  
   
 density.ones <- density[ones,]  
 density.zeros <- density[-ones,]  
  
 density.one <- prod(apply(density.ones, 2, sum)/len.ones)  
 density.zero <- prod(apply(density.zeros, 2, sum)/len.zeros)  
   
 prob.one <- prior.ones \* density.one / (prior.ones \* density.one + prior.zeros \* density.zero)  
 naiveBayes.raw[i] <- prob.one   
 }  
 return(naiveBayes.raw)  
}  
naiveBayes.scores <- naive.bayes.cl(1.2, testPredictors, testResponse, trainPredictors)

lda.fit <- lda(x=as.matrix(trainPredictors), grouping= as.factor(trainResponse), cv=TRUE)

# lda  
# ROC on the validation set  
scores <- predict(lda.fit, newdata= testPredictors)$posterior[,2]  
pred <- prediction( scores, labels= testResponse )  
perf <- performance(pred, "tpr", "fpr")  
plot(perf, col= 1, main="ROCs on validation set")  
# print out the area under the curve  
lda.test <- unlist(attributes(performance(pred, "auc"))$y.values)  
  
# naive bayes  
pred <- prediction(naiveBayes.scores, labels=testResponse)  
perf <- performance(pred, "tpr", "fpr")  
  
# plot the ROC curve  
plot(perf, col= 2, add=T)  
# print out the area under the curve  
naive.test <- unlist(attributes(performance(pred, "auc"))$y.values)  
legend(0.7,0.3, c("LDA", "naive bayes"), col=c(1:2), lty=1)



### problem 4. Tree-based Methods

##### (a) JWHT Chapter 8, Problem 9, but using the "South African Heart Disease" dataset

###### (a-b)

tree.cl <- tree(as.factor(chd) ~ ., data=trainSet)  
summary(tree.cl)

##   
## Classification tree:  
## tree(formula = as.factor(chd) ~ ., data = trainSet)  
## Number of terminal nodes: 26   
## Residual mean deviance: 0.5249 = 107.6 / 205   
## Misclassification error rate: 0.1169 = 27 / 231

Training error rate is 11.69%. There are 26 terminal nodes.

###### (c)

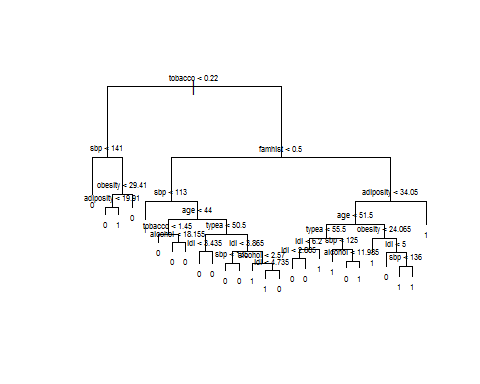
tree.cl

## node), split, n, deviance, yval, (yprob)  
## \* denotes terminal node  
##   
## 1) root 231 300.500 0 ( 0.64502 0.35498 )   
## 2) tobacco < 0.22 67 40.400 0 ( 0.91045 0.08955 )   
## 4) sbp < 141 49 0.000 0 ( 1.00000 0.00000 ) \*  
## 5) sbp > 141 18 22.910 0 ( 0.66667 0.33333 )   
## 10) obesity < 29.41 12 16.640 0 ( 0.50000 0.50000 )   
## 20) adiposity < 19.91 5 5.004 0 ( 0.80000 0.20000 ) \*  
## 21) adiposity > 19.91 7 8.376 1 ( 0.28571 0.71429 ) \*  
## 11) obesity > 29.41 6 0.000 0 ( 1.00000 0.00000 ) \*  
## 3) tobacco > 0.22 164 226.500 0 ( 0.53659 0.46341 )   
## 6) famhist < 0.5 83 99.830 0 ( 0.71084 0.28916 )   
## 12) sbp < 113 6 5.407 1 ( 0.16667 0.83333 ) \*  
## 13) sbp > 113 77 86.050 0 ( 0.75325 0.24675 )   
## 26) age < 44 31 19.710 0 ( 0.90323 0.09677 )   
## 52) tobacco < 1.45 14 0.000 0 ( 1.00000 0.00000 ) \*  
## 53) tobacco > 1.45 17 15.840 0 ( 0.82353 0.17647 )   
## 106) alcohol < 18.155 9 11.460 0 ( 0.66667 0.33333 ) \*  
## 107) alcohol > 18.155 8 0.000 0 ( 1.00000 0.00000 ) \*  
## 27) age > 44 46 59.440 0 ( 0.65217 0.34783 )   
## 54) typea < 50.5 18 12.560 0 ( 0.88889 0.11111 )   
## 108) ldl < 3.435 5 6.730 0 ( 0.60000 0.40000 ) \*  
## 109) ldl > 3.435 13 0.000 0 ( 1.00000 0.00000 ) \*  
## 55) typea > 50.5 28 38.820 1 ( 0.50000 0.50000 )   
## 110) ldl < 3.865 10 10.010 0 ( 0.80000 0.20000 )   
## 220) sbp < 135 5 0.000 0 ( 1.00000 0.00000 ) \*  
## 221) sbp > 135 5 6.730 0 ( 0.60000 0.40000 ) \*  
## 111) ldl > 3.865 18 22.910 1 ( 0.33333 0.66667 )   
## 222) alcohol < 2.57 8 6.028 1 ( 0.12500 0.87500 ) \*  
## 223) alcohol > 2.57 10 13.860 0 ( 0.50000 0.50000 )   
## 446) ldl < 4.735 5 5.004 1 ( 0.20000 0.80000 ) \*  
## 447) ldl > 4.735 5 5.004 0 ( 0.80000 0.20000 ) \*  
## 7) famhist > 0.5 81 105.700 1 ( 0.35802 0.64198 )   
## 14) adiposity < 34.05 70 94.970 1 ( 0.41429 0.58571 )   
## 28) age < 51.5 38 52.260 0 ( 0.55263 0.44737 )   
## 56) typea < 55.5 21 25.130 0 ( 0.71429 0.28571 )   
## 112) ldl < 6.2 14 11.480 0 ( 0.85714 0.14286 )   
## 224) ldl < 2.805 5 6.730 0 ( 0.60000 0.40000 ) \*  
## 225) ldl > 2.805 9 0.000 0 ( 1.00000 0.00000 ) \*  
## 113) ldl > 6.2 7 9.561 1 ( 0.42857 0.57143 ) \*  
## 57) typea > 55.5 17 22.070 1 ( 0.35294 0.64706 )   
## 114) sbp < 125 5 0.000 1 ( 0.00000 1.00000 ) \*  
## 115) sbp > 125 12 16.640 0 ( 0.50000 0.50000 )   
## 230) alcohol < 11.985 5 5.004 0 ( 0.80000 0.20000 ) \*  
## 231) alcohol > 11.985 7 8.376 1 ( 0.28571 0.71429 ) \*  
## 29) age > 51.5 32 35.990 1 ( 0.25000 0.75000 )   
## 58) obesity < 24.065 9 0.000 1 ( 0.00000 1.00000 ) \*  
## 59) obesity > 24.065 23 29.720 1 ( 0.34783 0.65217 )   
## 118) ldl < 5 9 11.460 0 ( 0.66667 0.33333 ) \*  
## 119) ldl > 5 14 11.480 1 ( 0.14286 0.85714 )   
## 238) sbp < 136 5 6.730 1 ( 0.40000 0.60000 ) \*  
## 239) sbp > 136 9 0.000 1 ( 0.00000 1.00000 ) \*  
## 15) adiposity > 34.05 11 0.000 1 ( 0.00000 1.00000 ) \*

1. adiposity > 34.05 11 0.000 1 ( 0.00000 1.00000 ) To go to the 15th terminal node, adiposity should be greater than 34.05, there is 1 observation in this branch, the deviance is 0, the prediction is chd = 1 with probability 1.

###### (d)

plot(tree.cl)  
text(tree.cl ,pretty =0, cex=0.5)



Initial tree built for training set without pruning.

###### (e)

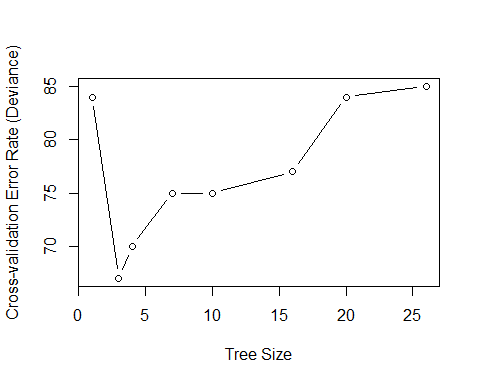
tree.pred <- predict (tree.cl , testSet, type ="class")  
table(tree.pred, testSet[,10])

##   
## tree.pred 0 1  
## 0 117 40  
## 1 36 38

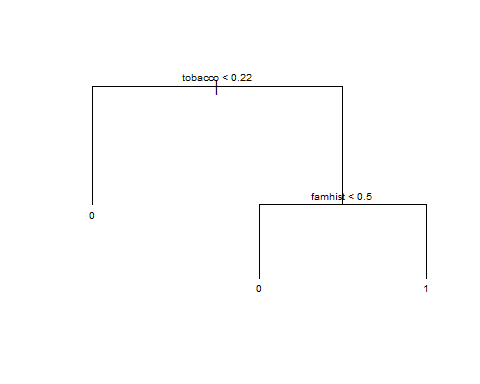
The misclassification rate for testing set is 32.90%.

###### (f-i)

set.seed(258)  
cv.tree.cl =cv.tree(tree.cl , FUN=prune.misclass)  
plot(cv.tree.cl$size ,cv.tree.cl$dev ,type="b", ylab="Cross-validation Error Rate (Deviance)", xlab="Tree Size")



prune.tree =prune.misclass (tree.cl ,best =3)  
plot(prune.tree)  
text(prune.tree ,pretty =0, cex=0.6)



###### (j)

tree.prune.train.pred <- predict(prune.tree, trainSet, type="class")  
mean(tree.prune.train.pred != trainSet[,10])

## [1] 0.2554113

prune.train.acc <- 1-mean(tree.prune.train.pred != trainSet[,10])

The misclassification rate on training set of pruned tree is 25.54% which is higher than the one (11.69%) of unpruned tree.

###### (k)

tree.prune.test.pred <- predict (prune.tree , testSet, type="class")  
mean(tree.prune.test.pred != testSet[,10])

## [1] 0.3376623

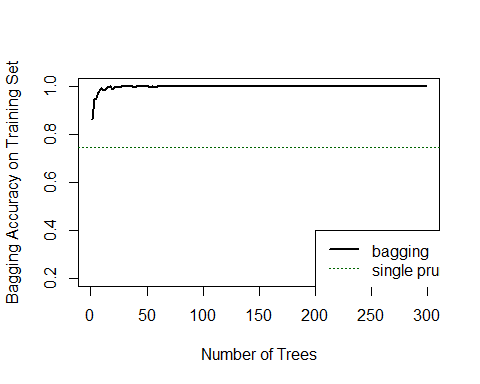
prune.test.acc <- 1-mean(tree.prune.test.pred != testSet[,10])

The misclassification rate on testing set of pruned tree is 33.77% which is lower than the one (38.53%) of unpruned tree.

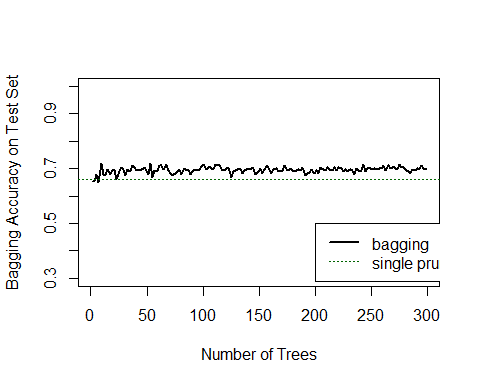
##### (b) Bagging

B.seq <- seq(1, 300, 2)  
acc.train.seq.bag <- rep(NA, length(B.seq))  
acc.test.seq.bag <- rep(NA, length(B.seq))  
set.seed (123)  
for (i in 1:length(B.seq)) {  
 bagging <- randomForest(as.factor(chd)~.,data=trainSet , mtry=9, importance =TRUE, ntree = B.seq[i])  
 #acc.train.seq.OOB[i] <- (bagging$confusion[1,1] + bagging$confusion[2,2])/dim(trainSet)[1]  
 pred.bagging <- predict(bagging, trainSet)  
 acc.train.seq.bag[i] <- mean(pred.bagging == trainSet[,10])  
   
 pred.bagging <- predict(bagging ,newdata =testSet)  
 acc.test.seq.bag[i] <- mean(pred.bagging == testSet[,10])  
}

plot(B.seq, acc.train.seq.bag, ylim=c(0.2,1), type="l", xlab="Number of Trees", ylab="Bagging Accuracy on Training Set", lwd=2)  
#lines(B.seq, acc.train.seq, ylim=c(0.2,1))  
abline(h=prune.train.acc, col="darkgreen", lty=3, lwd=1)  
legend(200,0.4, c("bagging", "single pruned tree"),  
 lty=c(1,3), lwd=c(2,1),col=c("black", "darkgreen"))



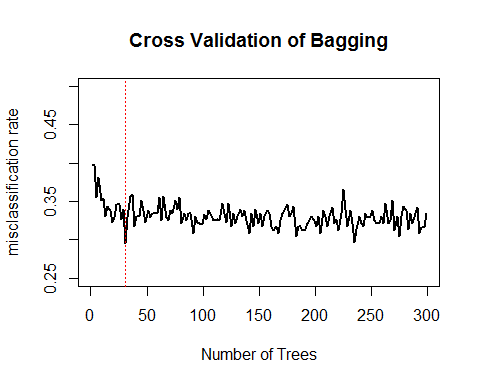
plot(B.seq, acc.test.seq.bag, ylim=c(0.3,1), type="l", xlab="Number of Trees", ylab="Bagging Accuracy on Test Set", lwd=2)  
#lines(B.seq, acc.test.seq, ylim=c(0.6,0.8))  
abline(h=prune.test.acc, col="darkgreen", lty=3, lwd=1)  
legend(200,0.5, c("bagging", "single pruned tree"),  
 lty=c(1,3), lwd=c(2,1),col=c("black", "darkgreen"))



#bagging  
#(bagging$confusion[1,1] + bagging$confusion[2,2])/dim(trainSet)[1]

# cross-validation to choose number of Trees on Bagging  
set.seed(321)  
data <- trainSet  
n <- dim(trainSet)[1]  
index <- 1:n  
K <- 10  
flds <- createFolds(index, k=K)  
miscl.cv <- rep(NA, length(B.seq))  
  
for (j in 1:length(B.seq)){  
 miscl.cv.raw <- rep(NA, K)  
 for (i in 1:K){  
 testID <- flds[[i]]  
 data.tr <- data[-testID,]  
 data.test <- data[testID,]  
 tree.cv <- randomForest(as.factor(chd)~.,data=data.tr , mtry=9, importance =TRUE, ntree = B.seq[j])  
 tree.cv.pred <- predict(tree.cv, newdata = data.test, type = "c")  
 #fnr.cv.raw[i] <- sum(tree.cv.pred == "FALSE" & data.test$IsB == "TRUE")/sum(data.test$IsB == "TRUE")  
 miscl.cv.raw[i] <- mean(tree.cv.pred != data.test[,10])  
 }  
 miscl.cv[j] <- mean(miscl.cv.raw)  
}

plot(B.seq, miscl.cv, type="l", lwd=2.5, ylim=c(0.25,0.5),   
 xlab= "Number of Trees", ylab="misclassification rate", main="Cross Validation of Bagging")  
abline(v=B.seq[which.min(miscl.cv)], lty=3, col="red")



cat("Best B for Bagging is :", B.seq[which.min(miscl.cv)], "\n")

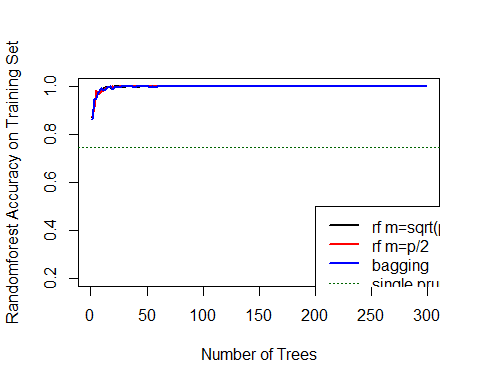
## Best B for Bagging is : 31

##### (c) RandomForest

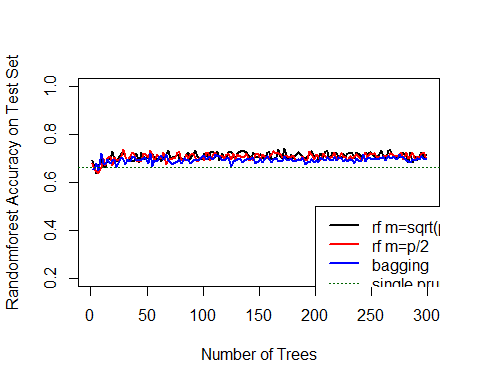
acc.train.seq.sqrt <- rep(NA, length(B.seq))  
acc.test.seq.sqrt <- rep(NA, length(B.seq))  
acc.train.seq.by2 <- rep(NA, length(B.seq))  
acc.test.seq.by2 <- rep(NA, length(B.seq))  
set.seed (123)  
for (i in 1:length(B.seq)) {  
   
 rf.tree.sqrt <- randomForest(as.factor(chd)~., data=trainSet , mtry=sqrt(9), importance =TRUE, ntree = B.seq[i])  
 rf.tree.by2 <- randomForest(as.factor(chd)~., data=trainSet , mtry=9/2, importance =TRUE, ntree = B.seq[i])  
   
 #acc.train.seq.OOB.sqrt[i] <- (rf.tree.sqrt$confusion[1,1] + rf.tree.sqrt$confusion[2,2])/dim(trainSet)[1]  
 pred.rf.sqrt <- predict (rf.tree.sqrt, newdata = trainSet)  
 acc.train.seq.sqrt[i] <- mean(pred.rf.sqrt ==trainSet[,10])  
   
 pred.rf.sqrt <- predict (rf.tree.sqrt ,newdata = testSet)  
 acc.test.seq.sqrt[i] <- mean(pred.rf.sqrt == testSet[,10])  
  
 #acc.train.seq.by2[i] <- (rf.tree.by2$confusion[1,1] + rf.tree.by2$confusion[2,2])/dim(trainSet)[1]  
 pred.rf.by2 <- predict(rf.tree.by2, trainSet)  
 acc.train.seq.by2[i] <- mean(pred.rf.by2 == trainSet[,10])   
  
   
 pred.rf.by2 <- predict (rf.tree.by2 ,newdata =testSet)  
 acc.test.seq.by2[i] <- mean(pred.rf.by2 == testSet[,10])   
}

predict(rf.tree.sqrt, testSet, type='prob') for ROC CURVE

# black: rf with sqrt(p) features  
# red: rf with p/2 features  
# blue: bagging  
# purple: single pruned tree  
plot(B.seq, acc.train.seq.sqrt, ylim=c(0.2,1), type="l", xlab="Number of Trees", ylab="Randomforest Accuracy on Training Set", lwd=2)  
lines(B.seq, acc.train.seq.by2, col="red", lwd=2)  
lines(B.seq, acc.train.seq.bag, col="blue", lwd=2)  
abline(h=prune.train.acc, col="darkgreen", lty=3, lwd=1)  
legend(200,0.5, c("rf m=sqrt(p)", "rf m=p/2", "bagging", "single pruned tree"),  
 lty=c(1,1,1,3), lwd=c(2,2,2,1),col=c("black","red", "blue", "darkgreen"))

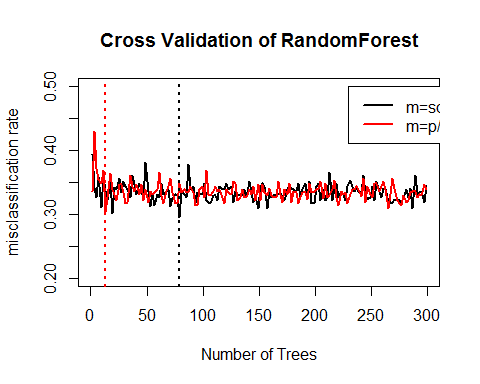


plot(B.seq, acc.test.seq.sqrt, ylim=c(0.2,1), type="l", xlab="Number of Trees", ylab="Randomforest Accuracy on Test Set", lwd=2)  
lines(B.seq, acc.test.seq.by2, col="red", lwd=2)  
lines(B.seq, acc.test.seq.bag, col="blue", lwd=2)  
abline(h=prune.test.acc, col="darkgreen", lty=3, lwd=1)  
legend(200,0.5, c("rf m=sqrt(p)", "rf m=p/2", "bagging", "single pruned tree"),  
 lty=c(1,1,1,3), lwd=c(2,2,2,1),col=c("black","red", "blue", "darkgreen"))



# cross-validation to choose number of Trees on RandomForest  
set.seed(321)  
data <- trainSet  
n <- dim(trainSet)[1]  
index <- 1:n  
K <- 10  
flds <- createFolds(index, k=K)  
miscl.sqrt.cv <- rep(NA, length(B.seq))  
miscl.by2.cv <- rep(NA, length(B.seq))  
  
for (j in 1:length(B.seq)){  
 miscl.sqrt.cv.raw <- rep(NA, K)  
 miscl.by2.cv.raw <- rep(NA, K)  
 for (i in 1:K){  
 testID <- flds[[i]]  
 data.tr <- data[-testID,]  
 data.test <- data[testID,]  
 tree.cv <- randomForest(as.factor(chd)~.,data=data.tr , mtry=sqrt(9), importance =FALSE, ntree = B.seq[j])  
 tree.cv.pred <- predict(tree.cv, newdata = data.test, type = "c")  
 miscl.sqrt.cv.raw[i] <- mean(tree.cv.pred != data.test[,10])  
   
 tree.cv <- randomForest(as.factor(chd)~.,data=data.tr , mtry=9/2, importance =FALSE, ntree = B.seq[j])  
 tree.cv.pred <- predict(tree.cv, newdata = data.test, type = "c")  
 miscl.by2.cv.raw[i] <- mean(tree.cv.pred != data.test[,10])  
 }  
 miscl.sqrt.cv[j] <- mean(miscl.sqrt.cv.raw)  
 miscl.by2.cv[j] <- mean(miscl.by2.cv.raw)  
}

plot(B.seq, miscl.sqrt.cv, type="l", lwd=2.5, ylim=c(0.2,0.5),   
 xlab= "Number of Trees", ylab="misclassification rate", main="Cross Validation of RandomForest")  
lines(B.seq, miscl.by2.cv, lwd=2.5, col="red")  
abline(v=B.seq[which.min(miscl.sqrt.cv)], lty=3, col="black", lwd=2)  
abline(v=B.seq[which.min(miscl.by2.cv)], lty=3, col="red", lwd=2)  
legend(230,0.5, c("m=sqrt(p)", "m=p/2"),  
 lty=c(1,1), lwd=c(2,2),col=c("black", "red"))



cat("Best B for RandomForest with m=sqrt(p) is :", B.seq[which.min(miscl.sqrt.cv)], "\n")

## Best B for RandomForest with m=sqrt(p) is : 79

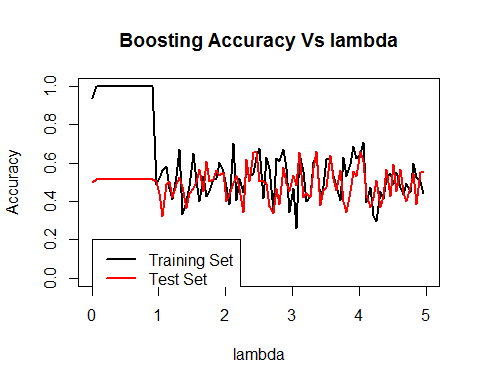
cat("Best B for RandomForest with m=p/2 is :", B.seq[which.min(miscl.by2.cv)], "\n")

## Best B for RandomForest with m=p/2 is : 13

##### (d) Boosting

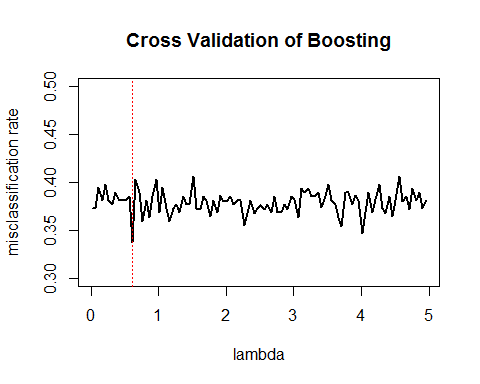
set.seed(123)  
grid <- seq(0.01, 5, 0.05)  
acc.train.seq.boost <- rep(NA, length(grid))  
acc.test.seq.boost <- rep(NA, length(grid))  
for (i in 1:length(grid)) {  
 boost.tree <- gbm(chd~., data=trainSet, distribution="bernoulli", n.trees =1000, interaction.depth=4, shrinkage=grid[i])  
 boost.tree.train.pred <- predict(boost.tree, data=trainSet, n.trees=1000, type="response") > 0.5  
 acc.train.seq.boost[i] <- mean(boost.tree.train.pred == trainSet$chd)  
  
 boost.tree.test.pred <- predict(boost.tree, data=testSet, n.trees=1000, type="response") > 0.5  
 acc.test.seq.boost[i] <- mean(boost.tree.test.pred == testSet$chd)  
}

# black: train  
# red: test  
plot(grid, acc.train.seq.boost, type="l", xlim=c(0,5), ylim=c(0,1), xlab="lambda", ylab="Accuracy", lwd=2, main="Boosting Accuracy Vs lambda")  
lines(grid, acc.test.seq.boost, type="l", col="red", lwd=2)  
  
legend(0,0.2, c("Training Set", "Test Set"),  
 lty=c(1,1), lwd=c(2,2),col=c("black", "red"))



# cross-validation to choose lambda on Boosting  
set.seed(321)  
data <- trainSet  
n <- dim(trainSet)[1]  
index <- 1:n  
K <- 10  
flds <- createFolds(index, k=K)  
miscl.cv <- rep(NA, length(grid))  
  
for (j in 1:length(grid)){  
 miscl.cv.raw <- rep(NA, K)  
 for (i in 1:K){  
 testID <- flds[[i]]  
 data.tr <- data[-testID,]  
 data.test <- data[testID,]  
 tree.cv <- gbm(chd~., data=data.tr, distribution="bernoulli", n.trees =1000, interaction.depth=4, shrinkage=grid[i])  
 tree.cv.pred <- predict(tree.cv, newdata = data.test, type = "response", n.trees=1000) > 0.5  
 #fnr.cv.raw[i] <- sum(tree.cv.pred == "FALSE" & data.test$IsB == "TRUE")/sum(data.test$IsB == "TRUE")  
 miscl.cv.raw[i] <- mean(tree.cv.pred != data.test[,10])  
 }  
 miscl.cv[j] <- mean(miscl.cv.raw)  
}

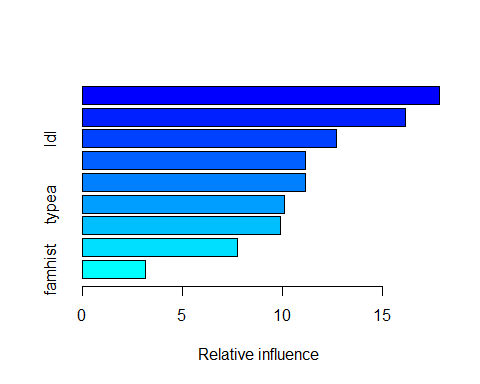
plot(grid, miscl.cv, type="l", lwd=2, ylim=c(0.3,0.5), xlab="lambda", ylab="misclassification rate",  
 main="Cross Validation of Boosting")  
abline(v=grid[which.min(miscl.cv)], col="red", lty=3)



cat("Best lambda for Boosting with B=1000 is :", grid[which.min(miscl.cv)], "\n")

## Best lambda for Boosting with B=1000 is : 0.61

boosting.tree <- gbm(chd~., data=trainSet, distribution="bernoulli", n.trees=1000, interaction.depth=4, shrinkage=0.61)  
summary(boosting.tree)



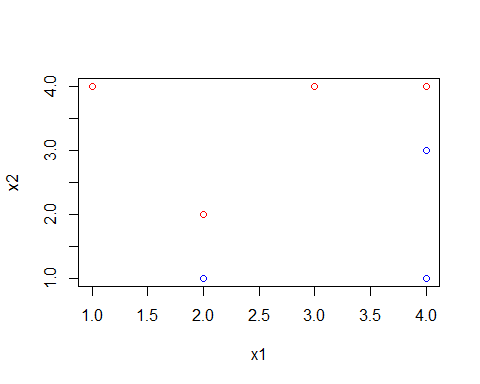
## var rel.inf  
## tobacco tobacco 17.864434  
## age age 16.165435  
## ldl ldl 12.700520  
## alcohol alcohol 11.161555  
## adiposity adiposity 11.152392  
## typea typea 10.107254  
## sbp sbp 9.931618  
## obesity obesity 7.762373  
## famhist famhist 3.154419

#boosting.pred <- predict(boosting.tree, testSet, type='response', n.trees=1000)  
#pred <- prediction(boosting.pred, labels= testSet$chd )  
#mean((boosting.pred > 0.5) == testSet$chd)

### 5. JWHT Chapter 9, Problem 3.

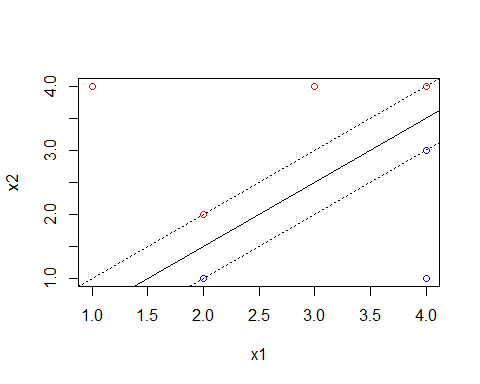
##### (a)

x1 <- c(3,2,4,1,2,4,4)  
x2 <- c(4,2,4,4,1,3,1)  
y <- c("red", "red","red","red","blue","blue","blue")  
plot(x1,x2, col=y)



##### (b)

plot(x1,x2, col=y)  
abline(a=-0.5, b=1)  
abline(a=0, b=1, lty=3)  
abline(a=-1, b=1, lty=3)



The hyperplane here is :

##### (c)

The classification rule is:

Red if

Blue if

##### (d)

The margin here is the perpendicular distance from one dotted line to the solid line.

And the value of the margin is .

##### (e)

The support vectors are:

(2,1),(2,2),(4,3),(4,4)

##### (f)

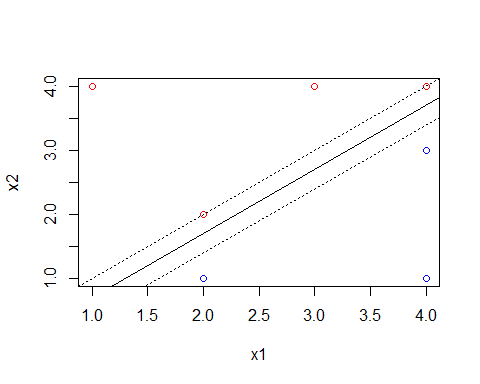
For SVM, the points that would affect the hyperplane are the support vectors.

Clearly the seventh point (4,1) is not a support vector and far from the hyperplane.

Thus, a slight movement of the seventh observation would not affect the maximal margin hyperplane.

##### (g)

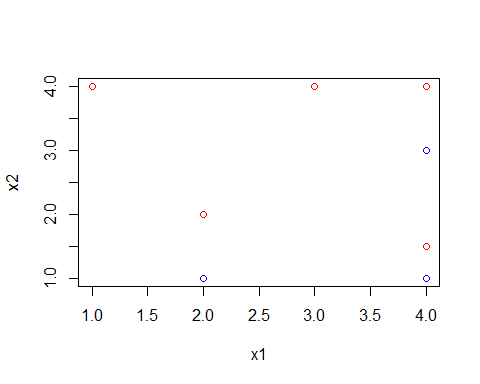
plot(x1,x2, col=y)  
abline(a=-0.3, b=1)  
abline(a=0, b=1, lty=3)  
abline(a=-0.6, b=1, lty=3)



There are infinite number of hyperplanes that are not the optimal ones. Here is one with .

##### (h)

x1 <- c(3,2,4,1,2,4,4,4)  
x2 <- c(4,2,4,4,1,3,1,1.5)  
y <- c("red", "red","red","red","blue","blue","blue", "red")  
plot(x1,x2, col=y)



The two classes won't be linearly separable with an additional red point (4, 1.5).

### 6. In this problem, we will investigate the use of support vector machines and neural networks.

##### (a) Train support vector machine the "South African Heart Disease" dataset, and evaluate its performance on the validation set.

svmdata <- Mydata  
svmdata$chd[svmdata$chd == 0] <- -1  
svm.trainSet <- svmdata[train,]  
svm.testSet <- svmdata[-train,]

set.seed(123)  
tune.out <- tune(svm , as.factor(chd)~., data=svm.trainSet, kernel ="radial",   
 ranges =list(cost=c(0.01, 0.1, 1, 10 ,100 ,1000), gamma=c(0.005, 0.01, 0.05, 0.1, 0.5, 1,2,3,4)))  
svm.best <- tune.out$best.model  
summary(tune.out)

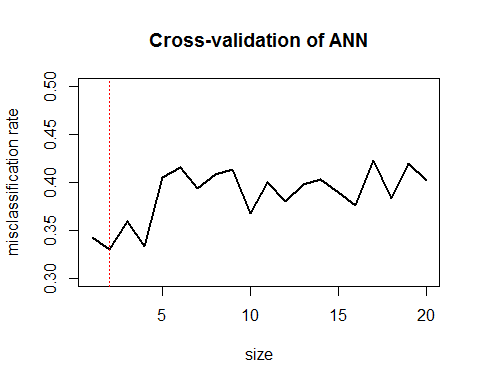
##   
## Parameter tuning of 'svm':  
##   
## - sampling method: 10-fold cross validation   
##   
## - best parameters:  
## cost gamma  
## 10 0.01  
##   
## - best performance: 0.2731884   
##   
## - Detailed performance results:  
## cost gamma error dispersion  
## 1 1e-02 0.005 0.3554348 0.08544121  
## 2 1e-01 0.005 0.3554348 0.08544121  
## 3 1e+00 0.005 0.3382246 0.09257879  
## 4 1e+01 0.005 0.2903986 0.09032997  
## 5 1e+02 0.005 0.2731884 0.09710325  
## 6 1e+03 0.005 0.3594203 0.07723428  
## 7 1e-02 0.010 0.3554348 0.08544121  
## 8 1e-01 0.010 0.3554348 0.08544121  
## 9 1e+00 0.010 0.3295290 0.08877613  
## 10 1e+01 0.010 0.2731884 0.09924274  
## 11 1e+02 0.010 0.3159420 0.08663386  
## 12 1e+03 0.010 0.3983696 0.08680731  
## 13 1e-02 0.050 0.3554348 0.08544121  
## 14 1e-01 0.050 0.3554348 0.08544121  
## 15 1e+00 0.050 0.2817029 0.09521647  
## 16 1e+01 0.050 0.3161232 0.08975165  
## 17 1e+02 0.050 0.3815217 0.09509748  
## 18 1e+03 0.050 0.3894928 0.07575555  
## 19 1e-02 0.100 0.3554348 0.08544121  
## 20 1e-01 0.100 0.3554348 0.08544121  
## 21 1e+00 0.100 0.2947464 0.08979552  
## 22 1e+01 0.100 0.3813406 0.08540471  
## 23 1e+02 0.100 0.3855072 0.07332818  
## 24 1e+03 0.100 0.3768116 0.05158009  
## 25 1e-02 0.500 0.3554348 0.08544121  
## 26 1e-01 0.500 0.3554348 0.08544121  
## 27 1e+00 0.500 0.3596014 0.08807839  
## 28 1e+01 0.500 0.3981884 0.06655565  
## 29 1e+02 0.500 0.3981884 0.06655565  
## 30 1e+03 0.500 0.3981884 0.06655565  
## 31 1e-02 1.000 0.3554348 0.08544121  
## 32 1e-01 1.000 0.3554348 0.08544121  
## 33 1e+00 1.000 0.3597826 0.09314484  
## 34 1e+01 1.000 0.4202899 0.08855219  
## 35 1e+02 1.000 0.4202899 0.08855219  
## 36 1e+03 1.000 0.4202899 0.08855219  
## 37 1e-02 2.000 0.3554348 0.08544121  
## 38 1e-01 2.000 0.3554348 0.08544121  
## 39 1e+00 2.000 0.3554348 0.08544121  
## 40 1e+01 2.000 0.3641304 0.09353863  
## 41 1e+02 2.000 0.3641304 0.09353863  
## 42 1e+03 2.000 0.3641304 0.09353863  
## 43 1e-02 3.000 0.3554348 0.08544121  
## 44 1e-01 3.000 0.3554348 0.08544121  
## 45 1e+00 3.000 0.3554348 0.08544121  
## 46 1e+01 3.000 0.3554348 0.08544121  
## 47 1e+02 3.000 0.3554348 0.08544121  
## 48 1e+03 3.000 0.3554348 0.08544121  
## 49 1e-02 4.000 0.3554348 0.08544121  
## 50 1e-01 4.000 0.3554348 0.08544121  
## 51 1e+00 4.000 0.3554348 0.08544121  
## 52 1e+01 4.000 0.3554348 0.08544121  
## 53 1e+02 4.000 0.3554348 0.08544121  
## 54 1e+03 4.000 0.3554348 0.08544121

##### (b) Train neural networks on the training set of the "South African Heart Disease" dataset, and evaluate its performance on the validation set.

set.seed(666)  
data <- trainSet  
n <- dim(trainSet)[1]  
index <- 1:n  
K <- 10  
flds <- createFolds(index, k=K)  
sizes <- seq(1, 20, 1)  
miscl.cv <- rep(NA, length(sizes))  
  
  
for (j in 1:length(sizes)){  
 miscl.cv.raw <- rep(NA, K)  
 for (i in 1:K){  
 testID <- flds[[i]]  
 data.tr <- data[-testID,]  
 #rownames(data.tr) <- c(1:dim(data.tr)[1])  
 ideal <- class.ind(data.tr$chd)  
 data.test <- data[testID,]  
 ann.cv <- nnet(data.tr[,-10], ideal, size=sizes[j], softmax=TRUE, maxit = 300, decay = 5e-4)  
 ann.cv.pred <- predict(ann.cv, data.test[,-10], type = "class")  
 miscl.cv.raw[i] <- mean(ann.cv.pred != data.test[,10])  
 }  
 miscl.cv[j] <- mean(miscl.cv.raw)  
}

## # weights: 14  
## initial value 134.040085   
## iter 10 value 133.937021  
## iter 20 value 131.541451  
## iter 30 value 131.013680  
## iter 40 value 131.011333  
## iter 50 value 131.010156  
## final value 131.009632   
## converged  
## # weights: 14  
## initial value 138.729892   
## iter 10 value 128.360971  
## iter 20 value 121.630667  
## iter 30 value 121.367203  
## iter 40 value 121.366756  
## final value 121.366735   
## converged  
## # weights: 14  
## initial value 153.372697   
## iter 10 value 134.168124  
## final value 134.167169   
## converged  
## # weights: 14  
## initial value 147.500663   
## iter 10 value 134.792372  
## final value 134.792368   
## converged  
## # weights: 14  
## initial value 175.387800   
## iter 10 value 135.532394  
## final value 135.531407   
## converged  
## # weights: 14  
## initial value 155.916297   
## iter 10 value 136.998825  
## final value 136.997972   
## converged  
## # weights: 14  
## initial value 135.097642   
## iter 10 value 132.784934  
## iter 20 value 129.088042  
## iter 30 value 129.010988  
## iter 40 value 129.010220  
## iter 50 value 129.007480  
## iter 60 value 129.006508  
## final value 129.006372   
## converged  
## # weights: 14  
## initial value 134.965688   
## iter 10 value 134.955674  
## final value 134.955598   
## converged  
## # weights: 14  
## initial value 203.826218   
## iter 10 value 134.425487  
## iter 20 value 132.863903  
## iter 30 value 126.881141  
## iter 40 value 126.484877  
## iter 50 value 126.476913  
## iter 60 value 126.474989  
## iter 70 value 126.472675  
## iter 80 value 126.471534  
## final value 126.471504   
## converged  
## # weights: 14  
## initial value 157.205097   
## iter 10 value 134.956418  
## final value 134.955659   
## converged  
## # weights: 26  
## initial value 139.340414   
## iter 10 value 133.938359  
## iter 20 value 133.936891  
## final value 133.936843   
## converged  
## # weights: 26  
## initial value 141.184872   
## iter 10 value 132.889359  
## iter 20 value 132.750226  
## iter 30 value 132.749152  
## iter 40 value 132.747861  
## iter 50 value 132.747080  
## iter 60 value 121.289593  
## iter 70 value 113.792487  
## iter 80 value 110.595037  
## iter 90 value 110.533391  
## iter 100 value 110.527117  
## iter 110 value 110.515868  
## iter 120 value 110.507226  
## iter 130 value 110.503482  
## iter 140 value 110.501167  
## iter 150 value 110.500998  
## final value 110.500974   
## converged  
## # weights: 26  
## initial value 175.926423   
## iter 10 value 132.599832  
## iter 20 value 131.605444  
## iter 30 value 130.319276  
## iter 40 value 128.361209  
## iter 50 value 126.789567  
## iter 60 value 126.278697  
## iter 70 value 126.183313  
## iter 80 value 125.705964  
## iter 90 value 124.442129  
## iter 100 value 123.244673  
## iter 110 value 122.999750  
## iter 120 value 122.997196  
## iter 130 value 119.766487  
## iter 140 value 114.906788  
## iter 150 value 112.144107  
## iter 160 value 110.152509  
## iter 170 value 109.880051  
## iter 180 value 109.825446  
## iter 190 value 109.822692  
## iter 200 value 109.810895  
## iter 210 value 109.805728  
## iter 220 value 109.803844  
## iter 220 value 109.803844  
## iter 220 value 109.803844  
## final value 109.803844   
## converged  
## # weights: 26  
## initial value 153.667179   
## iter 10 value 128.774223  
## iter 20 value 125.068986  
## iter 30 value 125.058032  
## iter 40 value 125.056730  
## iter 50 value 125.055184  
## final value 125.055003   
## converged  
## # weights: 26  
## initial value 151.007398   
## iter 10 value 135.533287  
## final value 135.532101   
## converged  
## # weights: 26  
## initial value 140.565780   
## iter 10 value 136.996180  
## final value 136.995830   
## converged  
## # weights: 26  
## initial value 214.517000   
## iter 10 value 134.808074  
## iter 20 value 134.804948  
## iter 30 value 134.792432  
## iter 40 value 130.783226  
## iter 50 value 123.820120  
## iter 60 value 122.033861  
## iter 70 value 121.672123  
## iter 80 value 121.467339  
## iter 90 value 121.459674  
## iter 100 value 120.066070  
## iter 110 value 118.545928  
## iter 120 value 118.386825  
## iter 130 value 118.168321  
## iter 140 value 118.138921  
## final value 118.138273   
## converged  
## # weights: 26  
## initial value 138.445817   
## iter 10 value 121.243093  
## iter 20 value 113.325017  
## iter 30 value 110.334253  
## iter 40 value 110.107845  
## iter 50 value 110.069065  
## iter 60 value 110.058597  
## iter 70 value 110.054724  
## iter 80 value 110.045282  
## iter 90 value 110.038628  
## iter 100 value 110.033148  
## final value 110.032752   
## converged  
## # weights: 26  
## initial value 141.220244   
## iter 10 value 126.138209  
## iter 20 value 120.519772  
## iter 30 value 116.398564  
## iter 40 value 115.498075  
## iter 50 value 114.491192  
## iter 60 value 114.481286  
## iter 70 value 114.477348  
## iter 80 value 114.477028  
## iter 90 value 114.029553  
## iter 100 value 113.163762  
## iter 110 value 111.955536  
## iter 120 value 111.662141  
## iter 130 value 111.655426  
## iter 140 value 111.653479  
## iter 150 value 111.652150  
## iter 160 value 111.651037  
## iter 170 value 111.649899  
## final value 111.649704   
## converged  
## # weights: 26  
## initial value 136.566948   
## iter 10 value 115.614474  
## iter 20 value 110.468273  
## iter 30 value 108.340489  
## iter 40 value 107.791664  
## iter 50 value 107.672467  
## iter 60 value 107.666616  
## iter 70 value 107.663657  
## iter 80 value 107.663389  
## iter 80 value 107.663389  
## final value 107.663389   
## converged  
## # weights: 38  
## initial value 137.446478   
## iter 10 value 133.937901  
## iter 20 value 133.937218  
## iter 30 value 133.936738  
## final value 133.936638   
## converged  
## # weights: 38  
## initial value 184.442349   
## iter 10 value 135.982269  
## iter 20 value 134.823281  
## iter 30 value 130.834100  
## iter 40 value 130.368292  
## iter 50 value 124.717359  
## iter 60 value 123.315918  
## iter 70 value 121.586665  
## iter 80 value 120.436995  
## iter 90 value 120.225762  
## iter 100 value 120.219292  
## iter 110 value 120.103626  
## iter 120 value 118.275324  
## iter 130 value 112.821395  
## iter 140 value 110.491221  
## iter 150 value 108.886932  
## iter 160 value 108.641886  
## iter 170 value 108.606664  
## iter 180 value 108.584865  
## iter 190 value 108.571584  
## iter 200 value 108.570767  
## iter 210 value 108.568412  
## iter 220 value 108.565265  
## iter 230 value 108.565001  
## iter 240 value 108.564700  
## final value 108.564683   
## converged  
## # weights: 38  
## initial value 198.969599   
## iter 10 value 131.869914  
## iter 20 value 128.186605  
## iter 30 value 128.144069  
## iter 40 value 127.306381  
## iter 50 value 127.132889  
## iter 60 value 127.131503  
## iter 70 value 127.129525  
## iter 80 value 126.474466  
## iter 90 value 119.638999  
## iter 100 value 111.515294  
## iter 110 value 111.123923  
## iter 120 value 107.829574  
## iter 130 value 105.983365  
## iter 140 value 105.372992  
## iter 150 value 104.949183  
## iter 160 value 104.508644  
## iter 170 value 104.471699  
## iter 180 value 104.463089  
## iter 190 value 104.282384  
## iter 200 value 103.215317  
## iter 210 value 96.708394  
## iter 220 value 89.288530  
## iter 230 value 85.556954  
## iter 240 value 85.232654  
## iter 250 value 85.168755  
## iter 260 value 84.683687  
## iter 270 value 84.641539  
## iter 280 value 84.629811  
## iter 290 value 84.607239  
## iter 300 value 84.585185  
## final value 84.585185   
## stopped after 300 iterations  
## # weights: 38  
## initial value 308.139691   
## iter 10 value 133.776331  
## iter 20 value 133.764135  
## iter 30 value 132.708157  
## iter 40 value 132.705590  
## iter 50 value 132.703282  
## iter 60 value 131.271308  
## iter 70 value 130.238157  
## iter 80 value 110.366997  
## iter 90 value 107.370381  
## iter 100 value 107.362052  
## iter 110 value 107.357079  
## iter 120 value 105.728136  
## iter 130 value 104.959850  
## iter 140 value 104.918036  
## iter 150 value 104.899782  
## iter 160 value 104.815654  
## iter 170 value 104.795560  
## final value 104.791348   
## converged  
## # weights: 38  
## initial value 141.906845   
## iter 10 value 120.206136  
## iter 20 value 112.490695  
## iter 30 value 111.203081  
## iter 40 value 110.641381  
## iter 50 value 110.334330  
## iter 60 value 110.299399  
## iter 70 value 110.273768  
## iter 80 value 110.257533  
## iter 90 value 110.245691  
## iter 100 value 110.174763  
## iter 110 value 107.754719  
## iter 120 value 103.997515  
## iter 130 value 98.443606  
## iter 140 value 97.756390  
## iter 150 value 97.710280  
## iter 160 value 97.672002  
## iter 170 value 97.659697  
## iter 180 value 97.657859  
## iter 180 value 97.657859  
## final value 97.657859   
## converged  
## # weights: 38  
## initial value 139.085984   
## iter 10 value 135.029005  
## iter 20 value 134.973661  
## iter 30 value 134.972492  
## iter 40 value 134.971756  
## final value 134.971703   
## converged  
## # weights: 38  
## initial value 182.857273   
## iter 10 value 134.790986  
## iter 20 value 131.631830  
## iter 30 value 120.654774  
## iter 40 value 118.498788  
## iter 50 value 117.266059  
## iter 60 value 116.234554  
## iter 70 value 115.990871  
## iter 80 value 115.124070  
## iter 90 value 112.235364  
## iter 100 value 108.583004  
## iter 110 value 105.262567  
## iter 120 value 104.654926  
## iter 130 value 103.457516  
## iter 140 value 102.889097  
## iter 150 value 102.730520  
## iter 160 value 102.712937  
## iter 170 value 102.700842  
## iter 180 value 102.695841  
## iter 190 value 102.694035  
## iter 200 value 102.692055  
## final value 102.691441   
## converged  
## # weights: 38  
## initial value 214.849693   
## iter 10 value 134.957778  
## iter 20 value 119.016852  
## iter 30 value 113.188442  
## iter 40 value 112.991457  
## iter 50 value 112.988869  
## iter 60 value 112.982932  
## iter 70 value 110.479509  
## iter 80 value 105.579223  
## iter 90 value 103.122220  
## iter 100 value 103.075729  
## iter 110 value 103.063991  
## iter 120 value 103.060592  
## iter 130 value 103.059762  
## iter 140 value 103.058590  
## iter 150 value 103.031687  
## iter 160 value 101.251219  
## iter 170 value 100.582375  
## iter 180 value 100.549759  
## iter 190 value 100.541003  
## iter 200 value 100.537186  
## iter 210 value 100.535603  
## iter 220 value 100.534866  
## iter 230 value 100.533977  
## iter 240 value 100.532704  
## iter 250 value 100.531879  
## final value 100.531048   
## converged  
## # weights: 38  
## initial value 152.326148   
## iter 10 value 135.981350  
## iter 20 value 135.166937  
## iter 30 value 134.166271  
## iter 40 value 133.715524  
## iter 50 value 133.694139  
## iter 60 value 133.671354  
## iter 70 value 133.346650  
## iter 80 value 133.334170  
## iter 90 value 133.332688  
## iter 100 value 133.332068  
## iter 110 value 133.331931  
## final value 133.331880   
## converged  
## # weights: 38  
## initial value 153.696936   
## iter 10 value 134.843933  
## iter 20 value 134.286042  
## iter 30 value 133.677501  
## iter 40 value 133.398662  
## iter 50 value 133.341336  
## iter 60 value 133.335585  
## iter 70 value 133.267650  
## iter 80 value 131.530460  
## iter 90 value 126.878815  
## iter 100 value 125.021803  
## iter 110 value 124.159490  
## iter 120 value 115.407893  
## iter 130 value 107.315205  
## iter 140 value 103.017703  
## iter 150 value 102.171929  
## iter 160 value 100.847721  
## iter 170 value 100.290959  
## iter 180 value 100.262942  
## iter 190 value 100.252362  
## iter 200 value 100.037096  
## iter 210 value 99.822521  
## iter 220 value 99.813862  
## iter 230 value 99.812166  
## iter 240 value 99.811981  
## iter 250 value 99.811725  
## iter 260 value 99.811519  
## final value 99.811515   
## converged  
## # weights: 50  
## initial value 208.135355   
## iter 10 value 133.944011  
## iter 20 value 133.786337  
## iter 30 value 127.627291  
## iter 40 value 110.021430  
## iter 50 value 104.585643  
## iter 60 value 103.186215  
## iter 70 value 103.160112  
## iter 80 value 103.140323  
## iter 90 value 103.136118  
## iter 100 value 102.884093  
## iter 110 value 101.892915  
## iter 120 value 97.704944  
## iter 130 value 94.094226  
## iter 140 value 93.661340  
## iter 150 value 93.274116  
## iter 160 value 92.750077  
## iter 170 value 88.225500  
## iter 180 value 85.332077  
## iter 190 value 84.650901  
## iter 200 value 84.454166  
## iter 210 value 84.277297  
## iter 220 value 84.155201  
## iter 230 value 84.103995  
## iter 240 value 83.997066  
## iter 250 value 80.624535  
## iter 260 value 70.170498  
## iter 270 value 66.495494  
## iter 280 value 64.300132  
## iter 290 value 63.032143  
## iter 300 value 61.933370  
## final value 61.933370   
## stopped after 300 iterations  
## # weights: 50  
## initial value 219.694882   
## iter 10 value 134.975919  
## iter 20 value 134.971097  
## iter 30 value 133.797012  
## iter 40 value 130.339000  
## iter 50 value 118.284050  
## iter 60 value 110.539229  
## iter 70 value 107.314883  
## iter 80 value 106.903244  
## iter 90 value 106.869057  
## iter 100 value 106.831898  
## iter 110 value 106.818199  
## iter 120 value 106.798317  
## iter 130 value 106.788978  
## iter 140 value 106.678885  
## iter 150 value 105.549141  
## iter 160 value 103.636376  
## iter 170 value 102.509391  
## iter 180 value 101.626469  
## iter 190 value 101.594776  
## iter 200 value 101.534503  
## iter 210 value 101.484112  
## iter 220 value 101.475161  
## iter 230 value 101.472942  
## iter 240 value 101.471752  
## iter 250 value 101.470998  
## final value 101.470874   
## converged  
## # weights: 50  
## initial value 201.062349   
## iter 10 value 134.172784  
## iter 20 value 134.062250  
## iter 30 value 126.112245  
## iter 40 value 123.481516  
## iter 50 value 119.294784  
## iter 60 value 113.757238  
## iter 70 value 112.529441  
## iter 80 value 111.390542  
## iter 90 value 111.202282  
## iter 100 value 111.185948  
## iter 110 value 111.182788  
## iter 120 value 111.180420  
## iter 130 value 111.180100  
## iter 140 value 111.179714  
## iter 150 value 111.179549  
## iter 160 value 111.179483  
## iter 160 value 111.179483  
## final value 111.179483   
## converged  
## # weights: 50  
## initial value 182.810597   
## iter 10 value 134.793995  
## iter 20 value 129.412557  
## iter 30 value 120.284190  
## iter 40 value 119.864626  
## iter 50 value 119.818073  
## iter 60 value 119.814552  
## iter 70 value 119.228114  
## iter 80 value 115.970052  
## iter 90 value 112.130708  
## iter 100 value 111.725242  
## iter 110 value 111.711686  
## iter 120 value 111.709341  
## iter 130 value 111.708979  
## iter 140 value 111.708766  
## iter 150 value 110.905574  
## iter 160 value 109.713353  
## iter 170 value 104.891124  
## iter 180 value 99.714173  
## iter 190 value 96.593889  
## iter 200 value 95.262403  
## iter 210 value 95.014319  
## iter 220 value 94.934364  
## iter 230 value 94.432725  
## iter 240 value 93.982644  
## iter 250 value 93.662260  
## iter 260 value 93.563350  
## iter 270 value 93.508366  
## iter 280 value 93.478868  
## iter 290 value 93.448939  
## iter 300 value 93.398369  
## final value 93.398369   
## stopped after 300 iterations  
## # weights: 50  
## initial value 145.652438   
## iter 10 value 135.532359  
## iter 20 value 131.991975  
## iter 30 value 126.298599  
## iter 40 value 117.498921  
## iter 50 value 114.560125  
## iter 60 value 111.198722  
## iter 70 value 108.371607  
## iter 80 value 106.971922  
## iter 90 value 105.693029  
## iter 100 value 104.621462  
## iter 110 value 103.951114  
## iter 120 value 103.621404  
## iter 130 value 103.592699  
## iter 140 value 103.585807  
## iter 150 value 103.584365  
## iter 160 value 103.583889  
## iter 170 value 103.582846  
## iter 180 value 103.173829  
## iter 190 value 96.688795  
## iter 200 value 92.345759  
## iter 210 value 91.052257  
## iter 220 value 89.265062  
## iter 230 value 88.467645  
## iter 240 value 88.396968  
## iter 250 value 88.302062  
## iter 260 value 88.207267  
## iter 270 value 88.179232  
## iter 280 value 88.163543  
## iter 290 value 87.555614  
## iter 300 value 87.457385  
## final value 87.457385   
## stopped after 300 iterations  
## # weights: 50  
## initial value 137.072289   
## iter 10 value 134.980014  
## iter 20 value 134.970100  
## iter 30 value 132.360705  
## iter 40 value 130.845076  
## iter 50 value 130.806381  
## iter 60 value 130.805720  
## iter 70 value 126.838075  
## iter 80 value 118.778379  
## iter 90 value 109.222070  
## iter 100 value 106.163691  
## iter 110 value 106.147430  
## iter 120 value 106.054718  
## iter 130 value 104.964865  
## iter 140 value 104.527605  
## iter 150 value 104.395418  
## iter 160 value 104.344963  
## iter 170 value 104.328811  
## iter 180 value 104.326383  
## iter 190 value 104.282560  
## iter 200 value 104.017953  
## iter 210 value 103.801561  
## iter 220 value 100.297670  
## iter 230 value 96.660231  
## iter 240 value 95.797215  
## iter 250 value 95.775107  
## iter 260 value 94.507435  
## iter 270 value 94.171903  
## iter 280 value 93.884853  
## iter 290 value 93.814309  
## iter 300 value 93.548840  
## final value 93.548840   
## stopped after 300 iterations  
## # weights: 50  
## initial value 174.462183   
## iter 10 value 134.796380  
## iter 20 value 134.538120  
## iter 30 value 122.652050  
## iter 40 value 122.548996  
## iter 50 value 122.491777  
## iter 60 value 122.046316  
## iter 70 value 118.042081  
## iter 80 value 117.096434  
## iter 90 value 116.502526  
## iter 100 value 116.000506  
## iter 110 value 114.084976  
## iter 120 value 107.517711  
## iter 130 value 104.837206  
## iter 140 value 104.501029  
## iter 150 value 104.396778  
## iter 160 value 104.124297  
## iter 170 value 102.496198  
## iter 180 value 98.818706  
## iter 190 value 87.054989  
## iter 200 value 78.932403  
## iter 210 value 77.953171  
## iter 220 value 77.588034  
## iter 230 value 77.551744  
## iter 240 value 77.501027  
## iter 250 value 77.168081  
## iter 260 value 77.044077  
## iter 270 value 77.008474  
## iter 280 value 76.985589  
## iter 290 value 76.978906  
## iter 300 value 76.976243  
## final value 76.976243   
## stopped after 300 iterations  
## # weights: 50  
## initial value 155.760404   
## iter 10 value 132.918578  
## iter 20 value 132.904784  
## iter 30 value 130.685126  
## iter 40 value 111.584269  
## iter 50 value 108.783992  
## iter 60 value 108.225559  
## iter 70 value 107.994580  
## iter 80 value 107.944313  
## iter 90 value 107.933900  
## iter 100 value 107.932724  
## iter 110 value 107.925198  
## iter 120 value 107.812891  
## iter 130 value 106.501553  
## iter 140 value 100.852958  
## iter 150 value 96.216330  
## iter 160 value 90.817994  
## iter 170 value 89.253509  
## iter 180 value 88.377946  
## iter 190 value 88.038257  
## iter 200 value 87.828315  
## iter 210 value 87.696499  
## iter 220 value 86.591482  
## iter 230 value 86.530443  
## iter 240 value 86.256617  
## iter 250 value 86.105894  
## iter 260 value 85.237451  
## iter 270 value 83.514505  
## iter 280 value 83.347562  
## iter 290 value 83.303995  
## iter 300 value 83.286992  
## final value 83.286992   
## stopped after 300 iterations  
## # weights: 50  
## initial value 144.052770   
## iter 10 value 134.452460  
## iter 20 value 131.617514  
## iter 30 value 125.356994  
## iter 40 value 121.408524  
## iter 50 value 119.917099  
## iter 60 value 119.885722  
## iter 70 value 119.875066  
## iter 80 value 118.748048  
## iter 90 value 118.484740  
## iter 100 value 118.232901  
## iter 110 value 117.351809  
## iter 120 value 116.127985  
## iter 130 value 115.474720  
## iter 140 value 114.518189  
## iter 150 value 111.603703  
## iter 160 value 111.166868  
## iter 170 value 111.024020  
## iter 180 value 110.491476  
## iter 190 value 110.442069  
## iter 200 value 110.418790  
## iter 210 value 109.418974  
## iter 220 value 107.745246  
## iter 230 value 107.070182  
## iter 240 value 106.833903  
## iter 250 value 106.715734  
## iter 260 value 106.679092  
## iter 270 value 106.638855  
## iter 280 value 106.624203  
## iter 290 value 106.617721  
## iter 300 value 106.614235  
## final value 106.614235   
## stopped after 300 iterations  
## # weights: 50  
## initial value 150.778098   
## iter 10 value 134.957128  
## iter 20 value 131.832660  
## iter 30 value 128.093136  
## iter 40 value 124.209154  
## iter 50 value 123.149534  
## iter 60 value 122.985566  
## iter 70 value 118.594173  
## iter 80 value 112.455239  
## iter 90 value 111.032425  
## iter 100 value 110.979089  
## iter 110 value 110.955857  
## iter 120 value 110.949347  
## iter 130 value 110.934728  
## iter 140 value 109.797945  
## iter 150 value 106.490015  
## iter 160 value 104.499095  
## iter 170 value 103.829696  
## iter 180 value 103.434760  
## iter 190 value 103.220433  
## iter 200 value 103.196061  
## iter 210 value 103.189076  
## iter 220 value 103.183187  
## iter 230 value 102.021013  
## iter 240 value 101.788405  
## iter 250 value 101.754677  
## iter 260 value 101.752861  
## iter 270 value 101.752004  
## iter 280 value 101.751846  
## final value 101.751833   
## converged  
## # weights: 62  
## initial value 140.292316   
## iter 10 value 128.968795  
## iter 20 value 125.242691  
## iter 30 value 123.837794  
## iter 40 value 123.812019  
## iter 50 value 123.802947  
## iter 60 value 123.795845  
## iter 70 value 123.791231  
## iter 80 value 123.745276  
## iter 90 value 122.550522  
## iter 100 value 116.146367  
## iter 110 value 114.551787  
## iter 120 value 113.932962  
## iter 130 value 113.780508  
## iter 140 value 113.733676  
## iter 150 value 113.677320  
## iter 160 value 113.381203  
## iter 170 value 113.039599  
## iter 180 value 112.972486  
## iter 190 value 112.458377  
## iter 200 value 99.105790  
## iter 210 value 87.688984  
## iter 220 value 86.026947  
## iter 230 value 85.755245  
## iter 240 value 85.582972  
## iter 250 value 85.261340  
## iter 260 value 85.100421  
## iter 270 value 85.008875  
## iter 280 value 84.793173  
## iter 290 value 84.705940  
## iter 300 value 83.910477  
## final value 83.910477   
## stopped after 300 iterations  
## # weights: 62  
## initial value 206.157615   
## iter 10 value 129.004373  
## iter 20 value 121.627320  
## iter 30 value 117.390785  
## iter 40 value 117.355816  
## iter 50 value 117.189626  
## iter 60 value 117.057047  
## iter 70 value 117.024918  
## iter 80 value 116.920068  
## iter 90 value 116.562499  
## iter 100 value 112.985117  
## iter 110 value 110.774749  
## iter 120 value 108.902231  
## iter 130 value 106.176408  
## iter 140 value 95.672426  
## iter 150 value 88.470485  
## iter 160 value 86.995394  
## iter 170 value 84.798728  
## iter 180 value 82.106156  
## iter 190 value 78.037776  
## iter 200 value 76.045525  
## iter 210 value 74.240470  
## iter 220 value 73.425977  
## iter 230 value 73.142372  
## iter 240 value 72.999449  
## iter 250 value 72.888684  
## iter 260 value 72.778207  
## iter 270 value 72.750459  
## iter 280 value 72.727720  
## final value 72.726072   
## converged  
## # weights: 62  
## initial value 134.206256   
## iter 10 value 119.673658  
## iter 20 value 119.615041  
## iter 30 value 118.358299  
## iter 40 value 115.841795  
## iter 50 value 110.587899  
## iter 60 value 108.870390  
## iter 70 value 108.840644  
## iter 80 value 108.831774  
## iter 90 value 108.823874  
## iter 100 value 108.821681  
## iter 110 value 108.820327  
## iter 120 value 108.819623  
## iter 130 value 108.819015  
## iter 140 value 108.725162  
## iter 150 value 106.766678  
## iter 160 value 98.539092  
## iter 170 value 95.594520  
## iter 180 value 94.260968  
## iter 190 value 94.119740  
## iter 200 value 94.055846  
## iter 210 value 93.823224  
## iter 220 value 92.296194  
## iter 230 value 83.088436  
## iter 240 value 77.795303  
## iter 250 value 74.571867  
## iter 260 value 74.235094  
## iter 270 value 73.811300  
## iter 280 value 73.504179  
## iter 290 value 73.331107  
## iter 300 value 73.283595  
## final value 73.283595   
## stopped after 300 iterations  
## # weights: 62  
## initial value 200.980691   
## iter 10 value 134.216016  
## iter 20 value 130.853403  
## iter 30 value 126.879827  
## iter 40 value 126.464613  
## iter 50 value 126.394711  
## iter 60 value 126.381470  
## iter 70 value 126.279783  
## iter 80 value 125.411503  
## iter 90 value 120.953091  
## iter 100 value 116.075657  
## iter 110 value 112.812346  
## iter 120 value 109.552778  
## iter 130 value 109.067032  
## iter 140 value 108.295039  
## iter 150 value 107.311278  
## iter 160 value 106.159080  
## iter 170 value 105.835810  
## iter 180 value 105.461351  
## iter 190 value 105.450352  
## iter 200 value 105.443777  
## iter 210 value 105.439908  
## iter 220 value 105.438156  
## iter 230 value 105.435364  
## iter 240 value 105.134102  
## iter 250 value 98.681721  
## iter 260 value 95.483988  
## iter 270 value 94.169968  
## iter 280 value 93.529260  
## iter 290 value 92.978813  
## iter 300 value 92.819337  
## final value 92.819337   
## stopped after 300 iterations  
## # weights: 62  
## initial value 143.892298   
## iter 10 value 124.753542  
## iter 20 value 115.737113  
## iter 30 value 111.618381  
## iter 40 value 110.786871  
## iter 50 value 110.726278  
## iter 60 value 110.696888  
## iter 70 value 110.678835  
## iter 80 value 110.670452  
## iter 90 value 110.639425  
## iter 100 value 110.562582  
## iter 110 value 103.856484  
## iter 120 value 102.316140  
## iter 130 value 101.749411  
## iter 140 value 101.481669  
## iter 150 value 100.995403  
## iter 160 value 100.659157  
## iter 170 value 100.562548  
## iter 180 value 99.940079  
## iter 190 value 99.327649  
## iter 200 value 99.300364  
## iter 210 value 99.282735  
## iter 220 value 99.269376  
## iter 230 value 99.264992  
## iter 240 value 99.047049  
## iter 250 value 98.586081  
## iter 260 value 98.407287  
## iter 270 value 98.261777  
## iter 280 value 95.976160  
## iter 290 value 88.814732  
## iter 300 value 86.450353  
## final value 86.450353   
## stopped after 300 iterations  
## # weights: 62  
## initial value 165.565381   
## final value 137.001170   
## converged  
## # weights: 62  
## initial value 182.019067   
## iter 10 value 134.660427  
## iter 20 value 133.110920  
## iter 30 value 132.662983  
## iter 40 value 132.652317  
## iter 50 value 132.485674  
## iter 60 value 132.022363  
## iter 70 value 131.321741  
## iter 80 value 130.719863  
## iter 90 value 124.553597  
## iter 100 value 120.140419  
## iter 110 value 119.557736  
## iter 120 value 119.523095  
## iter 130 value 118.905574  
## iter 140 value 116.363352  
## iter 150 value 116.044667  
## iter 160 value 115.026805  
## iter 170 value 114.635998  
## iter 180 value 114.240588  
## iter 190 value 114.038622  
## iter 200 value 114.025328  
## iter 210 value 114.018996  
## iter 220 value 114.007912  
## iter 230 value 112.587983  
## iter 240 value 110.830193  
## iter 250 value 110.811519  
## iter 260 value 110.805113  
## iter 270 value 110.800884  
## iter 280 value 110.642984  
## iter 290 value 110.287953  
## iter 300 value 109.894323  
## final value 109.894323   
## stopped after 300 iterations  
## # weights: 62  
## initial value 164.034633   
## iter 10 value 125.130530  
## iter 20 value 120.145104  
## iter 30 value 119.526232  
## iter 40 value 119.447111  
## iter 50 value 118.872525  
## iter 60 value 118.541541  
## iter 70 value 118.471941  
## iter 80 value 118.367111  
## iter 90 value 114.256865  
## iter 100 value 109.887446  
## iter 110 value 107.927064  
## iter 120 value 107.436129  
## iter 130 value 107.398789  
## iter 140 value 107.350051  
## iter 150 value 107.338734  
## iter 160 value 107.332306  
## iter 170 value 107.329956  
## iter 180 value 106.037957  
## iter 190 value 104.256688  
## iter 200 value 103.267615  
## iter 210 value 102.761527  
## iter 220 value 102.314163  
## iter 230 value 101.837953  
## iter 240 value 100.087525  
## iter 250 value 98.106287  
## iter 260 value 97.732992  
## iter 270 value 97.648241  
## iter 280 value 97.640039  
## iter 290 value 97.636487  
## iter 300 value 97.615836  
## final value 97.615836   
## stopped after 300 iterations  
## # weights: 62  
## initial value 140.372940   
## iter 10 value 134.002189  
## iter 20 value 125.866593  
## iter 30 value 121.173491  
## iter 40 value 115.137063  
## iter 50 value 113.294644  
## iter 60 value 112.772226  
## iter 70 value 112.470341  
## iter 80 value 112.382201  
## iter 90 value 112.364854  
## iter 100 value 112.344367  
## iter 110 value 112.341095  
## iter 120 value 111.788410  
## iter 130 value 108.348699  
## iter 140 value 105.406877  
## iter 150 value 104.045826  
## iter 160 value 103.967389  
## iter 170 value 103.952153  
## iter 180 value 103.905877  
## iter 190 value 103.718093  
## iter 200 value 101.946469  
## iter 210 value 96.039414  
## iter 220 value 91.734064  
## iter 230 value 90.971274  
## iter 240 value 89.279386  
## iter 250 value 88.849902  
## iter 260 value 88.820076  
## iter 270 value 88.788976  
## iter 280 value 88.772959  
## iter 290 value 88.770336  
## iter 300 value 88.769741  
## final value 88.769741   
## stopped after 300 iterations  
## # weights: 62  
## initial value 140.883862   
## iter 10 value 134.956836  
## iter 20 value 129.997910  
## iter 30 value 111.859528  
## iter 40 value 110.871679  
## iter 50 value 108.607532  
## iter 60 value 107.890511  
## iter 70 value 105.021362  
## iter 80 value 103.257227  
## iter 90 value 103.185492  
## iter 100 value 103.139049  
## iter 110 value 102.919436  
## iter 120 value 101.199577  
## iter 130 value 98.039577  
## iter 140 value 96.663948  
## iter 150 value 96.096829  
## iter 160 value 95.993750  
## iter 170 value 94.896074  
## iter 180 value 89.973512  
## iter 190 value 87.426006  
## iter 200 value 86.663219  
## iter 210 value 86.240178  
## iter 220 value 85.634531  
## iter 230 value 85.204500  
## iter 240 value 85.041285  
## iter 250 value 85.000710  
## iter 260 value 84.979020  
## iter 270 value 84.970744  
## iter 280 value 84.968385  
## iter 290 value 84.965137  
## iter 300 value 84.964482  
## final value 84.964482   
## stopped after 300 iterations  
## # weights: 74  
## initial value 129.824007   
## iter 10 value 118.373011  
## iter 20 value 105.231202  
## iter 30 value 98.216832  
## iter 40 value 94.107702  
## iter 50 value 93.174429  
## iter 60 value 92.628897  
## iter 70 value 90.128292  
## iter 80 value 89.941173  
## iter 90 value 89.916926  
## iter 100 value 89.901412  
## iter 110 value 89.896282  
## iter 120 value 89.722639  
## iter 130 value 89.475478  
## iter 140 value 87.475161  
## iter 150 value 85.283325  
## iter 160 value 84.714360  
## iter 170 value 84.612592  
## iter 180 value 84.500650  
## iter 190 value 84.428632  
## iter 200 value 84.277171  
## iter 210 value 84.251600  
## iter 220 value 84.166476  
## iter 230 value 84.000044  
## iter 240 value 83.455456  
## iter 250 value 82.808758  
## iter 260 value 82.296609  
## iter 270 value 82.258042  
## iter 280 value 82.242108  
## iter 290 value 82.238093  
## iter 300 value 82.235177  
## final value 82.235177   
## stopped after 300 iterations  
## # weights: 74  
## initial value 144.747012   
## iter 10 value 135.986319  
## iter 20 value 134.163053  
## iter 30 value 125.568550  
## iter 40 value 121.535825  
## iter 50 value 120.729558  
## iter 60 value 119.882413  
## iter 70 value 118.865451  
## iter 80 value 118.853530  
## iter 90 value 117.885163  
## iter 100 value 115.432494  
## iter 110 value 110.535280  
## iter 120 value 109.771275  
## iter 130 value 109.431950  
## iter 140 value 107.807358  
## iter 150 value 104.548891  
## iter 160 value 103.616834  
## iter 170 value 103.217316  
## iter 180 value 103.204444  
## iter 190 value 103.197595  
## iter 200 value 103.195883  
## iter 210 value 103.195593  
## iter 220 value 103.195003  
## iter 230 value 103.194835  
## iter 240 value 103.194571  
## final value 103.194569   
## converged  
## # weights: 74  
## initial value 143.806935   
## iter 10 value 131.888813  
## iter 20 value 125.920233  
## iter 30 value 118.812222  
## iter 40 value 112.385950  
## iter 50 value 110.181414  
## iter 60 value 110.088196  
## iter 70 value 109.653468  
## iter 80 value 108.997392  
## iter 90 value 107.316816  
## iter 100 value 103.954298  
## iter 110 value 102.834385  
## iter 120 value 102.800347  
## iter 130 value 102.542230  
## iter 140 value 102.187536  
## iter 150 value 100.128557  
## iter 160 value 98.905339  
## iter 170 value 98.654245  
## iter 180 value 98.635720  
## iter 190 value 98.624558  
## iter 200 value 98.621990  
## iter 210 value 98.621338  
## iter 220 value 98.619570  
## iter 230 value 98.619125  
## iter 240 value 98.618339  
## iter 250 value 98.618084  
## final value 98.618023   
## converged  
## # weights: 74  
## initial value 194.963677   
## iter 10 value 134.802253  
## iter 20 value 125.901038  
## iter 30 value 120.169873  
## iter 40 value 114.046335  
## iter 50 value 109.933771  
## iter 60 value 103.969153  
## iter 70 value 102.333384  
## iter 80 value 101.930676  
## iter 90 value 101.853049  
## iter 100 value 101.825051  
## iter 110 value 101.808784  
## iter 120 value 101.798831  
## iter 130 value 101.793673  
## iter 140 value 101.791112  
## iter 150 value 101.789672  
## iter 160 value 101.759544  
## iter 170 value 101.507647  
## iter 180 value 98.548631  
## iter 190 value 87.692657  
## iter 200 value 79.842620  
## iter 210 value 77.144404  
## iter 220 value 75.819880  
## iter 230 value 74.953209  
## iter 240 value 74.848349  
## iter 250 value 74.714542  
## iter 260 value 74.642846  
## iter 270 value 74.606423  
## iter 280 value 74.573691  
## iter 290 value 74.439433  
## iter 300 value 72.872527  
## final value 72.872527   
## stopped after 300 iterations  
## # weights: 74  
## initial value 319.786154   
## iter 10 value 135.536665  
## iter 20 value 134.364632  
## iter 30 value 132.925267  
## iter 40 value 132.660610  
## iter 50 value 132.560492  
## iter 60 value 132.559568  
## iter 70 value 132.559231  
## iter 80 value 132.559124  
## iter 90 value 131.375005  
## iter 100 value 127.898571  
## iter 110 value 119.059442  
## iter 120 value 116.981046  
## iter 130 value 113.334655  
## iter 140 value 105.603280  
## iter 150 value 100.845957  
## iter 160 value 98.090606  
## iter 170 value 93.721413  
## iter 180 value 88.042061  
## iter 190 value 87.480308  
## iter 200 value 87.280895  
## iter 210 value 85.940503  
## iter 220 value 83.909163  
## iter 230 value 80.830278  
## iter 240 value 79.938132  
## iter 250 value 78.868048  
## iter 260 value 78.077787  
## iter 270 value 76.319629  
## iter 280 value 75.502923  
## iter 290 value 75.397443  
## iter 300 value 75.023063  
## final value 75.023063   
## stopped after 300 iterations  
## # weights: 74  
## initial value 160.947820   
## iter 10 value 134.995982  
## iter 20 value 134.976506  
## iter 30 value 123.375271  
## iter 40 value 122.485465  
## iter 50 value 121.383653  
## iter 60 value 118.746773  
## iter 70 value 118.710306  
## iter 80 value 118.705966  
## iter 90 value 118.703933  
## iter 100 value 118.703271  
## iter 110 value 118.158262  
## iter 120 value 117.597429  
## iter 130 value 116.412287  
## iter 140 value 113.465024  
## iter 150 value 111.228835  
## iter 160 value 110.447085  
## iter 170 value 108.348888  
## iter 180 value 106.922349  
## iter 190 value 106.549746  
## iter 200 value 106.471188  
## iter 210 value 106.368066  
## iter 220 value 103.961368  
## iter 230 value 99.373665  
## iter 240 value 98.343367  
## iter 250 value 97.974279  
## iter 260 value 97.922489  
## iter 270 value 97.880449  
## iter 280 value 97.851238  
## iter 290 value 97.833830  
## iter 300 value 97.697418  
## final value 97.697418   
## stopped after 300 iterations  
## # weights: 74  
## initial value 137.104701   
## iter 10 value 133.759990  
## iter 20 value 133.194817  
## iter 30 value 125.583960  
## iter 40 value 117.583961  
## iter 50 value 117.151356  
## iter 60 value 115.896229  
## iter 70 value 114.594366  
## iter 80 value 114.538067  
## iter 90 value 114.521719  
## iter 100 value 111.772364  
## iter 110 value 107.408898  
## iter 120 value 107.135128  
## iter 130 value 106.988865  
## iter 140 value 106.975946  
## iter 150 value 106.973585  
## iter 160 value 106.970595  
## iter 170 value 106.969467  
## final value 106.969372   
## converged  
## # weights: 74  
## initial value 167.462717   
## iter 10 value 128.351464  
## iter 20 value 126.472040  
## iter 30 value 126.465909  
## iter 40 value 125.645516  
## iter 50 value 111.684655  
## iter 60 value 106.765593  
## iter 70 value 105.886726  
## iter 80 value 105.089920  
## iter 90 value 105.053322  
## iter 100 value 105.044724  
## iter 110 value 105.042543  
## iter 120 value 105.041200  
## iter 130 value 105.039444  
## iter 140 value 105.008026  
## iter 150 value 104.181270  
## iter 160 value 99.976100  
## iter 170 value 97.233983  
## iter 180 value 95.219964  
## iter 190 value 92.738726  
## iter 200 value 92.287027  
## iter 210 value 92.191788  
## iter 220 value 92.162163  
## iter 230 value 92.142797  
## iter 240 value 92.136032  
## iter 250 value 92.131151  
## iter 260 value 92.126986  
## iter 270 value 90.134167  
## iter 280 value 80.197626  
## iter 290 value 77.906368  
## iter 300 value 76.612280  
## final value 76.612280   
## stopped after 300 iterations  
## # weights: 74  
## initial value 148.241462   
## iter 10 value 135.983984  
## iter 20 value 135.014500  
## iter 30 value 134.397111  
## iter 40 value 116.704549  
## iter 50 value 115.127029  
## iter 60 value 110.081650  
## iter 70 value 108.192831  
## iter 80 value 105.769298  
## iter 90 value 102.931045  
## iter 100 value 99.222092  
## iter 110 value 98.320176  
## iter 120 value 97.861585  
## iter 130 value 97.633416  
## iter 140 value 96.313373  
## iter 150 value 95.826798  
## iter 160 value 95.609932  
## iter 170 value 95.328901  
## iter 180 value 95.008866  
## iter 190 value 93.934965  
## iter 200 value 88.225473  
## iter 210 value 85.044732  
## iter 220 value 84.574305  
## iter 230 value 83.840477  
## iter 240 value 83.261644  
## iter 250 value 82.808790  
## iter 260 value 82.657738  
## iter 270 value 82.586825  
## iter 280 value 82.554500  
## iter 290 value 82.544881  
## iter 300 value 82.542004  
## final value 82.542004   
## stopped after 300 iterations  
## # weights: 74  
## initial value 212.217955   
## iter 10 value 140.148295  
## iter 20 value 129.196605  
## iter 30 value 120.865141  
## iter 40 value 120.179070  
## iter 50 value 119.670046  
## iter 60 value 118.434124  
## iter 70 value 113.417123  
## iter 80 value 110.324809  
## iter 90 value 109.032467  
## iter 100 value 107.693089  
## iter 110 value 104.905735  
## iter 120 value 100.999910  
## iter 130 value 98.819054  
## iter 140 value 98.499037  
## iter 150 value 98.210800  
## iter 160 value 97.643750  
## iter 170 value 96.884894  
## iter 180 value 96.449979  
## iter 190 value 96.338857  
## iter 200 value 96.176559  
## iter 210 value 96.071813  
## iter 220 value 96.059552  
## iter 230 value 96.056894  
## iter 240 value 96.053413  
## iter 250 value 96.051791  
## iter 260 value 96.029790  
## iter 270 value 95.500410  
## iter 280 value 93.248151  
## iter 290 value 89.887280  
## iter 300 value 88.326213  
## final value 88.326213   
## stopped after 300 iterations  
## # weights: 86  
## initial value 166.714143   
## iter 10 value 131.291871  
## iter 20 value 129.856852  
## iter 30 value 129.838954  
## iter 40 value 129.835203  
## iter 50 value 129.831032  
## iter 60 value 121.906025  
## iter 70 value 115.687097  
## iter 80 value 107.991940  
## iter 90 value 100.290581  
## iter 100 value 96.670232  
## iter 110 value 96.115986  
## iter 120 value 93.033318  
## iter 130 value 89.966976  
## iter 140 value 83.020789  
## iter 150 value 75.596980  
## iter 160 value 74.827410  
## iter 170 value 74.594580  
## iter 180 value 74.247333  
## iter 190 value 70.987765  
## iter 200 value 68.125327  
## iter 210 value 67.379310  
## iter 220 value 67.169241  
## iter 230 value 67.111552  
## iter 240 value 67.071846  
## iter 250 value 67.046718  
## iter 260 value 66.966888  
## iter 270 value 66.552102  
## iter 280 value 66.390039  
## iter 290 value 66.043764  
## iter 300 value 65.360913  
## final value 65.360913   
## stopped after 300 iterations  
## # weights: 86  
## initial value 253.291939   
## iter 10 value 134.283674  
## iter 20 value 133.496458  
## iter 30 value 133.493702  
## iter 40 value 130.471907  
## iter 50 value 118.443403  
## iter 60 value 111.371506  
## iter 70 value 109.997998  
## iter 80 value 109.191002  
## iter 90 value 109.171516  
## iter 100 value 108.964413  
## iter 110 value 107.771262  
## iter 120 value 107.695137  
## iter 130 value 107.449770  
## iter 140 value 106.610639  
## iter 150 value 99.654852  
## iter 160 value 96.312435  
## iter 170 value 94.322765  
## iter 180 value 93.907132  
## iter 190 value 93.869041  
## iter 200 value 93.833844  
## iter 210 value 93.824608  
## iter 220 value 93.820555  
## iter 230 value 93.819455  
## iter 240 value 93.796686  
## iter 250 value 93.321263  
## iter 260 value 92.084571  
## iter 270 value 91.838053  
## iter 280 value 91.812044  
## iter 290 value 91.807946  
## iter 300 value 91.806555  
## final value 91.806555   
## stopped after 300 iterations  
## # weights: 86  
## initial value 152.482082   
## iter 10 value 127.821815  
## iter 20 value 116.290360  
## iter 30 value 108.315357  
## iter 40 value 107.491798  
## iter 50 value 107.312215  
## iter 60 value 107.250271  
## iter 70 value 107.197350  
## iter 80 value 107.055692  
## iter 90 value 105.986156  
## iter 100 value 105.918835  
## iter 110 value 105.856965  
## iter 120 value 105.845614  
## iter 130 value 105.768890  
## iter 140 value 105.688325  
## iter 150 value 105.097225  
## iter 160 value 103.816753  
## iter 170 value 103.712089  
## iter 180 value 103.252845  
## iter 190 value 101.474158  
## iter 200 value 99.503659  
## iter 210 value 96.958959  
## iter 220 value 96.356040  
## iter 230 value 95.538027  
## iter 240 value 94.702873  
## iter 250 value 93.909322  
## iter 260 value 93.808126  
## iter 270 value 93.786787  
## iter 280 value 91.807950  
## iter 290 value 89.252968  
## iter 300 value 86.844985  
## final value 86.844985   
## stopped after 300 iterations  
## # weights: 86  
## initial value 159.873563   
## iter 10 value 134.803686  
## iter 20 value 127.020436  
## iter 30 value 124.830219  
## iter 40 value 122.240425  
## iter 50 value 120.170256  
## iter 60 value 112.704359  
## iter 70 value 109.265994  
## iter 80 value 109.233931  
## iter 90 value 109.141059  
## iter 100 value 107.350908  
## iter 110 value 98.207698  
## iter 120 value 90.045457  
## iter 130 value 88.327147  
## iter 140 value 88.196613  
## iter 150 value 88.010150  
## iter 160 value 85.572930  
## iter 170 value 81.322599  
## iter 180 value 78.266635  
## iter 190 value 77.736926  
## iter 200 value 77.624668  
## iter 210 value 77.514483  
## iter 220 value 77.460988  
## iter 230 value 77.186147  
## iter 240 value 74.802868  
## iter 250 value 70.937520  
## iter 260 value 69.147703  
## iter 270 value 66.835337  
## iter 280 value 66.188281  
## iter 290 value 64.026340  
## iter 300 value 58.517803  
## final value 58.517803   
## stopped after 300 iterations  
## # weights: 86  
## initial value 141.837001   
## iter 10 value 125.633733  
## iter 20 value 116.857966  
## iter 30 value 113.930146  
## iter 40 value 113.770571  
## iter 50 value 113.086743  
## iter 60 value 112.002808  
## iter 70 value 110.678733  
## iter 80 value 109.468022  
## iter 90 value 109.436486  
## iter 100 value 109.429917  
## iter 110 value 109.425186  
## iter 120 value 109.422598  
## iter 130 value 109.199249  
## iter 140 value 107.646196  
## iter 150 value 105.766972  
## iter 160 value 101.701262  
## iter 170 value 100.153294  
## iter 180 value 98.463679  
## iter 190 value 98.434619  
## iter 200 value 98.260085  
## iter 210 value 97.975757  
## iter 220 value 97.927984  
## iter 230 value 97.918619  
## iter 240 value 97.912200  
## iter 250 value 97.910137  
## iter 260 value 97.907871  
## iter 270 value 97.797808  
## iter 280 value 95.027285  
## iter 290 value 94.473053  
## iter 300 value 94.193097  
## final value 94.193097   
## stopped after 300 iterations  
## # weights: 86  
## initial value 141.618360   
## iter 10 value 118.445148  
## iter 20 value 115.628672  
## iter 30 value 115.329836  
## iter 40 value 115.316811  
## iter 50 value 115.309067  
## iter 60 value 114.621443  
## iter 70 value 109.945022  
## iter 80 value 106.527856  
## iter 90 value 102.403578  
## iter 100 value 101.375953  
## iter 110 value 101.267474  
## iter 120 value 101.216444  
## iter 130 value 99.861778  
## iter 140 value 97.924835  
## iter 150 value 97.283294  
## iter 160 value 97.032740  
## iter 170 value 96.021617  
## iter 180 value 95.979657  
## iter 190 value 95.955968  
## iter 200 value 95.940887  
## iter 210 value 95.931953  
## iter 220 value 95.828817  
## iter 230 value 94.720700  
## iter 240 value 89.156181  
## iter 250 value 84.217324  
## iter 260 value 82.552480  
## iter 270 value 82.069752  
## iter 280 value 81.827474  
## iter 290 value 80.769687  
## iter 300 value 77.515364  
## final value 77.515364   
## stopped after 300 iterations  
## # weights: 86  
## initial value 144.360571   
## iter 10 value 130.724325  
## iter 20 value 118.806821  
## iter 30 value 114.148476  
## iter 40 value 110.964492  
## iter 50 value 110.603961  
## iter 60 value 110.600164  
## iter 70 value 110.593463  
## iter 80 value 110.085539  
## iter 90 value 109.912319  
## iter 100 value 109.648851  
## iter 110 value 109.391837  
## iter 120 value 109.321712  
## iter 130 value 108.830161  
## iter 140 value 105.976791  
## iter 150 value 105.346773  
## iter 160 value 104.745630  
## iter 170 value 104.678329  
## iter 180 value 104.585167  
## iter 190 value 102.669356  
## iter 200 value 97.018470  
## iter 210 value 88.844198  
## iter 220 value 86.038297  
## iter 230 value 85.251656  
## iter 240 value 83.817002  
## iter 250 value 83.285536  
## iter 260 value 82.745527  
## iter 270 value 82.623105  
## iter 280 value 82.484191  
## iter 290 value 82.232973  
## iter 300 value 82.039331  
## final value 82.039331   
## stopped after 300 iterations  
## # weights: 86  
## initial value 226.214109   
## iter 10 value 124.476179  
## iter 20 value 115.990566  
## iter 30 value 112.577547  
## iter 40 value 112.401501  
## iter 50 value 111.057496  
## iter 60 value 107.696793  
## iter 70 value 105.149821  
## iter 80 value 104.241726  
## iter 90 value 104.160672  
## iter 100 value 104.116902  
## iter 110 value 104.097690  
## iter 120 value 104.083204  
## iter 130 value 104.081752  
## iter 140 value 103.617244  
## iter 150 value 103.103977  
## iter 160 value 103.079126  
## iter 170 value 103.078268  
## iter 180 value 103.077930  
## iter 190 value 103.077799  
## iter 190 value 103.077798  
## final value 103.077798   
## converged  
## # weights: 86  
## initial value 153.733083   
## iter 10 value 130.639778  
## iter 20 value 125.721292  
## iter 30 value 120.805310  
## iter 40 value 119.143565  
## iter 50 value 117.423777  
## iter 60 value 117.032032  
## iter 70 value 116.882276  
## iter 80 value 116.839906  
## iter 90 value 116.772580  
## iter 100 value 115.780752  
## iter 110 value 115.330033  
## iter 120 value 115.204494  
## iter 130 value 115.142993  
## iter 140 value 115.093653  
## iter 150 value 115.090746  
## iter 160 value 115.065219  
## iter 170 value 114.275898  
## iter 180 value 109.584891  
## iter 190 value 107.491711  
## iter 200 value 107.126246  
## iter 210 value 106.603771  
## iter 220 value 106.210097  
## iter 230 value 105.862949  
## iter 240 value 105.471739  
## iter 250 value 105.397027  
## iter 260 value 105.351546  
## iter 270 value 103.994658  
## iter 280 value 100.500934  
## iter 290 value 98.999140  
## iter 300 value 97.594353  
## final value 97.594353   
## stopped after 300 iterations  
## # weights: 86  
## initial value 138.370058   
## iter 10 value 131.691181  
## iter 20 value 119.958642  
## iter 30 value 104.083707  
## iter 40 value 98.024792  
## iter 50 value 97.323466  
## iter 60 value 96.869794  
## iter 70 value 96.505932  
## iter 80 value 96.244445  
## iter 90 value 96.009371  
## iter 100 value 95.914422  
## iter 110 value 95.329194  
## iter 120 value 95.219182  
## iter 130 value 95.182311  
## iter 140 value 95.173167  
## iter 150 value 95.165718  
## iter 160 value 95.163883  
## iter 170 value 95.162472  
## iter 180 value 95.161278  
## iter 190 value 95.039999  
## iter 200 value 94.788021  
## iter 210 value 90.386856  
## iter 220 value 87.339351  
## iter 230 value 86.747335  
## iter 240 value 86.515762  
## iter 250 value 86.354483  
## iter 260 value 86.322876  
## iter 270 value 84.044368  
## iter 280 value 80.942514  
## iter 290 value 76.173020  
## iter 300 value 74.698295  
## final value 74.698295   
## stopped after 300 iterations  
## # weights: 98  
## initial value 133.781061   
## iter 10 value 123.765352  
## iter 20 value 115.928112  
## iter 30 value 112.704068  
## iter 40 value 109.836176  
## iter 50 value 109.154507  
## iter 60 value 108.300030  
## iter 70 value 108.291621  
## iter 80 value 108.288925  
## iter 90 value 108.286491  
## iter 100 value 108.285397  
## iter 110 value 106.159751  
## iter 120 value 101.894152  
## iter 130 value 98.628306  
## iter 140 value 98.066255  
## iter 150 value 97.773638  
## iter 160 value 96.865413  
## iter 170 value 96.673999  
## iter 180 value 94.870880  
## iter 190 value 93.937745  
## iter 200 value 93.219836  
## iter 210 value 92.330429  
## iter 220 value 92.133055  
## iter 230 value 91.513376  
## iter 240 value 91.182179  
## iter 250 value 91.137096  
## iter 260 value 91.038163  
## iter 270 value 88.208474  
## iter 280 value 80.608389  
## iter 290 value 79.164538  
## iter 300 value 78.072762  
## final value 78.072762   
## stopped after 300 iterations  
## # weights: 98  
## initial value 210.779540   
## iter 10 value 133.573933  
## iter 20 value 128.856258  
## iter 30 value 120.800749  
## iter 40 value 116.805089  
## iter 50 value 114.794316  
## iter 60 value 114.645531  
## iter 70 value 114.593124  
## iter 80 value 114.561882  
## iter 90 value 114.543096  
## iter 100 value 114.535167  
## iter 110 value 114.352242  
## iter 120 value 113.279081  
## iter 130 value 108.755223  
## iter 140 value 107.277627  
## iter 150 value 105.077711  
## iter 160 value 103.801404  
## iter 170 value 96.973917  
## iter 180 value 92.845564  
## iter 190 value 91.526236  
## iter 200 value 91.135811  
## iter 210 value 91.009876  
## iter 220 value 90.763031  
## iter 230 value 90.119451  
## iter 240 value 87.991524  
## iter 250 value 84.325793  
## iter 260 value 81.579867  
## iter 270 value 79.907192  
## iter 280 value 78.611412  
## iter 290 value 77.703186  
## iter 300 value 77.162309  
## final value 77.162309   
## stopped after 300 iterations  
## # weights: 98  
## initial value 133.893879   
## iter 10 value 122.623453  
## iter 20 value 118.014795  
## iter 30 value 115.899410  
## iter 40 value 114.095254  
## iter 50 value 113.970444  
## iter 60 value 113.960610  
## iter 70 value 113.955248  
## iter 80 value 113.195657  
## iter 90 value 111.167326  
## iter 100 value 109.216545  
## iter 110 value 106.935761  
## iter 120 value 102.926005  
## iter 130 value 99.655773  
## iter 140 value 99.318231  
## iter 150 value 99.256409  
## iter 160 value 99.181265  
## iter 170 value 99.155716  
## iter 180 value 98.937879  
## iter 190 value 98.835638  
## iter 200 value 98.772093  
## iter 210 value 98.417881  
## iter 220 value 95.557865  
## iter 230 value 93.818166  
## iter 240 value 92.561573  
## iter 250 value 92.201859  
## iter 260 value 91.873722  
## iter 270 value 91.758370  
## iter 280 value 91.659995  
## iter 290 value 91.608663  
## iter 300 value 91.512630  
## final value 91.512630   
## stopped after 300 iterations  
## # weights: 98  
## initial value 256.470846   
## iter 10 value 134.799195  
## iter 20 value 130.990490  
## iter 30 value 122.901684  
## iter 40 value 118.267722  
## iter 50 value 117.937301  
## iter 60 value 117.785890  
## iter 70 value 117.098325  
## iter 80 value 116.758387  
## iter 90 value 116.105335  
## iter 100 value 115.869559  
## iter 110 value 115.654521  
## iter 120 value 115.114344  
## iter 130 value 115.016635  
## iter 140 value 114.976692  
## iter 150 value 114.938875  
## iter 160 value 113.539636  
## iter 170 value 109.538049  
## iter 180 value 107.647290  
## iter 190 value 106.935565  
## iter 200 value 104.133876  
## iter 210 value 103.191702  
## iter 220 value 103.175541  
## iter 230 value 103.154971  
## iter 240 value 103.145495  
## iter 250 value 103.113969  
## iter 260 value 102.429233  
## iter 270 value 102.214076  
## iter 280 value 102.206190  
## iter 290 value 102.204590  
## iter 300 value 102.203726  
## final value 102.203726   
## stopped after 300 iterations  
## # weights: 98  
## initial value 140.871766   
## iter 10 value 131.454222  
## iter 20 value 117.071052  
## iter 30 value 113.383205  
## iter 40 value 112.278947  
## iter 50 value 111.619464  
## iter 60 value 109.815344  
## iter 70 value 109.094379  
## iter 80 value 107.516861  
## iter 90 value 106.609378  
## iter 100 value 105.471535  
## iter 110 value 104.546553  
## iter 120 value 104.332313  
## iter 130 value 104.122161  
## iter 140 value 103.851967  
## iter 150 value 102.862543  
## iter 160 value 102.281268  
## iter 170 value 102.254612  
## iter 180 value 102.233978  
## iter 190 value 101.840675  
## iter 200 value 99.671321  
## iter 210 value 97.065044  
## iter 220 value 90.645562  
## iter 230 value 88.413502  
## iter 240 value 87.262633  
## iter 250 value 85.084833  
## iter 260 value 83.932461  
## iter 270 value 79.481726  
## iter 280 value 77.840827  
## iter 290 value 77.696406  
## iter 300 value 77.559617  
## final value 77.559617   
## stopped after 300 iterations  
## # weights: 98  
## initial value 331.505907   
## iter 10 value 137.005878  
## iter 20 value 134.589622  
## iter 30 value 130.292571  
## iter 40 value 116.260257  
## iter 50 value 108.871392  
## iter 60 value 106.706717  
## iter 70 value 105.283275  
## iter 80 value 104.342331  
## iter 90 value 104.208028  
## iter 100 value 103.957528  
## iter 110 value 101.032169  
## iter 120 value 98.941633  
## iter 130 value 97.107218  
## iter 140 value 91.424622  
## iter 150 value 90.212348  
## iter 160 value 89.293394  
## iter 170 value 89.235943  
## iter 180 value 89.217114  
## iter 190 value 89.209728  
## iter 200 value 89.204134  
## iter 210 value 89.203331  
## iter 220 value 89.202992  
## iter 230 value 89.185119  
## iter 240 value 88.764143  
## iter 250 value 85.973386  
## iter 260 value 83.258467  
## iter 270 value 79.416551  
## iter 280 value 72.231752  
## iter 290 value 68.942010  
## iter 300 value 65.183832  
## final value 65.183832   
## stopped after 300 iterations  
## # weights: 98  
## initial value 144.907980   
## iter 10 value 130.014637  
## iter 20 value 123.572729  
## iter 30 value 118.381957  
## iter 40 value 111.231870  
## iter 50 value 109.643858  
## iter 60 value 108.774588  
## iter 70 value 108.190422  
## iter 80 value 106.301188  
## iter 90 value 105.218248  
## iter 100 value 104.494556  
## iter 110 value 103.048429  
## iter 120 value 101.510737  
## iter 130 value 100.648923  
## iter 140 value 99.979700  
## iter 150 value 99.134350  
## iter 160 value 96.926652  
## iter 170 value 92.839537  
## iter 180 value 90.032478  
## iter 190 value 89.263294  
## iter 200 value 89.068796  
## iter 210 value 88.736407  
## iter 220 value 88.308891  
## iter 230 value 87.524622  
## iter 240 value 86.548203  
## iter 250 value 86.139528  
## iter 260 value 86.031768  
## iter 270 value 86.010144  
## iter 280 value 86.001291  
## iter 290 value 83.889382  
## iter 300 value 80.646775  
## final value 80.646775   
## stopped after 300 iterations  
## # weights: 98  
## initial value 270.502106   
## iter 10 value 129.293150  
## iter 20 value 120.322879  
## iter 30 value 114.228313  
## iter 40 value 108.337395  
## iter 50 value 106.200169  
## iter 60 value 105.812536  
## iter 70 value 105.751318  
## iter 80 value 105.745291  
## iter 90 value 105.223547  
## iter 100 value 104.419124  
## iter 110 value 102.336798  
## iter 120 value 99.968561  
## iter 130 value 98.950629  
## iter 140 value 98.849690  
## iter 150 value 98.789859  
## iter 160 value 98.321935  
## iter 170 value 97.178325  
## iter 180 value 94.808124  
## iter 190 value 93.416167  
## iter 200 value 93.315972  
## iter 210 value 93.278178  
## iter 220 value 93.231811  
## iter 230 value 93.131162  
## iter 240 value 89.339862  
## iter 250 value 81.614070  
## iter 260 value 78.312949  
## iter 270 value 76.993911  
## iter 280 value 76.811033  
## iter 290 value 76.142111  
## iter 300 value 74.457371  
## final value 74.457371   
## stopped after 300 iterations  
## # weights: 98  
## initial value 287.089984   
## iter 10 value 120.524328  
## iter 20 value 114.323052  
## iter 30 value 112.982075  
## iter 40 value 111.937209  
## iter 50 value 111.138070  
## iter 60 value 110.723823  
## iter 70 value 110.578863  
## iter 80 value 109.145361  
## iter 90 value 107.523844  
## iter 100 value 106.792879  
## iter 110 value 106.270655  
## iter 120 value 106.234820  
## iter 130 value 105.854799  
## iter 140 value 103.671157  
## iter 150 value 103.293394  
## iter 160 value 103.221946  
## iter 170 value 103.020610  
## iter 180 value 102.601800  
## iter 190 value 102.575841  
## iter 200 value 102.571821  
## iter 210 value 102.568362  
## iter 220 value 102.527801  
## iter 230 value 102.238159  
## iter 240 value 98.225436  
## iter 250 value 96.865709  
## iter 260 value 96.499565  
## iter 270 value 96.246432  
## iter 280 value 95.687796  
## iter 290 value 93.487911  
## iter 300 value 91.215812  
## final value 91.215812   
## stopped after 300 iterations  
## # weights: 98  
## initial value 220.799186   
## iter 10 value 132.422974  
## iter 20 value 121.124515  
## iter 30 value 118.219442  
## iter 40 value 117.711776  
## iter 50 value 117.242840  
## iter 60 value 115.648569  
## iter 70 value 114.062483  
## iter 80 value 113.574883  
## iter 90 value 113.567741  
## iter 100 value 113.559555  
## iter 110 value 113.557443  
## iter 120 value 113.444463  
## iter 130 value 109.171996  
## iter 140 value 106.514593  
## iter 150 value 105.447247  
## iter 160 value 102.963022  
## iter 170 value 101.307366  
## iter 180 value 101.214826  
## iter 190 value 101.173883  
## iter 200 value 101.153545  
## iter 210 value 100.989828  
## iter 220 value 100.600944  
## iter 230 value 98.023802  
## iter 240 value 88.041734  
## iter 250 value 84.533871  
## iter 260 value 78.630147  
## iter 270 value 77.128500  
## iter 280 value 77.024786  
## iter 290 value 76.868912  
## iter 300 value 76.087875  
## final value 76.087875   
## stopped after 300 iterations  
## # weights: 110  
## initial value 257.320122   
## iter 10 value 131.197948  
## iter 20 value 126.742553  
## iter 30 value 121.765165  
## iter 40 value 113.570898  
## iter 50 value 106.537244  
## iter 60 value 104.345608  
## iter 70 value 103.025883  
## iter 80 value 101.380160  
## iter 90 value 101.305585  
## iter 100 value 101.299833  
## iter 110 value 101.297171  
## iter 120 value 101.294892  
## iter 130 value 100.432343  
## iter 140 value 95.948007  
## iter 150 value 93.993947  
## iter 160 value 93.761664  
## iter 170 value 93.750218  
## iter 180 value 93.737810  
## iter 190 value 93.732703  
## iter 200 value 93.713580  
## iter 210 value 93.462834  
## iter 220 value 91.010953  
## iter 230 value 82.870529  
## iter 240 value 76.561814  
## iter 250 value 73.673814  
## iter 260 value 73.181961  
## iter 270 value 72.169255  
## iter 280 value 70.527328  
## iter 290 value 69.615395  
## iter 300 value 69.437049  
## final value 69.437049   
## stopped after 300 iterations  
## # weights: 110  
## initial value 138.475997   
## iter 10 value 131.222436  
## iter 20 value 120.943192  
## iter 30 value 114.684689  
## iter 40 value 113.951538  
## iter 50 value 111.165830  
## iter 60 value 106.629292  
## iter 70 value 104.785464  
## iter 80 value 100.829223  
## iter 90 value 99.373244  
## iter 100 value 99.282570  
## iter 110 value 99.207279  
## iter 120 value 99.169680  
## iter 130 value 99.105781  
## iter 140 value 95.697303  
## iter 150 value 94.933445  
## iter 160 value 94.843888  
## iter 170 value 94.834831  
## iter 180 value 94.828732  
## iter 190 value 94.679552  
## iter 200 value 93.574947  
## iter 210 value 89.751965  
## iter 220 value 89.049070  
## iter 230 value 86.167517  
## iter 240 value 81.190442  
## iter 250 value 78.090015  
## iter 260 value 73.275472  
## iter 270 value 70.520041  
## iter 280 value 68.039562  
## iter 290 value 67.280063  
## iter 300 value 67.075931  
## final value 67.075931   
## stopped after 300 iterations  
## # weights: 110  
## initial value 320.335214   
## iter 10 value 134.171000  
## iter 20 value 127.821872  
## iter 30 value 121.087570  
## iter 40 value 120.729887  
## iter 50 value 118.016291  
## iter 60 value 113.564404  
## iter 70 value 111.088130  
## iter 80 value 110.125132  
## iter 90 value 107.313663  
## iter 100 value 105.353898  
## iter 110 value 103.818955  
## iter 120 value 103.728112  
## iter 130 value 103.577845  
## iter 140 value 103.361875  
## iter 150 value 103.303671  
## iter 160 value 103.275137  
## iter 170 value 103.263570  
## iter 180 value 103.258235  
## iter 190 value 103.137114  
## iter 200 value 102.199468  
## iter 210 value 98.300142  
## iter 220 value 94.794750  
## iter 230 value 94.037462  
## iter 240 value 93.152549  
## iter 250 value 91.792900  
## iter 260 value 89.060588  
## iter 270 value 85.630744  
## iter 280 value 83.478355  
## iter 290 value 80.789214  
## iter 300 value 79.523893  
## final value 79.523893   
## stopped after 300 iterations  
## # weights: 110  
## initial value 142.980745   
## iter 10 value 130.336836  
## iter 20 value 119.720435  
## iter 30 value 114.026809  
## iter 40 value 110.910321  
## iter 50 value 110.312944  
## iter 60 value 109.013862  
## iter 70 value 108.796482  
## iter 80 value 108.209024  
## iter 90 value 107.960164  
## iter 100 value 107.883645  
## iter 110 value 107.739301  
## iter 120 value 107.191736  
## iter 130 value 102.925637  
## iter 140 value 101.548771  
## iter 150 value 101.303963  
## iter 160 value 100.931890  
## iter 170 value 100.554903  
## iter 180 value 100.069706  
## iter 190 value 99.850016  
## iter 200 value 99.694004  
## iter 210 value 99.523103  
## iter 220 value 99.427099  
## iter 230 value 99.087292  
## iter 240 value 98.718750  
## iter 250 value 97.632082  
## iter 260 value 96.696091  
## iter 270 value 96.459156  
## iter 280 value 96.433664  
## iter 290 value 96.416213  
## iter 300 value 96.383208  
## final value 96.383208   
## stopped after 300 iterations  
## # weights: 110  
## initial value 139.650757   
## iter 10 value 135.543266  
## iter 20 value 132.163841  
## iter 30 value 121.486820  
## iter 40 value 110.347278  
## iter 50 value 108.456181  
## iter 60 value 103.309730  
## iter 70 value 99.047640  
## iter 80 value 98.385147  
## iter 90 value 98.347273  
## iter 100 value 98.322931  
## iter 110 value 98.317142  
## iter 120 value 98.314578  
## iter 130 value 98.313386  
## iter 140 value 98.311530  
## iter 150 value 97.964095  
## iter 160 value 96.122144  
## iter 170 value 93.311884  
## iter 180 value 90.968793  
## iter 190 value 89.596590  
## iter 200 value 88.582014  
## iter 210 value 87.518117  
## iter 220 value 86.970476  
## iter 230 value 86.843069  
## iter 240 value 86.817901  
## iter 250 value 86.810810  
## iter 260 value 86.771526  
## iter 270 value 86.133403  
## iter 280 value 83.432838  
## iter 290 value 82.616055  
## iter 300 value 81.850211  
## final value 81.850211   
## stopped after 300 iterations  
## # weights: 110  
## initial value 139.802466   
## iter 10 value 127.152460  
## iter 20 value 121.979240  
## iter 30 value 116.101557  
## iter 40 value 114.929924  
## iter 50 value 114.705822  
## iter 60 value 114.481788  
## iter 70 value 113.499780  
## iter 80 value 112.622699  
## iter 90 value 112.338504  
## iter 100 value 111.997120  
## iter 110 value 111.728642  
## iter 120 value 111.687725  
## iter 130 value 111.643887  
## iter 140 value 111.622254  
## iter 150 value 111.612921  
## iter 160 value 111.468952  
## iter 170 value 111.340377  
## iter 180 value 111.298238  
## iter 190 value 111.284722  
## iter 200 value 111.281314  
## iter 210 value 111.240642  
## iter 220 value 110.601869  
## iter 230 value 106.318382  
## iter 240 value 98.948466  
## iter 250 value 98.047847  
## iter 260 value 95.566225  
## iter 270 value 94.187969  
## iter 280 value 88.072487  
## iter 290 value 83.439444  
## iter 300 value 80.573672  
## final value 80.573672   
## stopped after 300 iterations  
## # weights: 110  
## initial value 308.067540   
## iter 10 value 126.128819  
## iter 20 value 123.678126  
## iter 30 value 123.398010  
## iter 40 value 123.386818  
## iter 50 value 121.965801  
## iter 60 value 121.686080  
## iter 70 value 121.681138  
## iter 80 value 121.676655  
## iter 90 value 121.583435  
## iter 100 value 117.155735  
## iter 110 value 109.547858  
## iter 120 value 107.397940  
## iter 130 value 106.458966  
## iter 140 value 105.423031  
## iter 150 value 102.416124  
## iter 160 value 102.074259  
## iter 170 value 100.971525  
## iter 180 value 99.313798  
## iter 190 value 98.150096  
## iter 200 value 97.487700  
## iter 210 value 97.271110  
## iter 220 value 97.219816  
## iter 230 value 96.876392  
## iter 240 value 95.152383  
## iter 250 value 91.690161  
## iter 260 value 90.027841  
## iter 270 value 87.947780  
## iter 280 value 87.645700  
## iter 290 value 87.576289  
## iter 300 value 87.504873  
## final value 87.504873   
## stopped after 300 iterations  
## # weights: 110  
## initial value 152.869735   
## iter 10 value 123.069400  
## iter 20 value 116.567693  
## iter 30 value 113.962246  
## iter 40 value 110.749013  
## iter 50 value 110.174929  
## iter 60 value 110.122868  
## iter 70 value 110.116207  
## iter 80 value 108.291475  
## iter 90 value 104.629481  
## iter 100 value 103.688456  
## iter 110 value 103.649568  
## iter 120 value 103.643284  
## iter 130 value 103.639300  
## iter 140 value 103.638244  
## iter 150 value 103.636590  
## iter 160 value 103.215155  
## iter 170 value 100.469788  
## iter 180 value 92.353106  
## iter 190 value 82.338629  
## iter 200 value 77.320000  
## iter 210 value 76.468978  
## iter 220 value 74.546068  
## iter 230 value 70.655748  
## iter 240 value 65.408219  
## iter 250 value 61.387322  
## iter 260 value 60.397872  
## iter 270 value 60.061417  
## iter 280 value 59.859897  
## iter 290 value 59.033413  
## iter 300 value 57.299403  
## final value 57.299403   
## stopped after 300 iterations  
## # weights: 110  
## initial value 158.881937   
## iter 10 value 130.331066  
## iter 20 value 116.554700  
## iter 30 value 115.197856  
## iter 40 value 115.020014  
## iter 50 value 114.986424  
## iter 60 value 114.970610  
## iter 70 value 114.742941  
## iter 80 value 114.715313  
## iter 90 value 114.611764  
## iter 100 value 114.196611  
## iter 110 value 114.151468  
## iter 120 value 114.140220  
## iter 130 value 114.097136  
## iter 140 value 113.586676  
## iter 150 value 113.483910  
## iter 160 value 113.448208  
## iter 170 value 113.079299  
## iter 180 value 113.021120  
## iter 190 value 112.990947  
## iter 200 value 111.786022  
## iter 210 value 110.417860  
## iter 220 value 108.719262  
## iter 230 value 107.879157  
## iter 240 value 106.231971  
## iter 250 value 104.489725  
## iter 260 value 103.413830  
## iter 270 value 103.350132  
## iter 280 value 101.865218  
## iter 290 value 101.458564  
## iter 300 value 100.757661  
## final value 100.757661   
## stopped after 300 iterations  
## # weights: 110  
## initial value 154.249655   
## iter 10 value 125.716075  
## iter 20 value 119.939222  
## iter 30 value 117.244506  
## iter 40 value 116.706414  
## iter 50 value 115.566915  
## iter 60 value 114.940760  
## iter 70 value 114.734985  
## iter 80 value 114.707134  
## iter 90 value 114.676482  
## iter 100 value 114.642159  
## iter 110 value 114.622955  
## iter 120 value 113.569142  
## iter 130 value 110.273579  
## iter 140 value 102.992998  
## iter 150 value 98.072190  
## iter 160 value 96.207309  
## iter 170 value 92.385551  
## iter 180 value 89.990736  
## iter 190 value 88.259917  
## iter 200 value 87.219594  
## iter 210 value 86.912529  
## iter 220 value 86.706170  
## iter 230 value 86.667993  
## iter 240 value 86.647342  
## iter 250 value 84.729579  
## iter 260 value 79.763100  
## iter 270 value 78.595351  
## iter 280 value 78.209391  
## iter 290 value 77.871306  
## iter 300 value 77.379058  
## final value 77.379058   
## stopped after 300 iterations  
## # weights: 122  
## initial value 141.684275   
## iter 10 value 126.015717  
## iter 20 value 118.854918  
## iter 30 value 117.913140  
## iter 40 value 115.110952  
## iter 50 value 114.834960  
## iter 60 value 114.715308  
## iter 70 value 111.570009  
## iter 80 value 107.194774  
## iter 90 value 105.885817  
## iter 100 value 105.417332  
## iter 110 value 104.577311  
## iter 120 value 104.130215  
## iter 130 value 103.733921  
## iter 140 value 102.956624  
## iter 150 value 102.455950  
## iter 160 value 102.320956  
## iter 170 value 102.211561  
## iter 180 value 102.105718  
## iter 190 value 101.034394  
## iter 200 value 96.637234  
## iter 210 value 91.863466  
## iter 220 value 90.185128  
## iter 230 value 89.433288  
## iter 240 value 88.596552  
## iter 250 value 86.971163  
## iter 260 value 82.473682  
## iter 270 value 80.201620  
## iter 280 value 79.798632  
## iter 290 value 79.051264  
## iter 300 value 76.461500  
## final value 76.461500   
## stopped after 300 iterations  
## # weights: 122  
## initial value 169.002949   
## iter 10 value 127.732964  
## iter 20 value 122.016803  
## iter 30 value 121.234588  
## iter 40 value 119.832203  
## iter 50 value 117.402511  
## iter 60 value 116.227650  
## iter 70 value 116.136585  
## iter 80 value 116.123987  
## iter 90 value 115.164929  
## iter 100 value 112.858372  
## iter 110 value 106.886495  
## iter 120 value 103.808353  
## iter 130 value 103.576223  
## iter 140 value 103.058144  
## iter 150 value 102.916483  
## iter 160 value 102.737613  
## iter 170 value 102.434894  
## iter 180 value 102.411055  
## iter 190 value 102.058761  
## iter 200 value 99.600819  
## iter 210 value 94.858666  
## iter 220 value 90.215064  
## iter 230 value 89.732499  
## iter 240 value 89.690868  
## iter 250 value 89.633195  
## iter 260 value 89.554749  
## iter 270 value 89.008923  
## iter 280 value 88.546710  
## iter 290 value 85.076877  
## iter 300 value 80.839773  
## final value 80.839773   
## stopped after 300 iterations  
## # weights: 122  
## initial value 147.622590   
## iter 10 value 134.151182  
## iter 20 value 132.047241  
## iter 30 value 130.543658  
## iter 40 value 128.539332  
## iter 50 value 122.767562  
## iter 60 value 119.231345  
## iter 70 value 117.585469  
## iter 80 value 116.505416  
## iter 90 value 115.794736  
## iter 100 value 115.297376  
## iter 110 value 115.261636  
## iter 120 value 115.242036  
## iter 130 value 115.228635  
## iter 140 value 112.498431  
## iter 150 value 105.146087  
## iter 160 value 101.864222  
## iter 170 value 100.325564  
## iter 180 value 96.988645  
## iter 190 value 92.352474  
## iter 200 value 90.852761  
## iter 210 value 90.257350  
## iter 220 value 89.546966  
## iter 230 value 89.442414  
## iter 240 value 88.930456  
## iter 250 value 87.912535  
## iter 260 value 87.505575  
## iter 270 value 87.168676  
## iter 280 value 85.651022  
## iter 290 value 83.605940  
## iter 300 value 80.727052  
## final value 80.727052   
## stopped after 300 iterations  
## # weights: 122  
## initial value 137.548392   
## iter 10 value 126.064831  
## iter 20 value 120.774849  
## iter 30 value 119.050007  
## iter 40 value 119.004177  
## iter 50 value 118.998842  
## iter 60 value 118.987578  
## iter 70 value 118.946999  
## iter 80 value 116.153302  
## iter 90 value 113.054117  
## iter 100 value 111.650328  
## iter 110 value 111.274682  
## iter 120 value 110.979271  
## iter 130 value 108.940366  
## iter 140 value 106.580382  
## iter 150 value 105.628096  
## iter 160 value 105.453281  
## iter 170 value 105.434072  
## iter 180 value 105.357038  
## iter 190 value 104.639155  
## iter 200 value 102.286992  
## iter 210 value 101.722329  
## iter 220 value 101.537234  
## iter 230 value 101.246498  
## iter 240 value 101.152205  
## iter 250 value 100.740093  
## iter 260 value 100.686975  
## iter 270 value 100.681625  
## iter 280 value 100.677144  
## iter 290 value 100.284339  
## iter 300 value 95.160844  
## final value 95.160844   
## stopped after 300 iterations  
## # weights: 122  
## initial value 198.451917   
## iter 10 value 133.742191  
## iter 20 value 133.181948  
## iter 30 value 133.113718  
## iter 40 value 130.383673  
## iter 50 value 123.243032  
## iter 60 value 122.062054  
## iter 70 value 121.690012  
## iter 80 value 121.461050  
## iter 90 value 120.708704  
## iter 100 value 120.656514  
## iter 110 value 120.231029  
## iter 120 value 120.157582  
## iter 130 value 119.787642  
## iter 140 value 116.809860  
## iter 150 value 116.240056  
## iter 160 value 115.960296  
## iter 170 value 112.734767  
## iter 180 value 111.775994  
## iter 190 value 111.533102  
## iter 200 value 111.436034  
## iter 210 value 111.332121  
## iter 220 value 108.328308  
## iter 230 value 107.618871  
## iter 240 value 107.524694  
## iter 250 value 107.513734  
## iter 260 value 107.491995  
## iter 270 value 107.309933  
## iter 280 value 107.272080  
## iter 290 value 107.234541  
## iter 300 value 104.060889  
## final value 104.060889   
## stopped after 300 iterations  
## # weights: 122  
## initial value 141.065535   
## iter 10 value 123.737779  
## iter 20 value 114.336622  
## iter 30 value 111.810393  
## iter 40 value 111.393605  
## iter 50 value 111.369592  
## iter 60 value 111.342495  
## iter 70 value 111.170134  
## iter 80 value 109.671011  
## iter 90 value 107.332234  
## iter 100 value 106.535788  
## iter 110 value 105.795856  
## iter 120 value 104.206394  
## iter 130 value 102.419081  
## iter 140 value 102.256636  
## iter 150 value 102.224078  
## iter 160 value 102.208294  
## iter 170 value 102.198260  
## iter 180 value 102.179157  
## iter 190 value 101.175046  
## iter 200 value 94.581219  
## iter 210 value 93.875216  
## iter 220 value 93.810227  
## iter 230 value 92.664094  
## iter 240 value 85.517915  
## iter 250 value 82.872198  
## iter 260 value 81.910025  
## iter 270 value 78.321725  
## iter 280 value 74.596194  
## iter 290 value 70.450043  
## iter 300 value 69.279649  
## final value 69.279649   
## stopped after 300 iterations  
## # weights: 122  
## initial value 150.399788   
## iter 10 value 126.298010  
## iter 20 value 119.224984  
## iter 30 value 116.745944  
## iter 40 value 115.326529  
## iter 50 value 113.248483  
## iter 60 value 113.066124  
## iter 70 value 111.820402  
## iter 80 value 111.254548  
## iter 90 value 110.851814  
## iter 100 value 110.686543  
## iter 110 value 110.653367  
## iter 120 value 110.590649  
## iter 130 value 109.965992  
## iter 140 value 109.485641  
## iter 150 value 105.784750  
## iter 160 value 104.194141  
## iter 170 value 104.032343  
## iter 180 value 103.796684  
## iter 190 value 103.701883  
## iter 200 value 103.500417  
## iter 210 value 103.469206  
## iter 220 value 103.365688  
## iter 230 value 102.813387  
## iter 240 value 99.284545  
## iter 250 value 95.008681  
## iter 260 value 93.741372  
## iter 270 value 93.183456  
## iter 280 value 89.096784  
## iter 290 value 84.109123  
## iter 300 value 82.735848  
## final value 82.735848   
## stopped after 300 iterations  
## # weights: 122  
## initial value 140.659213   
## iter 10 value 121.196304  
## iter 20 value 115.443904  
## iter 30 value 113.362958  
## iter 40 value 112.395870  
## iter 50 value 111.553321  
## iter 60 value 108.893333  
## iter 70 value 108.223813  
## iter 80 value 106.691546  
## iter 90 value 106.440885  
## iter 100 value 106.336066  
## iter 110 value 106.180194  
## iter 120 value 105.889396  
## iter 130 value 104.458624  
## iter 140 value 100.572228  
## iter 150 value 99.353129  
## iter 160 value 99.242488  
## iter 170 value 99.150986  
## iter 180 value 97.843349  
## iter 190 value 93.316767  
## iter 200 value 88.009620  
## iter 210 value 83.429022  
## iter 220 value 82.089432  
## iter 230 value 81.965579  
## iter 240 value 81.655707  
## iter 250 value 81.404499  
## iter 260 value 81.349791  
## iter 270 value 81.248491  
## iter 280 value 78.801625  
## iter 290 value 73.220535  
## iter 300 value 66.971742  
## final value 66.971742   
## stopped after 300 iterations  
## # weights: 122  
## initial value 174.348133   
## iter 10 value 126.127644  
## iter 20 value 116.796129  
## iter 30 value 109.180910  
## iter 40 value 106.328104  
## iter 50 value 104.906761  
## iter 60 value 104.249797  
## iter 70 value 102.803911  
## iter 80 value 100.527651  
## iter 90 value 98.931284  
## iter 100 value 98.696269  
## iter 110 value 98.505589  
## iter 120 value 98.157091  
## iter 130 value 96.942340  
## iter 140 value 96.295572  
## iter 150 value 95.833973  
## iter 160 value 95.721605  
## iter 170 value 95.638191  
## iter 180 value 95.321210  
## iter 190 value 93.738113  
## iter 200 value 92.776817  
## iter 210 value 92.697379  
## iter 220 value 92.646994  
## iter 230 value 92.578663  
## iter 240 value 92.225589  
## iter 250 value 91.940816  
## iter 260 value 91.912280  
## iter 270 value 91.904322  
## iter 280 value 91.897083  
## iter 290 value 91.883798  
## iter 300 value 91.587608  
## final value 91.587608   
## stopped after 300 iterations  
## # weights: 122  
## initial value 175.142540   
## iter 10 value 116.952931  
## iter 20 value 115.482403  
## iter 30 value 114.373621  
## iter 40 value 113.707704  
## iter 50 value 113.361547  
## iter 60 value 113.249754  
## iter 70 value 112.643222  
## iter 80 value 112.011437  
## iter 90 value 109.114895  
## iter 100 value 108.793897  
## iter 110 value 108.787575  
## iter 120 value 108.762719  
## iter 130 value 108.033292  
## iter 140 value 106.620629  
## iter 150 value 105.889625  
## iter 160 value 104.805715  
## iter 170 value 104.208404  
## iter 180 value 104.179553  
## iter 190 value 104.171635  
## iter 200 value 104.170024  
## iter 210 value 104.169247  
## iter 220 value 104.168560  
## iter 230 value 104.140267  
## iter 240 value 103.066816  
## iter 250 value 101.240726  
## iter 260 value 100.520354  
## iter 270 value 98.912120  
## iter 280 value 94.191807  
## iter 290 value 92.732049  
## iter 300 value 91.859946  
## final value 91.859946   
## stopped after 300 iterations  
## # weights: 134  
## initial value 151.759008   
## iter 10 value 131.854392  
## iter 20 value 125.423598  
## iter 30 value 117.228397  
## iter 40 value 115.233185  
## iter 50 value 113.655955  
## iter 60 value 112.480431  
## iter 70 value 111.922982  
## iter 80 value 111.147206  
## iter 90 value 110.974405  
## iter 100 value 110.817075  
## iter 110 value 110.774698  
## iter 120 value 110.668101  
## iter 130 value 109.357508  
## iter 140 value 107.226400  
## iter 150 value 100.188403  
## iter 160 value 99.084681  
## iter 170 value 97.512235  
## iter 180 value 96.741697  
## iter 190 value 96.471312  
## iter 200 value 96.405707  
## iter 210 value 96.372264  
## iter 220 value 96.269937  
## iter 230 value 95.765771  
## iter 240 value 94.780006  
## iter 250 value 90.252682  
## iter 260 value 78.815691  
## iter 270 value 70.576355  
## iter 280 value 62.811438  
## iter 290 value 58.092621  
## iter 300 value 57.357672  
## final value 57.357672   
## stopped after 300 iterations  
## # weights: 134  
## initial value 155.743933   
## iter 10 value 133.141713  
## iter 20 value 128.932092  
## iter 30 value 115.367103  
## iter 40 value 112.482792  
## iter 50 value 111.882865  
## iter 60 value 111.378407  
## iter 70 value 111.344609  
## iter 80 value 111.338885  
## iter 90 value 111.017895  
## iter 100 value 109.040319  
## iter 110 value 106.273689  
## iter 120 value 105.071384  
## iter 130 value 103.779962  
## iter 140 value 103.454537  
## iter 150 value 103.175067  
## iter 160 value 102.258960  
## iter 170 value 100.699982  
## iter 180 value 97.087263  
## iter 190 value 92.112668  
## iter 200 value 91.409715  
## iter 210 value 90.896601  
## iter 220 value 90.815502  
## iter 230 value 90.804313  
## iter 240 value 90.425624  
## iter 250 value 89.153930  
## iter 260 value 88.346442  
## iter 270 value 88.191920  
## iter 280 value 87.897962  
## iter 290 value 85.825520  
## iter 300 value 80.099079  
## final value 80.099079   
## stopped after 300 iterations  
## # weights: 134  
## initial value 135.663110   
## iter 10 value 125.635004  
## iter 20 value 113.524097  
## iter 30 value 110.653056  
## iter 40 value 106.433204  
## iter 50 value 105.132307  
## iter 60 value 104.871024  
## iter 70 value 104.758672  
## iter 80 value 104.480302  
## iter 90 value 104.286595  
## iter 100 value 104.022933  
## iter 110 value 102.275441  
## iter 120 value 99.734125  
## iter 130 value 99.243769  
## iter 140 value 99.201431  
## iter 150 value 98.859182  
## iter 160 value 98.691055  
## iter 170 value 98.661099  
## iter 180 value 98.517418  
## iter 190 value 97.812625  
## iter 200 value 97.388193  
## iter 210 value 96.979348  
## iter 220 value 94.892386  
## iter 230 value 88.727942  
## iter 240 value 82.978812  
## iter 250 value 78.985675  
## iter 260 value 78.256756  
## iter 270 value 78.217145  
## iter 280 value 78.169928  
## iter 290 value 78.112751  
## iter 300 value 77.649313  
## final value 77.649313   
## stopped after 300 iterations  
## # weights: 134  
## initial value 138.429211   
## iter 10 value 127.878410  
## iter 20 value 122.521440  
## iter 30 value 117.341489  
## iter 40 value 116.646423  
## iter 50 value 116.582798  
## iter 60 value 116.569572  
## iter 70 value 116.557959  
## iter 80 value 116.556466  
## iter 90 value 116.172556  
## iter 100 value 112.338093  
## iter 110 value 106.338796  
## iter 120 value 103.097450  
## iter 130 value 93.237141  
## iter 140 value 90.538935  
## iter 150 value 88.992436  
## iter 160 value 88.407266  
## iter 170 value 85.809062  
## iter 180 value 84.839275  
## iter 190 value 83.879062  
## iter 200 value 78.010522  
## iter 210 value 75.007702  
## iter 220 value 74.052534  
## iter 230 value 73.218711  
## iter 240 value 72.404716  
## iter 250 value 70.524758  
## iter 260 value 69.783508  
## iter 270 value 68.283949  
## iter 280 value 63.666581  
## iter 290 value 62.972685  
## iter 300 value 62.662871  
## final value 62.662871   
## stopped after 300 iterations  
## # weights: 134  
## initial value 194.540827   
## iter 10 value 134.026727  
## iter 20 value 133.343441  
## iter 30 value 133.336768  
## iter 40 value 133.331994  
## iter 50 value 123.701879  
## iter 60 value 114.839477  
## iter 70 value 109.419718  
## iter 80 value 107.648328  
## iter 90 value 105.580445  
## iter 100 value 101.530810  
## iter 110 value 100.607062  
## iter 120 value 100.261787  
## iter 130 value 100.229451  
## iter 140 value 97.109098  
## iter 150 value 93.869831  
## iter 160 value 90.041683  
## iter 170 value 87.901815  
## iter 180 value 87.229005  
## iter 190 value 86.422462  
## iter 200 value 86.281870  
## iter 210 value 86.256511  
## iter 220 value 86.215410  
## iter 230 value 85.889969  
## iter 240 value 83.176862  
## iter 250 value 81.434418  
## iter 260 value 78.652610  
## iter 270 value 69.801009  
## iter 280 value 64.893470  
## iter 290 value 63.269406  
## iter 300 value 62.227412  
## final value 62.227412   
## stopped after 300 iterations  
## # weights: 134  
## initial value 164.003079   
## iter 10 value 133.083530  
## iter 20 value 126.482306  
## iter 30 value 119.331980  
## iter 40 value 116.029171  
## iter 50 value 113.568740  
## iter 60 value 107.544987  
## iter 70 value 103.111464  
## iter 80 value 102.321391  
## iter 90 value 100.671768  
## iter 100 value 99.849464  
## iter 110 value 98.851819  
## iter 120 value 97.855089  
## iter 130 value 95.890374  
## iter 140 value 95.483721  
## iter 150 value 95.448202  
## iter 160 value 95.415634  
## iter 170 value 93.672737  
## iter 180 value 90.407518  
## iter 190 value 84.799777  
## iter 200 value 82.566741  
## iter 210 value 81.697895  
## iter 220 value 81.555795  
## iter 230 value 81.451737  
## iter 240 value 81.392678  
## iter 250 value 80.743913  
## iter 260 value 80.446133  
## iter 270 value 79.932280  
## iter 280 value 79.888415  
## iter 290 value 79.526722  
## iter 300 value 78.759717  
## final value 78.759717   
## stopped after 300 iterations  
## # weights: 134  
## initial value 305.810040   
## iter 10 value 134.792485  
## iter 20 value 132.554891  
## iter 30 value 125.224470  
## iter 40 value 124.618772  
## iter 50 value 123.032038  
## iter 60 value 121.849139  
## iter 70 value 121.836672  
## iter 80 value 121.830811  
## iter 90 value 121.377306  
## iter 100 value 119.178983  
## iter 110 value 115.486340  
## iter 120 value 114.502089  
## iter 130 value 112.340163  
## iter 140 value 112.260962  
## iter 150 value 112.236705  
## iter 160 value 111.821483  
## iter 170 value 107.825339  
## iter 180 value 99.366193  
## iter 190 value 96.267806  
## iter 200 value 95.656900  
## iter 210 value 95.419455  
## iter 220 value 95.044852  
## iter 230 value 94.249593  
## iter 240 value 94.201658  
## iter 250 value 94.094741  
## iter 260 value 93.971093  
## iter 270 value 91.807417  
## iter 280 value 81.663489  
## iter 290 value 77.528645  
## iter 300 value 73.069832  
## final value 73.069832   
## stopped after 300 iterations  
## # weights: 134  
## initial value 347.550409   
## iter 10 value 130.716275  
## iter 20 value 126.647107  
## iter 30 value 124.760451  
## iter 40 value 124.749601  
## iter 50 value 124.734742  
## iter 60 value 124.400488  
## iter 70 value 123.988104  
## iter 80 value 123.932689  
## iter 90 value 119.251366  
## iter 100 value 114.429155  
## iter 110 value 109.862741  
## iter 120 value 102.836109  
## iter 130 value 96.655646  
## iter 140 value 94.082847  
## iter 150 value 93.570523  
## iter 160 value 91.826235  
## iter 170 value 89.562650  
## iter 180 value 88.893104  
## iter 190 value 87.901899  
## iter 200 value 87.403837  
## iter 210 value 87.294968  
## iter 220 value 87.135348  
## iter 230 value 86.763514  
## iter 240 value 84.816477  
## iter 250 value 78.202544  
## iter 260 value 76.173853  
## iter 270 value 74.934261  
## iter 280 value 72.208067  
## iter 290 value 68.071136  
## iter 300 value 66.295260  
## final value 66.295260   
## stopped after 300 iterations  
## # weights: 134  
## initial value 150.090066   
## iter 10 value 134.044462  
## iter 20 value 130.859964  
## iter 30 value 129.860832  
## iter 40 value 128.354331  
## iter 50 value 127.584001  
## iter 60 value 127.577408  
## iter 70 value 126.594762  
## iter 80 value 124.319735  
## iter 90 value 124.300839  
## iter 100 value 124.294915  
## iter 110 value 116.678987  
## iter 120 value 108.542623  
## iter 130 value 106.512385  
## iter 140 value 105.483905  
## iter 150 value 103.155570  
## iter 160 value 100.303953  
## iter 170 value 100.094596  
## iter 180 value 100.047204  
## iter 190 value 99.243400  
## iter 200 value 98.918540  
## iter 210 value 98.893635  
## iter 220 value 98.869528  
## iter 230 value 98.782314  
## iter 240 value 98.165401  
## iter 250 value 97.317190  
## iter 260 value 97.284104  
## iter 270 value 97.085631  
## iter 280 value 93.767230  
## iter 290 value 91.232954  
## iter 300 value 91.078157  
## final value 91.078157   
## stopped after 300 iterations  
## # weights: 134  
## initial value 147.964449   
## iter 10 value 126.584573  
## iter 20 value 115.511442  
## iter 30 value 109.160652  
## iter 40 value 105.890992  
## iter 50 value 103.085956  
## iter 60 value 101.534130  
## iter 70 value 101.242834  
## iter 80 value 101.214963  
## iter 90 value 101.204318  
## iter 100 value 100.447714  
## iter 110 value 100.438227  
## iter 120 value 100.436797  
## iter 130 value 100.434698  
## iter 140 value 100.400884  
## iter 150 value 100.120486  
## iter 160 value 96.654157  
## iter 170 value 91.538238  
## iter 180 value 82.774581  
## iter 190 value 76.889520  
## iter 200 value 71.244546  
## iter 210 value 70.602409  
## iter 220 value 69.761160  
## iter 230 value 66.156460  
## iter 240 value 61.983581  
## iter 250 value 59.389316  
## iter 260 value 58.547716  
## iter 270 value 58.206365  
## iter 280 value 57.872709  
## iter 290 value 57.607816  
## iter 300 value 57.476755  
## final value 57.476755   
## stopped after 300 iterations  
## # weights: 146  
## initial value 293.178173   
## iter 10 value 128.187826  
## iter 20 value 111.921389  
## iter 30 value 107.648100  
## iter 40 value 106.660965  
## iter 50 value 105.555063  
## iter 60 value 102.704234  
## iter 70 value 95.416929  
## iter 80 value 88.976315  
## iter 90 value 88.846295  
## iter 100 value 88.695349  
## iter 110 value 88.366456  
## iter 120 value 88.141591  
## iter 130 value 87.521995  
## iter 140 value 86.229342  
## iter 150 value 85.654224  
## iter 160 value 85.235782  
## iter 170 value 84.978325  
## iter 180 value 84.927080  
## iter 190 value 84.900407  
## iter 200 value 84.883951  
## iter 210 value 84.506034  
## iter 220 value 81.711038  
## iter 230 value 79.927488  
## iter 240 value 79.694287  
## iter 250 value 79.492579  
## iter 260 value 78.712644  
## iter 270 value 77.270548  
## iter 280 value 74.334651  
## iter 290 value 73.911341  
## iter 300 value 73.855745  
## final value 73.855745   
## stopped after 300 iterations  
## # weights: 146  
## initial value 185.991501   
## iter 10 value 135.224222  
## iter 20 value 124.467599  
## iter 30 value 115.683825  
## iter 40 value 113.889332  
## iter 50 value 113.642918  
## iter 60 value 112.741849  
## iter 70 value 112.081474  
## iter 80 value 111.936544  
## iter 90 value 111.846896  
## iter 100 value 111.723080  
## iter 110 value 111.167131  
## iter 120 value 110.970519  
## iter 130 value 110.742203  
## iter 140 value 108.400615  
## iter 150 value 106.465584  
## iter 160 value 106.189481  
## iter 170 value 105.797521  
## iter 180 value 105.760460  
## iter 190 value 104.923877  
## iter 200 value 102.486751  
## iter 210 value 95.415630  
## iter 220 value 90.728931  
## iter 230 value 90.311002  
## iter 240 value 90.255372  
## iter 250 value 89.775469  
## iter 260 value 89.239312  
## iter 270 value 89.062776  
## iter 280 value 89.036300  
## iter 290 value 88.773915  
## iter 300 value 87.460007  
## final value 87.460007   
## stopped after 300 iterations  
## # weights: 146  
## initial value 255.316411   
## iter 10 value 132.800542  
## iter 20 value 130.756118  
## iter 30 value 129.611440  
## iter 40 value 127.934891  
## iter 50 value 122.211702  
## iter 60 value 118.699531  
## iter 70 value 118.641983  
## iter 80 value 118.629533  
## iter 90 value 118.621540  
## iter 100 value 116.680114  
## iter 110 value 106.624041  
## iter 120 value 99.675382  
## iter 130 value 92.545513  
## iter 140 value 88.698612  
## iter 150 value 87.506188  
## iter 160 value 87.412219  
## iter 170 value 87.284030  
## iter 180 value 85.723394  
## iter 190 value 80.436434  
## iter 200 value 77.591155  
## iter 210 value 76.860114  
## iter 220 value 75.582908  
## iter 230 value 71.431930  
## iter 240 value 69.057788  
## iter 250 value 67.829400  
## iter 260 value 67.547091  
## iter 270 value 67.283020  
## iter 280 value 67.212871  
## iter 290 value 67.119805  
## iter 300 value 66.553197  
## final value 66.553197   
## stopped after 300 iterations  
## # weights: 146  
## initial value 180.432988   
## iter 10 value 134.803063  
## iter 20 value 133.309042  
## iter 30 value 131.386417  
## iter 40 value 131.377213  
## iter 50 value 130.765356  
## iter 60 value 120.808985  
## iter 70 value 117.802454  
## iter 80 value 117.347147  
## iter 90 value 116.833461  
## iter 100 value 115.857836  
## iter 110 value 114.733226  
## iter 120 value 112.806412  
## iter 130 value 112.366975  
## iter 140 value 111.601523  
## iter 150 value 110.607022  
## iter 160 value 110.382635  
## iter 170 value 110.325229  
## iter 180 value 109.639241  
## iter 190 value 104.757337  
## iter 200 value 100.602386  
## iter 210 value 98.929838  
## iter 220 value 98.670688  
## iter 230 value 95.528469  
## iter 240 value 91.911201  
## iter 250 value 91.345762  
## iter 260 value 91.097584  
## iter 270 value 89.966485  
## iter 280 value 86.025332  
## iter 290 value 83.011210  
## iter 300 value 79.969850  
## final value 79.969850   
## stopped after 300 iterations  
## # weights: 146  
## initial value 146.753978   
## iter 10 value 129.961109  
## iter 20 value 127.244801  
## iter 30 value 126.186703  
## iter 40 value 121.691272  
## iter 50 value 121.623505  
## iter 60 value 121.602351  
## iter 70 value 119.209295  
## iter 80 value 112.579626  
## iter 90 value 109.389487  
## iter 100 value 109.103332  
## iter 110 value 108.378236  
## iter 120 value 106.461058  
## iter 130 value 106.256675  
## iter 140 value 105.839540  
## iter 150 value 105.708471  
## iter 160 value 105.636682  
## iter 170 value 105.612201  
## iter 180 value 104.947673  
## iter 190 value 104.711771  
## iter 200 value 103.379353  
## iter 210 value 103.166394  
## iter 220 value 103.155781  
## iter 230 value 103.150313  
## iter 240 value 102.821082  
## iter 250 value 100.477304  
## iter 260 value 98.683573  
## iter 270 value 97.959904  
## iter 280 value 97.617625  
## iter 290 value 97.420485  
## iter 300 value 97.336779  
## final value 97.336779   
## stopped after 300 iterations  
## # weights: 146  
## initial value 243.251794   
## iter 10 value 133.137717  
## iter 20 value 124.996930  
## iter 30 value 117.832764  
## iter 40 value 113.494853  
## iter 50 value 111.324081  
## iter 60 value 110.280918  
## iter 70 value 105.905212  
## iter 80 value 104.782481  
## iter 90 value 104.607756  
## iter 100 value 104.425197  
## iter 110 value 104.189557  
## iter 120 value 104.166381  
## iter 130 value 103.887066  
## iter 140 value 103.187567  
## iter 150 value 100.626328  
## iter 160 value 100.126730  
## iter 170 value 100.004958  
## iter 180 value 99.251803  
## iter 190 value 97.951011  
## iter 200 value 97.702183  
## iter 210 value 97.528638  
## iter 220 value 97.370837  
## iter 230 value 97.305860  
## iter 240 value 96.944302  
## iter 250 value 96.728839  
## iter 260 value 96.196450  
## iter 270 value 96.134283  
## iter 280 value 96.033897  
## iter 290 value 95.864100  
## iter 300 value 94.665501  
## final value 94.665501   
## stopped after 300 iterations  
## # weights: 146  
## initial value 211.337205   
## iter 10 value 126.616334  
## iter 20 value 112.452185  
## iter 30 value 104.469461  
## iter 40 value 101.776865  
## iter 50 value 96.591992  
## iter 60 value 94.925531  
## iter 70 value 94.303352  
## iter 80 value 94.203323  
## iter 90 value 94.167016  
## iter 100 value 94.153991  
## iter 110 value 93.517619  
## iter 120 value 89.286217  
## iter 130 value 87.771061  
## iter 140 value 87.606453  
## iter 150 value 87.586166  
## iter 160 value 87.562903  
## iter 170 value 87.517667  
## iter 180 value 86.581995  
## iter 190 value 84.967192  
## iter 200 value 82.265605  
## iter 210 value 79.947775  
## iter 220 value 75.187750  
## iter 230 value 70.595872  
## iter 240 value 68.696645  
## iter 250 value 67.393920  
## iter 260 value 67.060104  
## iter 270 value 66.889675  
## iter 280 value 66.460706  
## iter 290 value 59.643795  
## iter 300 value 50.811958  
## final value 50.811958   
## stopped after 300 iterations  
## # weights: 146  
## initial value 143.040596   
## iter 10 value 130.946873  
## iter 20 value 128.413731  
## iter 30 value 128.399260  
## iter 40 value 128.387760  
## iter 50 value 126.198166  
## iter 60 value 121.426221  
## iter 70 value 121.014708  
## iter 80 value 116.031277  
## iter 90 value 108.656971  
## iter 100 value 105.901170  
## iter 110 value 102.782514  
## iter 120 value 99.517541  
## iter 130 value 98.590066  
## iter 140 value 98.495099  
## iter 150 value 98.415628  
## iter 160 value 97.493005  
## iter 170 value 93.870542  
## iter 180 value 91.338703  
## iter 190 value 90.001289  
## iter 200 value 87.797594  
## iter 210 value 84.708798  
## iter 220 value 82.485808  
## iter 230 value 81.557591  
## iter 240 value 80.045906  
## iter 250 value 77.106403  
## iter 260 value 76.590577  
## iter 270 value 73.245798  
## iter 280 value 65.604640  
## iter 290 value 60.249562  
## iter 300 value 58.080034  
## final value 58.080034   
## stopped after 300 iterations  
## # weights: 146  
## initial value 212.708047   
## iter 10 value 125.169908  
## iter 20 value 115.868530  
## iter 30 value 113.743392  
## iter 40 value 112.521804  
## iter 50 value 110.269102  
## iter 60 value 108.618421  
## iter 70 value 108.204669  
## iter 80 value 108.178812  
## iter 90 value 106.826878  
## iter 100 value 104.622199  
## iter 110 value 103.472907  
## iter 120 value 99.082107  
## iter 130 value 98.000270  
## iter 140 value 97.942451  
## iter 150 value 97.686153  
## iter 160 value 97.543705  
## iter 170 value 97.324919  
## iter 180 value 97.215594  
## iter 190 value 97.121479  
## iter 200 value 97.112933  
## iter 210 value 96.969134  
## iter 220 value 95.874371  
## iter 230 value 94.254627  
## iter 240 value 92.136309  
## iter 250 value 91.524170  
## iter 260 value 91.252737  
## iter 270 value 90.983538  
## iter 280 value 90.912997  
## iter 290 value 90.785962  
## iter 300 value 90.722584  
## final value 90.722584   
## stopped after 300 iterations  
## # weights: 146  
## initial value 171.427896   
## iter 10 value 128.259562  
## iter 20 value 118.428206  
## iter 30 value 117.871023  
## iter 40 value 117.831174  
## iter 50 value 117.356946  
## iter 60 value 117.028101  
## iter 70 value 116.197771  
## iter 80 value 111.249854  
## iter 90 value 110.919147  
## iter 100 value 110.831654  
## iter 110 value 110.770772  
## iter 120 value 107.940373  
## iter 130 value 105.587462  
## iter 140 value 104.207364  
## iter 150 value 103.556084  
## iter 160 value 102.957373  
## iter 170 value 97.977324  
## iter 180 value 95.041567  
## iter 190 value 93.505969  
## iter 200 value 91.400247  
## iter 210 value 85.762742  
## iter 220 value 82.596435  
## iter 230 value 77.573302  
## iter 240 value 73.211553  
## iter 250 value 71.493353  
## iter 260 value 71.228960  
## iter 270 value 70.784989  
## iter 280 value 70.566421  
## iter 290 value 70.123126  
## iter 300 value 68.900751  
## final value 68.900751   
## stopped after 300 iterations  
## # weights: 158  
## initial value 144.386075   
## iter 10 value 120.162786  
## iter 20 value 104.415660  
## iter 30 value 101.998252  
## iter 40 value 99.392240  
## iter 50 value 96.614346  
## iter 60 value 96.024319  
## iter 70 value 95.729014  
## iter 80 value 95.515219  
## iter 90 value 95.290913  
## iter 100 value 95.008368  
## iter 110 value 94.998426  
## iter 120 value 94.918957  
## iter 130 value 94.658255  
## iter 140 value 94.615048  
## iter 150 value 94.598634  
## iter 160 value 94.597111  
## iter 170 value 94.594983  
## iter 180 value 94.539862  
## iter 190 value 92.079185  
## iter 200 value 90.302520  
## iter 210 value 81.943527  
## iter 220 value 80.031076  
## iter 230 value 77.656603  
## iter 240 value 76.142528  
## iter 250 value 73.682564  
## iter 260 value 72.716095  
## iter 270 value 72.558053  
## iter 280 value 72.500141  
## iter 290 value 72.438277  
## iter 300 value 71.465337  
## final value 71.465337   
## stopped after 300 iterations  
## # weights: 158  
## initial value 140.741797   
## iter 10 value 128.886680  
## iter 20 value 126.396081  
## iter 30 value 121.085178  
## iter 40 value 116.692720  
## iter 50 value 114.661259  
## iter 60 value 113.987223  
## iter 70 value 113.925046  
## iter 80 value 113.903306  
## iter 90 value 113.891809  
## iter 100 value 113.889218  
## iter 110 value 113.884925  
## iter 120 value 113.880913  
## iter 130 value 111.996483  
## iter 140 value 109.737056  
## iter 150 value 109.478726  
## iter 160 value 108.944080  
## iter 170 value 108.856629  
## iter 180 value 108.670007  
## iter 190 value 108.002407  
## iter 200 value 106.068528  
## iter 210 value 102.605894  
## iter 220 value 100.647271  
## iter 230 value 100.013250  
## iter 240 value 97.718758  
## iter 250 value 94.548470  
## iter 260 value 90.813043  
## iter 270 value 89.311477  
## iter 280 value 87.655525  
## iter 290 value 86.462413  
## iter 300 value 85.318239  
## final value 85.318239   
## stopped after 300 iterations  
## # weights: 158  
## initial value 152.189266   
## iter 10 value 127.830165  
## iter 20 value 124.264675  
## iter 30 value 116.382805  
## iter 40 value 112.370894  
## iter 50 value 111.548123  
## iter 60 value 111.265719  
## iter 70 value 111.161428  
## iter 80 value 111.081907  
## iter 90 value 111.065796  
## iter 100 value 111.054454  
## iter 110 value 111.023200  
## iter 120 value 110.953817  
## iter 130 value 109.975208  
## iter 140 value 109.665944  
## iter 150 value 109.272180  
## iter 160 value 108.804835  
## iter 170 value 107.624046  
## iter 180 value 106.459364  
## iter 190 value 105.750383  
## iter 200 value 102.941602  
## iter 210 value 99.692464  
## iter 220 value 97.854272  
## iter 230 value 97.365784  
## iter 240 value 97.340147  
## iter 250 value 97.331967  
## iter 260 value 97.329249  
## iter 270 value 97.325903  
## iter 280 value 97.180933  
## iter 290 value 94.973347  
## iter 300 value 88.884795  
## final value 88.884795   
## stopped after 300 iterations  
## # weights: 158  
## initial value 314.688469   
## iter 10 value 133.918432  
## iter 20 value 127.791698  
## iter 30 value 125.947698  
## iter 40 value 125.111070  
## iter 50 value 125.091978  
## iter 60 value 125.079753  
## iter 70 value 125.066440  
## iter 80 value 125.062583  
## iter 90 value 124.748044  
## iter 100 value 122.164094  
## iter 110 value 118.408396  
## iter 120 value 116.501541  
## iter 130 value 116.168178  
## iter 140 value 113.255170  
## iter 150 value 104.264024  
## iter 160 value 102.477780  
## iter 170 value 101.482193  
## iter 180 value 100.880968  
## iter 190 value 100.735141  
## iter 200 value 99.875179  
## iter 210 value 93.965422  
## iter 220 value 86.997103  
## iter 230 value 83.186199  
## iter 240 value 81.256968  
## iter 250 value 80.775658  
## iter 260 value 80.575100  
## iter 270 value 80.286417  
## iter 280 value 79.006209  
## iter 290 value 75.008540  
## iter 300 value 74.250839  
## final value 74.250839   
## stopped after 300 iterations  
## # weights: 158  
## initial value 184.296345   
## iter 10 value 132.342203  
## iter 20 value 124.192034  
## iter 30 value 120.369606  
## iter 40 value 116.137981  
## iter 50 value 112.873836  
## iter 60 value 110.556215  
## iter 70 value 109.949128  
## iter 80 value 109.256591  
## iter 90 value 108.826383  
## iter 100 value 108.410602  
## iter 110 value 108.166368  
## iter 120 value 108.133094  
## iter 130 value 108.055170  
## iter 140 value 107.520112  
## iter 150 value 106.273295  
## iter 160 value 105.902285  
## iter 170 value 105.478046  
## iter 180 value 105.253177  
## iter 190 value 105.243495  
## iter 200 value 102.656895  
## iter 210 value 99.187705  
## iter 220 value 96.869963  
## iter 230 value 96.671564  
## iter 240 value 96.544503  
## iter 250 value 95.376169  
## iter 260 value 90.227805  
## iter 270 value 84.703391  
## iter 280 value 82.224579  
## iter 290 value 81.473774  
## iter 300 value 81.393521  
## final value 81.393521   
## stopped after 300 iterations  
## # weights: 158  
## initial value 158.705237   
## iter 10 value 133.834283  
## iter 20 value 126.888703  
## iter 30 value 123.361117  
## iter 40 value 119.236067  
## iter 50 value 119.096444  
## iter 60 value 119.026779  
## iter 70 value 118.861801  
## iter 80 value 118.847114  
## iter 90 value 118.753807  
## iter 100 value 118.074475  
## iter 110 value 117.782399  
## iter 120 value 117.777932  
## iter 130 value 117.775602  
## iter 140 value 117.772879  
## iter 150 value 107.765555  
## iter 160 value 102.170040  
## iter 170 value 93.382932  
## iter 180 value 90.413510  
## iter 190 value 88.404272  
## iter 200 value 81.670093  
## iter 210 value 76.629388  
## iter 220 value 73.056759  
## iter 230 value 67.813319  
## iter 240 value 63.470893  
## iter 250 value 62.124839  
## iter 260 value 58.686871  
## iter 270 value 53.187152  
## iter 280 value 51.491575  
## iter 290 value 50.834632  
## iter 300 value 50.786752  
## final value 50.786752   
## stopped after 300 iterations  
## # weights: 158  
## initial value 203.300724   
## iter 10 value 128.226208  
## iter 20 value 119.918768  
## iter 30 value 114.793787  
## iter 40 value 106.754321  
## iter 50 value 103.742472  
## iter 60 value 103.343280  
## iter 70 value 103.299908  
## iter 80 value 99.279616  
## iter 90 value 97.220044  
## iter 100 value 97.014962  
## iter 110 value 96.476767  
## iter 120 value 95.760292  
## iter 130 value 95.611098  
## iter 140 value 95.571599  
## iter 150 value 95.551126  
## iter 160 value 95.544200  
## iter 170 value 95.539324  
## iter 180 value 95.509526  
## iter 190 value 95.253986  
## iter 200 value 92.011512  
## iter 210 value 84.082824  
## iter 220 value 77.175881  
## iter 230 value 76.388715  
## iter 240 value 74.789526  
## iter 250 value 72.907571  
## iter 260 value 72.623785  
## iter 270 value 71.522948  
## iter 280 value 66.106129  
## iter 290 value 56.747516  
## iter 300 value 49.385838  
## final value 49.385838   
## stopped after 300 iterations  
## # weights: 158  
## initial value 196.299068   
## iter 10 value 132.028108  
## iter 20 value 125.999371  
## iter 30 value 123.121290  
## iter 40 value 117.109252  
## iter 50 value 115.889444  
## iter 60 value 115.593941  
## iter 70 value 114.651118  
## iter 80 value 113.619743  
## iter 90 value 110.975953  
## iter 100 value 110.738564  
## iter 110 value 110.524421  
## iter 120 value 106.748424  
## iter 130 value 105.270904  
## iter 140 value 97.964106  
## iter 150 value 94.104467  
## iter 160 value 93.576942  
## iter 170 value 93.465809  
## iter 180 value 93.166199  
## iter 190 value 92.815541  
## iter 200 value 92.616601  
## iter 210 value 92.535697  
## iter 220 value 92.438879  
## iter 230 value 92.394780  
## iter 240 value 92.365311  
## iter 250 value 92.339547  
## iter 260 value 92.334294  
## iter 270 value 92.330333  
## iter 280 value 92.215410  
## iter 290 value 91.864292  
## iter 300 value 88.751811  
## final value 88.751811   
## stopped after 300 iterations  
## # weights: 158  
## initial value 302.608738   
## iter 10 value 130.986514  
## iter 20 value 126.525629  
## iter 30 value 125.538934  
## iter 40 value 124.063412  
## iter 50 value 119.765463  
## iter 60 value 117.124605  
## iter 70 value 114.718925  
## iter 80 value 113.324503  
## iter 90 value 112.481696  
## iter 100 value 109.573935  
## iter 110 value 108.954774  
## iter 120 value 108.360192  
## iter 130 value 104.929605  
## iter 140 value 104.752687  
## iter 150 value 104.707359  
## iter 160 value 104.555028  
## iter 170 value 103.643613  
## iter 180 value 99.222757  
## iter 190 value 92.112655  
## iter 200 value 90.876684  
## iter 210 value 89.598674  
## iter 220 value 87.834459  
## iter 230 value 87.221267  
## iter 240 value 86.708820  
## iter 250 value 86.082439  
## iter 260 value 84.534398  
## iter 270 value 80.974575  
## iter 280 value 78.532150  
## iter 290 value 73.151989  
## iter 300 value 68.922610  
## final value 68.922610   
## stopped after 300 iterations  
## # weights: 158  
## initial value 202.764300   
## iter 10 value 132.914033  
## iter 20 value 123.441289  
## iter 30 value 117.961208  
## iter 40 value 115.461655  
## iter 50 value 114.365871  
## iter 60 value 113.651870  
## iter 70 value 111.322632  
## iter 80 value 108.355322  
## iter 90 value 108.243588  
## iter 100 value 108.194535  
## iter 110 value 107.775748  
## iter 120 value 107.489960  
## iter 130 value 107.352061  
## iter 140 value 107.239065  
## iter 150 value 107.234116  
## iter 160 value 107.232668  
## iter 170 value 107.230864  
## iter 180 value 107.058133  
## iter 190 value 106.350002  
## iter 200 value 104.225404  
## iter 210 value 103.370449  
## iter 220 value 102.835060  
## iter 230 value 102.764189  
## iter 240 value 102.692955  
## iter 250 value 101.602562  
## iter 260 value 90.845340  
## iter 270 value 87.164382  
## iter 280 value 83.887122  
## iter 290 value 83.277122  
## iter 300 value 83.015039  
## final value 83.015039   
## stopped after 300 iterations  
## # weights: 170  
## initial value 269.092633   
## iter 10 value 128.048537  
## iter 20 value 117.448066  
## iter 30 value 106.457760  
## iter 40 value 103.590055  
## iter 50 value 98.998743  
## iter 60 value 94.811134  
## iter 70 value 94.599071  
## iter 80 value 93.673705  
## iter 90 value 91.581589  
## iter 100 value 90.697672  
## iter 110 value 90.587115  
## iter 120 value 90.574730  
## iter 130 value 90.568415  
## iter 140 value 90.565674  
## iter 150 value 90.554018  
## iter 160 value 89.842572  
## iter 170 value 88.119063  
## iter 180 value 87.948711  
## iter 190 value 87.575865  
## iter 200 value 86.761928  
## iter 210 value 86.001057  
## iter 220 value 85.140942  
## iter 230 value 84.277226  
## iter 240 value 83.002051  
## iter 250 value 82.556044  
## iter 260 value 82.516608  
## iter 270 value 82.133689  
## iter 280 value 81.809059  
## iter 290 value 81.449033  
## iter 300 value 80.795541  
## final value 80.795541   
## stopped after 300 iterations  
## # weights: 170  
## initial value 168.942481   
## iter 10 value 133.658921  
## iter 20 value 124.695856  
## iter 30 value 119.460341  
## iter 40 value 114.834869  
## iter 50 value 113.086558  
## iter 60 value 112.887448  
## iter 70 value 110.314151  
## iter 80 value 109.299224  
## iter 90 value 108.451668  
## iter 100 value 108.435970  
## iter 110 value 107.308743  
## iter 120 value 105.853560  
## iter 130 value 105.675358  
## iter 140 value 105.137910  
## iter 150 value 105.093543  
## iter 160 value 105.081026  
## iter 170 value 105.053435  
## iter 180 value 104.506986  
## iter 190 value 104.050138  
## iter 200 value 103.625733  
## iter 210 value 103.453461  
## iter 220 value 103.264413  
## iter 230 value 100.954226  
## iter 240 value 99.827790  
## iter 250 value 99.067041  
## iter 260 value 97.884907  
## iter 270 value 97.393192  
## iter 280 value 97.196940  
## iter 290 value 97.101750  
## iter 300 value 97.042729  
## final value 97.042729   
## stopped after 300 iterations  
## # weights: 170  
## initial value 160.161384   
## iter 10 value 130.672687  
## iter 20 value 124.357655  
## iter 30 value 121.188373  
## iter 40 value 118.130583  
## iter 50 value 117.152181  
## iter 60 value 117.098432  
## iter 70 value 117.070981  
## iter 80 value 117.067509  
## iter 90 value 117.062896  
## iter 100 value 115.126773  
## iter 110 value 109.097993  
## iter 120 value 104.981211  
## iter 130 value 99.376474  
## iter 140 value 96.966603  
## iter 150 value 95.271667  
## iter 160 value 94.810200  
## iter 170 value 94.541902  
## iter 180 value 92.472723  
## iter 190 value 88.514869  
## iter 200 value 87.051455  
## iter 210 value 86.821073  
## iter 220 value 86.643871  
## iter 230 value 86.285132  
## iter 240 value 86.204911  
## iter 250 value 86.133088  
## iter 260 value 86.040949  
## iter 270 value 85.696860  
## iter 280 value 85.561432  
## iter 290 value 85.471635  
## iter 300 value 84.649848  
## final value 84.649848   
## stopped after 300 iterations  
## # weights: 170  
## initial value 152.599794   
## iter 10 value 120.560705  
## iter 20 value 114.021544  
## iter 30 value 108.278931  
## iter 40 value 103.313501  
## iter 50 value 97.659808  
## iter 60 value 93.543296  
## iter 70 value 92.387382  
## iter 80 value 90.632728  
## iter 90 value 89.251643  
## iter 100 value 88.290718  
## iter 110 value 88.052771  
## iter 120 value 87.929990  
## iter 130 value 87.870791  
## iter 140 value 87.776305  
## iter 150 value 87.509179  
## iter 160 value 87.145208  
## iter 170 value 87.096412  
## iter 180 value 87.037160  
## iter 190 value 86.509215  
## iter 200 value 84.713458  
## iter 210 value 82.288721  
## iter 220 value 81.207142  
## iter 230 value 80.703241  
## iter 240 value 77.147681  
## iter 250 value 74.626276  
## iter 260 value 73.852986  
## iter 270 value 72.497946  
## iter 280 value 71.868977  
## iter 290 value 71.123363  
## iter 300 value 70.609884  
## final value 70.609884   
## stopped after 300 iterations  
## # weights: 170  
## initial value 374.183071   
## iter 10 value 127.052402  
## iter 20 value 117.391092  
## iter 30 value 105.427937  
## iter 40 value 103.623790  
## iter 50 value 103.553769  
## iter 60 value 103.532734  
## iter 70 value 103.519452  
## iter 80 value 103.082447  
## iter 90 value 100.697049  
## iter 100 value 98.485145  
## iter 110 value 97.887550  
## iter 120 value 97.769918  
## iter 130 value 97.030068  
## iter 140 value 96.939116  
## iter 150 value 96.311878  
## iter 160 value 93.944077  
## iter 170 value 89.789710  
## iter 180 value 87.424140  
## iter 190 value 86.757713  
## iter 200 value 86.511945  
## iter 210 value 84.183366  
## iter 220 value 82.755165  
## iter 230 value 82.660325  
## iter 240 value 82.015676  
## iter 250 value 80.290212  
## iter 260 value 72.506282  
## iter 270 value 67.056038  
## iter 280 value 65.983958  
## iter 290 value 64.372482  
## iter 300 value 64.070693  
## final value 64.070693   
## stopped after 300 iterations  
## # weights: 170  
## initial value 158.908138   
## iter 10 value 133.229112  
## iter 20 value 125.060560  
## iter 30 value 120.947323  
## iter 40 value 116.774957  
## iter 50 value 114.522061  
## iter 60 value 112.875997  
## iter 70 value 106.834819  
## iter 80 value 103.430893  
## iter 90 value 102.840753  
## iter 100 value 101.753690  
## iter 110 value 101.189072  
## iter 120 value 100.509747  
## iter 130 value 99.293854  
## iter 140 value 99.169587  
## iter 150 value 98.888198  
## iter 160 value 98.602710  
## iter 170 value 98.475287  
## iter 180 value 98.171186  
## iter 190 value 97.500605  
## iter 200 value 96.743212  
## iter 210 value 96.226367  
## iter 220 value 95.692347  
## iter 230 value 95.438075  
## iter 240 value 95.208526  
## iter 250 value 95.134828  
## iter 260 value 94.900023  
## iter 270 value 94.562744  
## iter 280 value 94.526863  
## iter 290 value 93.928722  
## iter 300 value 93.425146  
## final value 93.425146   
## stopped after 300 iterations  
## # weights: 170  
## initial value 310.920502   
## iter 10 value 133.811607  
## iter 20 value 132.751377  
## iter 30 value 132.495630  
## iter 40 value 125.181037  
## iter 50 value 120.863443  
## iter 60 value 119.933347  
## iter 70 value 119.899640  
## iter 80 value 119.882475  
## iter 90 value 119.833077  
## iter 100 value 118.962001  
## iter 110 value 114.027196  
## iter 120 value 109.128913  
## iter 130 value 98.592249  
## iter 140 value 92.322540  
## iter 150 value 86.547526  
## iter 160 value 85.549646  
## iter 170 value 83.199564  
## iter 180 value 80.636078  
## iter 190 value 78.437146  
## iter 200 value 72.133307  
## iter 210 value 68.460042  
## iter 220 value 66.603181  
## iter 230 value 65.975764  
## iter 240 value 65.784356  
## iter 250 value 65.670736  
## iter 260 value 65.621698  
## iter 270 value 65.609608  
## iter 280 value 65.204469  
## iter 290 value 63.280848  
## iter 300 value 61.727588  
## final value 61.727588   
## stopped after 300 iterations  
## # weights: 170  
## initial value 161.246825   
## iter 10 value 130.530371  
## iter 20 value 118.723603  
## iter 30 value 114.038058  
## iter 40 value 113.409814  
## iter 50 value 112.456890  
## iter 60 value 112.187914  
## iter 70 value 109.181653  
## iter 80 value 108.861508  
## iter 90 value 107.844110  
## iter 100 value 107.680898  
## iter 110 value 107.668550  
## iter 120 value 107.662019  
## iter 130 value 107.655820  
## iter 140 value 105.435335  
## iter 150 value 103.041353  
## iter 160 value 95.518959  
## iter 170 value 92.986764  
## iter 180 value 90.678491  
## iter 190 value 86.030131  
## iter 200 value 82.370301  
## iter 210 value 80.610347  
## iter 220 value 80.507470  
## iter 230 value 80.446530  
## iter 240 value 80.116241  
## iter 250 value 78.350132  
## iter 260 value 75.189765  
## iter 270 value 68.154137  
## iter 280 value 65.031282  
## iter 290 value 64.151097  
## iter 300 value 63.454487  
## final value 63.454487   
## stopped after 300 iterations  
## # weights: 170  
## initial value 292.279831   
## iter 10 value 127.437023  
## iter 20 value 121.029203  
## iter 30 value 114.484376  
## iter 40 value 112.922002  
## iter 50 value 109.805482  
## iter 60 value 104.585890  
## iter 70 value 103.255802  
## iter 80 value 102.960257  
## iter 90 value 102.740880  
## iter 100 value 101.386277  
## iter 110 value 101.216902  
## iter 120 value 100.724372  
## iter 130 value 98.422080  
## iter 140 value 98.214359  
## iter 150 value 98.162761  
## iter 160 value 97.652021  
## iter 170 value 97.156821  
## iter 180 value 94.312558  
## iter 190 value 93.151147  
## iter 200 value 92.859235  
## iter 210 value 92.409515  
## iter 220 value 92.165039  
## iter 230 value 92.139583  
## iter 240 value 92.124191  
## iter 250 value 92.116293  
## iter 260 value 92.040992  
## iter 270 value 91.797555  
## iter 280 value 91.643206  
## iter 290 value 91.629850  
## iter 300 value 91.623125  
## final value 91.623125   
## stopped after 300 iterations  
## # weights: 170  
## initial value 157.373558   
## iter 10 value 121.700478  
## iter 20 value 114.170580  
## iter 30 value 111.858732  
## iter 40 value 107.583927  
## iter 50 value 106.799154  
## iter 60 value 103.868326  
## iter 70 value 103.163697  
## iter 80 value 101.784547  
## iter 90 value 100.914936  
## iter 100 value 100.218343  
## iter 110 value 99.338326  
## iter 120 value 97.807700  
## iter 130 value 96.715783  
## iter 140 value 96.578563  
## iter 150 value 96.569408  
## iter 160 value 94.867848  
## iter 170 value 94.740377  
## iter 180 value 94.385532  
## iter 190 value 93.365329  
## iter 200 value 93.051621  
## iter 210 value 91.548561  
## iter 220 value 91.375072  
## iter 230 value 91.366500  
## iter 240 value 91.318110  
## iter 250 value 91.100418  
## iter 260 value 88.653506  
## iter 270 value 82.192234  
## iter 280 value 71.622082  
## iter 290 value 67.104411  
## iter 300 value 66.345252  
## final value 66.345252   
## stopped after 300 iterations  
## # weights: 182  
## initial value 140.511019   
## iter 10 value 119.692836  
## iter 20 value 107.841823  
## iter 30 value 100.724745  
## iter 40 value 96.834597  
## iter 50 value 94.215511  
## iter 60 value 91.732744  
## iter 70 value 86.752153  
## iter 80 value 83.373833  
## iter 90 value 82.035742  
## iter 100 value 81.571953  
## iter 110 value 81.436995  
## iter 120 value 81.262045  
## iter 130 value 81.249937  
## iter 140 value 81.244033  
## iter 150 value 81.241264  
## iter 160 value 81.239383  
## iter 170 value 81.237613  
## iter 180 value 81.226903  
## iter 190 value 80.944156  
## iter 200 value 76.853945  
## iter 210 value 72.135486  
## iter 220 value 70.941756  
## iter 230 value 69.634440  
## iter 240 value 69.069178  
## iter 250 value 67.378905  
## iter 260 value 66.675524  
## iter 270 value 66.461384  
## iter 280 value 66.428457  
## iter 290 value 66.404322  
## iter 300 value 66.389609  
## final value 66.389609   
## stopped after 300 iterations  
## # weights: 182  
## initial value 190.465293   
## iter 10 value 131.216219  
## iter 20 value 128.088047  
## iter 30 value 116.650345  
## iter 40 value 112.935655  
## iter 50 value 112.105271  
## iter 60 value 112.038602  
## iter 70 value 111.511035  
## iter 80 value 111.244754  
## iter 90 value 111.081421  
## iter 100 value 111.061243  
## iter 110 value 110.714227  
## iter 120 value 106.321768  
## iter 130 value 97.743572  
## iter 140 value 92.904143  
## iter 150 value 91.856967  
## iter 160 value 90.612139  
## iter 170 value 89.625454  
## iter 180 value 89.506321  
## iter 190 value 89.401238  
## iter 200 value 89.290139  
## iter 210 value 89.148150  
## iter 220 value 88.535584  
## iter 230 value 88.457034  
## iter 240 value 86.738013  
## iter 250 value 83.367741  
## iter 260 value 81.800071  
## iter 270 value 80.614608  
## iter 280 value 80.216395  
## iter 290 value 78.842430  
## iter 300 value 76.506672  
## final value 76.506672   
## stopped after 300 iterations  
## # weights: 182  
## initial value 140.662991   
## iter 10 value 132.532966  
## iter 20 value 127.250533  
## iter 30 value 123.297557  
## iter 40 value 111.570221  
## iter 50 value 104.824990  
## iter 60 value 103.081336  
## iter 70 value 99.796054  
## iter 80 value 99.194964  
## iter 90 value 99.080123  
## iter 100 value 98.578551  
## iter 110 value 98.238693  
## iter 120 value 97.126401  
## iter 130 value 96.624130  
## iter 140 value 95.934258  
## iter 150 value 94.659325  
## iter 160 value 94.410621  
## iter 170 value 93.510581  
## iter 180 value 92.363195  
## iter 190 value 91.470263  
## iter 200 value 90.900968  
## iter 210 value 90.209248  
## iter 220 value 90.047209  
## iter 230 value 89.985932  
## iter 240 value 89.926877  
## iter 250 value 89.628683  
## iter 260 value 86.361204  
## iter 270 value 84.718781  
## iter 280 value 84.360453  
## iter 290 value 84.138411  
## iter 300 value 82.405268  
## final value 82.405268   
## stopped after 300 iterations  
## # weights: 182  
## initial value 147.672493   
## iter 10 value 132.526154  
## iter 20 value 131.491870  
## iter 30 value 125.239053  
## iter 40 value 117.006138  
## iter 50 value 114.589204  
## iter 60 value 111.412574  
## iter 70 value 111.052466  
## iter 80 value 111.036923  
## iter 90 value 111.023210  
## iter 100 value 111.017120  
## iter 110 value 110.197038  
## iter 120 value 108.500010  
## iter 130 value 104.556582  
## iter 140 value 101.955253  
## iter 150 value 101.190174  
## iter 160 value 101.165899  
## iter 170 value 101.004600  
## iter 180 value 97.474994  
## iter 190 value 89.272333  
## iter 200 value 86.414649  
## iter 210 value 85.979239  
## iter 220 value 85.816947  
## iter 230 value 82.557622  
## iter 240 value 80.655684  
## iter 250 value 80.005108  
## iter 260 value 79.771472  
## iter 270 value 79.624087  
## iter 280 value 77.347157  
## iter 290 value 74.524628  
## iter 300 value 71.349919  
## final value 71.349919   
## stopped after 300 iterations  
## # weights: 182  
## initial value 330.758075   
## iter 10 value 134.247978  
## iter 20 value 122.769987  
## iter 30 value 118.693605  
## iter 40 value 116.702235  
## iter 50 value 115.906089  
## iter 60 value 115.413243  
## iter 70 value 114.562983  
## iter 80 value 113.421700  
## iter 90 value 113.187274  
## iter 100 value 112.978942  
## iter 110 value 112.069264  
## iter 120 value 110.041664  
## iter 130 value 108.989446  
## iter 140 value 108.983360  
## iter 150 value 108.980367  
## iter 160 value 105.745471  
## iter 170 value 100.662811  
## iter 180 value 99.402309  
## iter 190 value 95.116565  
## iter 200 value 93.692726  
## iter 210 value 93.176268  
## iter 220 value 92.965303  
## iter 230 value 90.215242  
## iter 240 value 88.316382  
## iter 250 value 86.882035  
## iter 260 value 85.241147  
## iter 270 value 83.846735  
## iter 280 value 80.021049  
## iter 290 value 78.508204  
## iter 300 value 76.903055  
## final value 76.903055   
## stopped after 300 iterations  
## # weights: 182  
## initial value 255.770111   
## iter 10 value 126.249457  
## iter 20 value 113.853882  
## iter 30 value 110.651058  
## iter 40 value 107.625827  
## iter 50 value 104.357501  
## iter 60 value 103.264126  
## iter 70 value 103.154863  
## iter 80 value 102.930366  
## iter 90 value 101.243373  
## iter 100 value 98.935035  
## iter 110 value 96.294968  
## iter 120 value 93.137463  
## iter 130 value 86.567454  
## iter 140 value 80.847668  
## iter 150 value 79.942107  
## iter 160 value 79.577632  
## iter 170 value 79.505824  
## iter 180 value 79.447652  
## iter 190 value 79.341426  
## iter 200 value 78.220968  
## iter 210 value 76.585070  
## iter 220 value 74.907885  
## iter 230 value 73.834322  
## iter 240 value 73.275342  
## iter 250 value 70.493085  
## iter 260 value 68.283496  
## iter 270 value 67.828958  
## iter 280 value 67.103268  
## iter 290 value 64.843131  
## iter 300 value 62.858365  
## final value 62.858365   
## stopped after 300 iterations  
## # weights: 182  
## initial value 503.088711   
## iter 10 value 130.573051  
## iter 20 value 122.119956  
## iter 30 value 119.429793  
## iter 40 value 118.147341  
## iter 50 value 117.807408  
## iter 60 value 117.555255  
## iter 70 value 115.477964  
## iter 80 value 112.289076  
## iter 90 value 111.806192  
## iter 100 value 111.437397  
## iter 110 value 110.639219  
## iter 120 value 110.562041  
## iter 130 value 110.518465  
## iter 140 value 110.454069  
## iter 150 value 108.599208  
## iter 160 value 103.226941  
## iter 170 value 98.615303  
## iter 180 value 96.446839  
## iter 190 value 95.078456  
## iter 200 value 94.629848  
## iter 210 value 94.325633  
## iter 220 value 93.368566  
## iter 230 value 91.057238  
## iter 240 value 90.635238  
## iter 250 value 89.773602  
## iter 260 value 83.941356  
## iter 270 value 81.693550  
## iter 280 value 81.158982  
## iter 290 value 80.919334  
## iter 300 value 80.836376  
## final value 80.836376   
## stopped after 300 iterations  
## # weights: 182  
## initial value 135.603096   
## iter 10 value 122.727263  
## iter 20 value 114.996344  
## iter 30 value 108.078256  
## iter 40 value 100.992167  
## iter 50 value 98.104369  
## iter 60 value 90.687049  
## iter 70 value 87.692942  
## iter 80 value 85.599111  
## iter 90 value 83.991017  
## iter 100 value 82.714552  
## iter 110 value 82.021579  
## iter 120 value 80.418024  
## iter 130 value 79.404608  
## iter 140 value 79.318937  
## iter 150 value 78.984458  
## iter 160 value 78.829932  
## iter 170 value 77.936222  
## iter 180 value 77.048527  
## iter 190 value 76.623703  
## iter 200 value 76.607997  
## iter 210 value 76.601011  
## iter 220 value 76.597021  
## iter 230 value 76.594048  
## iter 240 value 76.587536  
## iter 250 value 76.033405  
## iter 260 value 75.414507  
## iter 270 value 75.054633  
## iter 280 value 74.470899  
## iter 290 value 74.384133  
## iter 300 value 74.326872  
## final value 74.326872   
## stopped after 300 iterations  
## # weights: 182  
## initial value 160.878347   
## iter 10 value 129.498474  
## iter 20 value 121.726224  
## iter 30 value 118.271409  
## iter 40 value 116.968783  
## iter 50 value 116.930643  
## iter 60 value 116.914891  
## iter 70 value 116.382246  
## iter 80 value 116.110543  
## iter 90 value 116.107450  
## iter 100 value 116.102560  
## iter 110 value 115.805285  
## iter 120 value 113.712208  
## iter 130 value 111.754932  
## iter 140 value 107.284216  
## iter 150 value 104.997180  
## iter 160 value 104.282960  
## iter 170 value 103.816583  
## iter 180 value 102.998035  
## iter 190 value 102.783945  
## iter 200 value 99.638968  
## iter 210 value 95.107023  
## iter 220 value 91.335086  
## iter 230 value 91.075164  
## iter 240 value 90.274790  
## iter 250 value 88.135670  
## iter 260 value 80.010610  
## iter 270 value 72.958597  
## iter 280 value 69.412176  
## iter 290 value 67.607223  
## iter 300 value 67.343758  
## final value 67.343758   
## stopped after 300 iterations  
## # weights: 182  
## initial value 139.619993   
## iter 10 value 122.459098  
## iter 20 value 119.824772  
## iter 30 value 107.683717  
## iter 40 value 104.394322  
## iter 50 value 103.807038  
## iter 60 value 103.770646  
## iter 70 value 103.412227  
## iter 80 value 103.222367  
## iter 90 value 102.894051  
## iter 100 value 99.290345  
## iter 110 value 98.919669  
## iter 120 value 98.887002  
## iter 130 value 98.827023  
## iter 140 value 98.628523  
## iter 150 value 98.586915  
## iter 160 value 98.569351  
## iter 170 value 98.485069  
## iter 180 value 98.055318  
## iter 190 value 97.955718  
## iter 200 value 97.760919  
## iter 210 value 97.740191  
## iter 220 value 97.433117  
## iter 230 value 95.574204  
## iter 240 value 91.748751  
## iter 250 value 90.672021  
## iter 260 value 86.953681  
## iter 270 value 80.157442  
## iter 280 value 78.063168  
## iter 290 value 76.912054  
## iter 300 value 76.303355  
## final value 76.303355   
## stopped after 300 iterations  
## # weights: 194  
## initial value 161.461342   
## iter 10 value 132.911883  
## iter 20 value 132.881116  
## iter 30 value 131.786637  
## iter 40 value 131.779412  
## iter 50 value 115.216920  
## iter 60 value 105.312269  
## iter 70 value 102.226431  
## iter 80 value 100.551237  
## iter 90 value 99.847439  
## iter 100 value 97.637054  
## iter 110 value 97.321108  
## iter 120 value 97.006455  
## iter 130 value 96.888469  
## iter 140 value 96.571136  
## iter 150 value 96.338584  
## iter 160 value 96.253897  
## iter 170 value 95.940241  
## iter 180 value 95.701773  
## iter 190 value 95.311503  
## iter 200 value 93.619751  
## iter 210 value 91.935313  
## iter 220 value 88.837751  
## iter 230 value 82.542736  
## iter 240 value 79.865911  
## iter 250 value 78.807246  
## iter 260 value 78.758747  
## iter 270 value 78.740405  
## iter 280 value 78.633077  
## iter 290 value 78.005688  
## iter 300 value 77.276608  
## final value 77.276608   
## stopped after 300 iterations  
## # weights: 194  
## initial value 142.500153   
## iter 10 value 128.395892  
## iter 20 value 122.558814  
## iter 30 value 120.320984  
## iter 40 value 117.867167  
## iter 50 value 116.368149  
## iter 60 value 114.030494  
## iter 70 value 113.432953  
## iter 80 value 112.784232  
## iter 90 value 112.767270  
## iter 100 value 112.757864  
## iter 110 value 112.345432  
## iter 120 value 108.567545  
## iter 130 value 101.566156  
## iter 140 value 100.388627  
## iter 150 value 99.896159  
## iter 160 value 93.652190  
## iter 170 value 88.922739  
## iter 180 value 85.257482  
## iter 190 value 82.718794  
## iter 200 value 82.213046  
## iter 210 value 79.961145  
## iter 220 value 76.856550  
## iter 230 value 75.832382  
## iter 240 value 74.499831  
## iter 250 value 73.421799  
## iter 260 value 72.304131  
## iter 270 value 71.440906  
## iter 280 value 69.519576  
## iter 290 value 65.572633  
## iter 300 value 64.796081  
## final value 64.796081   
## stopped after 300 iterations  
## # weights: 194  
## initial value 145.156381   
## iter 10 value 125.715318  
## iter 20 value 120.297239  
## iter 30 value 120.248611  
## iter 40 value 120.232357  
## iter 50 value 120.217509  
## iter 60 value 117.794245  
## iter 70 value 115.024911  
## iter 80 value 113.658225  
## iter 90 value 112.574121  
## iter 100 value 112.265795  
## iter 110 value 112.250782  
## iter 120 value 112.246113  
## iter 130 value 112.243080  
## iter 140 value 111.421330  
## iter 150 value 108.541706  
## iter 160 value 107.788575  
## iter 170 value 107.675701  
## iter 180 value 103.990754  
## iter 190 value 94.642926  
## iter 200 value 92.979048  
## iter 210 value 92.725827  
## iter 220 value 92.091603  
## iter 230 value 92.027680  
## iter 240 value 91.993352  
## iter 250 value 91.140723  
## iter 260 value 85.579309  
## iter 270 value 76.943379  
## iter 280 value 73.944677  
## iter 290 value 71.701093  
## iter 300 value 70.420929  
## final value 70.420929   
## stopped after 300 iterations  
## # weights: 194  
## initial value 143.229812   
## iter 10 value 121.903745  
## iter 20 value 116.504765  
## iter 30 value 104.103029  
## iter 40 value 97.614743  
## iter 50 value 95.660493  
## iter 60 value 94.044084  
## iter 70 value 93.693938  
## iter 80 value 91.850487  
## iter 90 value 91.768287  
## iter 100 value 91.193718  
## iter 110 value 90.371211  
## iter 120 value 88.364568  
## iter 130 value 85.016131  
## iter 140 value 82.836017  
## iter 150 value 82.091646  
## iter 160 value 81.786953  
## iter 170 value 81.613868  
## iter 180 value 81.571023  
## iter 190 value 81.532564  
## iter 200 value 81.526644  
## iter 210 value 81.520461  
## iter 220 value 81.517941  
## iter 230 value 81.516127  
## iter 240 value 80.926617  
## iter 250 value 77.169050  
## iter 260 value 72.434273  
## iter 270 value 67.293068  
## iter 280 value 63.170300  
## iter 290 value 57.734552  
## iter 300 value 50.008738  
## final value 50.008738   
## stopped after 300 iterations  
## # weights: 194  
## initial value 183.532566   
## iter 10 value 130.462653  
## iter 20 value 124.076451  
## iter 30 value 119.971457  
## iter 40 value 115.435736  
## iter 50 value 113.794049  
## iter 60 value 113.196412  
## iter 70 value 111.792418  
## iter 80 value 111.516521  
## iter 90 value 111.455197  
## iter 100 value 111.438691  
## iter 110 value 110.613929  
## iter 120 value 107.504644  
## iter 130 value 103.753813  
## iter 140 value 94.792306  
## iter 150 value 94.183790  
## iter 160 value 93.995710  
## iter 170 value 93.655262  
## iter 180 value 93.589473  
## iter 190 value 93.423942  
## iter 200 value 93.337475  
## iter 210 value 93.309454  
## iter 220 value 91.922869  
## iter 230 value 88.814812  
## iter 240 value 84.428250  
## iter 250 value 83.266151  
## iter 260 value 82.247008  
## iter 270 value 81.400793  
## iter 280 value 81.264372  
## iter 290 value 81.152378  
## iter 300 value 80.952075  
## final value 80.952075   
## stopped after 300 iterations  
## # weights: 194  
## initial value 143.277975   
## iter 10 value 122.965264  
## iter 20 value 115.608497  
## iter 30 value 108.274017  
## iter 40 value 101.831684  
## iter 50 value 97.339053  
## iter 60 value 96.117922  
## iter 70 value 93.968082  
## iter 80 value 91.416237  
## iter 90 value 89.963764  
## iter 100 value 89.102557  
## iter 110 value 88.757079  
## iter 120 value 87.837310  
## iter 130 value 87.555317  
## iter 140 value 87.448684  
## iter 150 value 87.385628  
## iter 160 value 87.340224  
## iter 170 value 86.517122  
## iter 180 value 83.200676  
## iter 190 value 79.951226  
## iter 200 value 77.777114  
## iter 210 value 77.207541  
## iter 220 value 76.534473  
## iter 230 value 76.487168  
## iter 240 value 76.443294  
## iter 250 value 76.047666  
## iter 260 value 75.783768  
## iter 270 value 75.742453  
## iter 280 value 75.392929  
## iter 290 value 74.666027  
## iter 300 value 74.107615  
## final value 74.107615   
## stopped after 300 iterations  
## # weights: 194  
## initial value 151.438280   
## iter 10 value 132.047278  
## iter 20 value 122.895001  
## iter 30 value 117.994889  
## iter 40 value 117.826882  
## iter 50 value 117.816506  
## iter 60 value 117.809842  
## iter 70 value 117.483744  
## iter 80 value 116.641281  
## iter 90 value 116.614089  
## iter 100 value 116.611975  
## iter 110 value 115.540309  
## iter 120 value 107.566419  
## iter 130 value 106.832074  
## iter 140 value 106.693556  
## iter 150 value 106.123049  
## iter 160 value 105.913133  
## iter 170 value 105.710291  
## iter 180 value 104.752957  
## iter 190 value 102.819983  
## iter 200 value 101.148949  
## iter 210 value 100.980812  
## iter 220 value 100.945341  
## iter 230 value 100.922478  
## iter 240 value 100.908853  
## iter 250 value 100.903900  
## iter 260 value 100.899495  
## iter 270 value 100.236048  
## iter 280 value 98.484703  
## iter 290 value 89.397501  
## iter 300 value 87.958641  
## final value 87.958641   
## stopped after 300 iterations  
## # weights: 194  
## initial value 198.398011   
## iter 10 value 123.424519  
## iter 20 value 117.935833  
## iter 30 value 116.354370  
## iter 40 value 110.767517  
## iter 50 value 108.440996  
## iter 60 value 104.239907  
## iter 70 value 98.585294  
## iter 80 value 93.562173  
## iter 90 value 92.843524  
## iter 100 value 92.330597  
## iter 110 value 91.171383  
## iter 120 value 90.902630  
## iter 130 value 90.426245  
## iter 140 value 89.400176  
## iter 150 value 88.820275  
## iter 160 value 88.700805  
## iter 170 value 88.682294  
## iter 180 value 88.564353  
## iter 190 value 88.437365  
## iter 200 value 88.409476  
## iter 210 value 88.403549  
## iter 220 value 88.396983  
## iter 230 value 86.705601  
## iter 240 value 84.801453  
## iter 250 value 83.030461  
## iter 260 value 82.315058  
## iter 270 value 81.726584  
## iter 280 value 81.629450  
## iter 290 value 81.459866  
## iter 300 value 81.235132  
## final value 81.235132   
## stopped after 300 iterations  
## # weights: 194  
## initial value 173.182420   
## iter 10 value 130.147679  
## iter 20 value 126.057566  
## iter 30 value 120.538528  
## iter 40 value 117.573259  
## iter 50 value 111.204972  
## iter 60 value 105.718764  
## iter 70 value 102.105034  
## iter 80 value 97.255430  
## iter 90 value 94.312849  
## iter 100 value 91.750688  
## iter 110 value 91.326715  
## iter 120 value 90.669692  
## iter 130 value 90.317122  
## iter 140 value 90.157785  
## iter 150 value 89.567039  
## iter 160 value 89.314050  
## iter 170 value 89.272772  
## iter 180 value 89.245098  
## iter 190 value 89.179932  
## iter 200 value 89.096034  
## iter 210 value 89.086228  
## iter 220 value 89.075335  
## iter 230 value 89.071598  
## iter 240 value 89.029936  
## iter 250 value 88.954823  
## iter 260 value 87.657171  
## iter 270 value 83.219223  
## iter 280 value 81.060957  
## iter 290 value 79.314456  
## iter 300 value 79.208501  
## final value 79.208501   
## stopped after 300 iterations  
## # weights: 194  
## initial value 231.325171   
## iter 10 value 129.530813  
## iter 20 value 125.282782  
## iter 30 value 123.097082  
## iter 40 value 122.678612  
## iter 50 value 122.310245  
## iter 60 value 122.270088  
## iter 70 value 122.231983  
## iter 80 value 121.831745  
## iter 90 value 116.911222  
## iter 100 value 116.585249  
## iter 110 value 113.177020  
## iter 120 value 113.066581  
## iter 130 value 113.016895  
## iter 140 value 112.966887  
## iter 150 value 112.355945  
## iter 160 value 111.021935  
## iter 170 value 110.403967  
## iter 180 value 109.956441  
## iter 190 value 109.676566  
## iter 200 value 107.605982  
## iter 210 value 104.112792  
## iter 220 value 103.922714  
## iter 230 value 103.840598  
## iter 240 value 102.630396  
## iter 250 value 97.628496  
## iter 260 value 97.217467  
## iter 270 value 96.900801  
## iter 280 value 95.127390  
## iter 290 value 91.079020  
## iter 300 value 89.584425  
## final value 89.584425   
## stopped after 300 iterations  
## # weights: 206  
## initial value 356.261147   
## iter 10 value 131.812719  
## iter 20 value 130.365166  
## iter 30 value 128.899889  
## iter 40 value 128.587544  
## iter 50 value 124.960327  
## iter 60 value 123.045549  
## iter 70 value 122.613824  
## iter 80 value 122.600291  
## iter 90 value 122.590541  
## iter 100 value 122.584373  
## iter 110 value 121.294926  
## iter 120 value 107.437505  
## iter 130 value 103.442812  
## iter 140 value 101.027440  
## iter 150 value 100.407157  
## iter 160 value 100.386733  
## iter 170 value 100.147881  
## iter 180 value 100.049860  
## iter 190 value 99.084817  
## iter 200 value 96.993863  
## iter 210 value 95.452771  
## iter 220 value 93.479780  
## iter 230 value 91.106304  
## iter 240 value 89.752363  
## iter 250 value 88.052933  
## iter 260 value 83.999446  
## iter 270 value 82.252719  
## iter 280 value 82.069808  
## iter 290 value 81.253690  
## iter 300 value 77.346215  
## final value 77.346215   
## stopped after 300 iterations  
## # weights: 206  
## initial value 208.254537   
## iter 10 value 130.730777  
## iter 20 value 124.959285  
## iter 30 value 119.009975  
## iter 40 value 116.750429  
## iter 50 value 116.006772  
## iter 60 value 115.981041  
## iter 70 value 115.430355  
## iter 80 value 113.058667  
## iter 90 value 109.448905  
## iter 100 value 107.457521  
## iter 110 value 103.729231  
## iter 120 value 102.282678  
## iter 130 value 101.934402  
## iter 140 value 100.334495  
## iter 150 value 97.386799  
## iter 160 value 94.232657  
## iter 170 value 92.257143  
## iter 180 value 89.379209  
## iter 190 value 87.822551  
## iter 200 value 87.287875  
## iter 210 value 86.948338  
## iter 220 value 86.092866  
## iter 230 value 85.522810  
## iter 240 value 85.340898  
## iter 250 value 85.224821  
## iter 260 value 83.763182  
## iter 270 value 82.316347  
## iter 280 value 79.198428  
## iter 290 value 78.949269  
## iter 300 value 78.895102  
## final value 78.895102   
## stopped after 300 iterations  
## # weights: 206  
## initial value 340.677929   
## iter 10 value 131.382954  
## iter 20 value 119.233930  
## iter 30 value 113.350042  
## iter 40 value 111.206852  
## iter 50 value 106.660502  
## iter 60 value 106.316729  
## iter 70 value 106.288631  
## iter 80 value 106.274160  
## iter 90 value 106.268644  
## iter 100 value 106.238638  
## iter 110 value 105.216067  
## iter 120 value 100.584396  
## iter 130 value 98.723550  
## iter 140 value 98.237497  
## iter 150 value 98.171492  
## iter 160 value 97.499584  
## iter 170 value 95.798301  
## iter 180 value 95.059709  
## iter 190 value 95.001174  
## iter 200 value 94.930799  
## iter 210 value 94.904015  
## iter 220 value 90.798025  
## iter 230 value 88.135189  
## iter 240 value 84.904390  
## iter 250 value 83.361892  
## iter 260 value 83.155488  
## iter 270 value 83.117547  
## iter 280 value 82.820939  
## iter 290 value 80.929378  
## iter 300 value 80.535674  
## final value 80.535674   
## stopped after 300 iterations  
## # weights: 206  
## initial value 330.969291   
## iter 10 value 133.725435  
## iter 20 value 127.382181  
## iter 30 value 125.116296  
## iter 40 value 125.093377  
## iter 50 value 124.555662  
## iter 60 value 116.358012  
## iter 70 value 106.247463  
## iter 80 value 102.665072  
## iter 90 value 102.178002  
## iter 100 value 98.348091  
## iter 110 value 97.011424  
## iter 120 value 95.654270  
## iter 130 value 94.884231  
## iter 140 value 93.641541  
## iter 150 value 93.549969  
## iter 160 value 93.162338  
## iter 170 value 87.149394  
## iter 180 value 79.410544  
## iter 190 value 77.143667  
## iter 200 value 76.621049  
## iter 210 value 76.489498  
## iter 220 value 75.935171  
## iter 230 value 75.489867  
## iter 240 value 75.094611  
## iter 250 value 74.839662  
## iter 260 value 74.764913  
## iter 270 value 74.636715  
## iter 280 value 74.107032  
## iter 290 value 73.108502  
## iter 300 value 72.848621  
## final value 72.848621   
## stopped after 300 iterations  
## # weights: 206  
## initial value 232.446805   
## iter 10 value 130.401441  
## iter 20 value 120.296524  
## iter 30 value 116.887474  
## iter 40 value 112.178155  
## iter 50 value 108.212429  
## iter 60 value 104.128074  
## iter 70 value 97.089942  
## iter 80 value 91.927057  
## iter 90 value 90.730047  
## iter 100 value 90.678105  
## iter 110 value 90.389648  
## iter 120 value 88.470159  
## iter 130 value 87.658159  
## iter 140 value 87.535505  
## iter 150 value 87.519914  
## iter 160 value 87.495288  
## iter 170 value 87.032712  
## iter 180 value 84.662951  
## iter 190 value 83.049129  
## iter 200 value 82.032508  
## iter 210 value 81.195022  
## iter 220 value 81.087936  
## iter 230 value 81.020973  
## iter 240 value 80.943967  
## iter 250 value 78.612979  
## iter 260 value 77.465246  
## iter 270 value 77.303257  
## iter 280 value 77.276524  
## iter 290 value 76.970175  
## iter 300 value 75.745752  
## final value 75.745752   
## stopped after 300 iterations  
## # weights: 206  
## initial value 209.627472   
## iter 10 value 122.735108  
## iter 20 value 117.546566  
## iter 30 value 114.493324  
## iter 40 value 113.115567  
## iter 50 value 113.083674  
## iter 60 value 112.591186  
## iter 70 value 111.914470  
## iter 80 value 109.762454  
## iter 90 value 109.071218  
## iter 100 value 109.044384  
## iter 110 value 109.037374  
## iter 120 value 109.018833  
## iter 130 value 107.546891  
## iter 140 value 105.704992  
## iter 150 value 104.032136  
## iter 160 value 103.192909  
## iter 170 value 101.636919  
## iter 180 value 101.149458  
## iter 190 value 100.590829  
## iter 200 value 95.099218  
## iter 210 value 93.537501  
## iter 220 value 91.293970  
## iter 230 value 90.719821  
## iter 240 value 89.489688  
## iter 250 value 86.391260  
## iter 260 value 84.406738  
## iter 270 value 84.023131  
## iter 280 value 83.982855  
## iter 290 value 83.561209  
## iter 300 value 83.218387  
## final value 83.218387   
## stopped after 300 iterations  
## # weights: 206  
## initial value 134.942154   
## iter 10 value 125.848622  
## iter 20 value 116.415317  
## iter 30 value 110.586272  
## iter 40 value 102.614263  
## iter 50 value 96.332898  
## iter 60 value 94.839220  
## iter 70 value 94.779840  
## iter 80 value 94.593047  
## iter 90 value 93.737112  
## iter 100 value 89.385205  
## iter 110 value 85.545610  
## iter 120 value 82.936459  
## iter 130 value 82.595720  
## iter 140 value 82.535919  
## iter 150 value 82.401242  
## iter 160 value 82.013004  
## iter 170 value 80.136648  
## iter 180 value 77.472494  
## iter 190 value 75.364518  
## iter 200 value 70.905810  
## iter 210 value 68.570244  
## iter 220 value 66.408810  
## iter 230 value 66.196846  
## iter 240 value 65.944468  
## iter 250 value 65.776076  
## iter 260 value 65.732076  
## iter 270 value 65.670799  
## iter 280 value 65.281516  
## iter 290 value 63.348541  
## iter 300 value 61.838130  
## final value 61.838130   
## stopped after 300 iterations  
## # weights: 206  
## initial value 160.401490   
## iter 10 value 125.534570  
## iter 20 value 115.483404  
## iter 30 value 109.988083  
## iter 40 value 106.158701  
## iter 50 value 99.330484  
## iter 60 value 93.743910  
## iter 70 value 89.812293  
## iter 80 value 89.155901  
## iter 90 value 85.355685  
## iter 100 value 83.864702  
## iter 110 value 83.493052  
## iter 120 value 82.548805  
## iter 130 value 81.982339  
## iter 140 value 80.995412  
## iter 150 value 78.606096  
## iter 160 value 76.030257  
## iter 170 value 74.563888  
## iter 180 value 72.737540  
## iter 190 value 71.630560  
## iter 200 value 71.473489  
## iter 210 value 71.059811  
## iter 220 value 70.511715  
## iter 230 value 69.627483  
## iter 240 value 68.825573  
## iter 250 value 66.605871  
## iter 260 value 58.350303  
## iter 270 value 54.283692  
## iter 280 value 53.173172  
## iter 290 value 52.502966  
## iter 300 value 52.118520  
## final value 52.118520   
## stopped after 300 iterations  
## # weights: 206  
## initial value 372.595685   
## iter 10 value 135.996970  
## iter 20 value 134.809532  
## iter 30 value 134.212707  
## iter 40 value 134.189766  
## iter 50 value 128.475612  
## iter 60 value 120.686479  
## iter 70 value 107.293855  
## iter 80 value 97.589970  
## iter 90 value 91.620781  
## iter 100 value 83.687524  
## iter 110 value 77.093393  
## iter 120 value 72.261989  
## iter 130 value 70.340279  
## iter 140 value 69.433633  
## iter 150 value 68.905860  
## iter 160 value 67.781996  
## iter 170 value 67.471570  
## iter 180 value 67.350675  
## iter 190 value 66.798135  
## iter 200 value 64.835181  
## iter 210 value 64.207441  
## iter 220 value 63.492055  
## iter 230 value 62.469667  
## iter 240 value 60.438973  
## iter 250 value 59.191892  
## iter 260 value 58.247255  
## iter 270 value 57.660221  
## iter 280 value 57.288070  
## iter 290 value 57.253272  
## iter 300 value 56.315803  
## final value 56.315803   
## stopped after 300 iterations  
## # weights: 206  
## initial value 132.413927   
## iter 10 value 125.936668  
## iter 20 value 119.281351  
## iter 30 value 110.649974  
## iter 40 value 106.062101  
## iter 50 value 97.787812  
## iter 60 value 92.752911  
## iter 70 value 90.628633  
## iter 80 value 90.137409  
## iter 90 value 89.845599  
## iter 100 value 89.659956  
## iter 110 value 89.199522  
## iter 120 value 88.568805  
## iter 130 value 88.423815  
## iter 140 value 88.237681  
## iter 150 value 88.191753  
## iter 160 value 88.014929  
## iter 170 value 86.896349  
## iter 180 value 85.685652  
## iter 190 value 83.485428  
## iter 200 value 82.912115  
## iter 210 value 79.296827  
## iter 220 value 76.242300  
## iter 230 value 72.189426  
## iter 240 value 70.597045  
## iter 250 value 70.315007  
## iter 260 value 69.706687  
## iter 270 value 69.224888  
## iter 280 value 68.687496  
## iter 290 value 65.826327  
## iter 300 value 64.936972  
## final value 64.936972   
## stopped after 300 iterations  
## # weights: 218  
## initial value 210.550447   
## iter 10 value 127.858613  
## iter 20 value 110.796009  
## iter 30 value 98.749751  
## iter 40 value 93.378853  
## iter 50 value 91.266648  
## iter 60 value 88.737213  
## iter 70 value 86.780900  
## iter 80 value 84.659009  
## iter 90 value 84.382415  
## iter 100 value 84.241279  
## iter 110 value 83.556915  
## iter 120 value 82.014460  
## iter 130 value 81.982590  
## iter 140 value 81.940792  
## iter 150 value 81.320766  
## iter 160 value 80.861873  
## iter 170 value 80.784701  
## iter 180 value 80.774590  
## iter 190 value 80.769662  
## iter 200 value 80.756168  
## iter 210 value 79.412862  
## iter 220 value 78.950424  
## iter 230 value 78.825276  
## iter 240 value 78.806353  
## iter 250 value 78.511407  
## iter 260 value 77.069421  
## iter 270 value 72.260743  
## iter 280 value 70.854028  
## iter 290 value 66.713044  
## iter 300 value 61.331310  
## final value 61.331310   
## stopped after 300 iterations  
## # weights: 218  
## initial value 135.874757   
## iter 10 value 122.259841  
## iter 20 value 112.376482  
## iter 30 value 111.287724  
## iter 40 value 105.170645  
## iter 50 value 99.884938  
## iter 60 value 97.172745  
## iter 70 value 97.062092  
## iter 80 value 96.892755  
## iter 90 value 96.820671  
## iter 100 value 96.622723  
## iter 110 value 96.397611  
## iter 120 value 96.331612  
## iter 130 value 96.325446  
## iter 140 value 96.320025  
## iter 150 value 95.994157  
## iter 160 value 94.012635  
## iter 170 value 92.611250  
## iter 180 value 91.683691  
## iter 190 value 91.620127  
## iter 200 value 85.614322  
## iter 210 value 82.288637  
## iter 220 value 81.438127  
## iter 230 value 80.873086  
## iter 240 value 80.637110  
## iter 250 value 80.501776  
## iter 260 value 80.456781  
## iter 270 value 80.350013  
## iter 280 value 80.001808  
## iter 290 value 77.473637  
## iter 300 value 75.789805  
## final value 75.789805   
## stopped after 300 iterations  
## # weights: 218  
## initial value 138.188436   
## iter 10 value 130.260642  
## iter 20 value 121.198523  
## iter 30 value 118.532318  
## iter 40 value 115.525223  
## iter 50 value 114.188756  
## iter 60 value 111.371192  
## iter 70 value 109.585804  
## iter 80 value 108.976999  
## iter 90 value 108.948278  
## iter 100 value 108.929448  
## iter 110 value 108.924126  
## iter 120 value 108.918462  
## iter 130 value 108.881688  
## iter 140 value 108.243171  
## iter 150 value 104.375735  
## iter 160 value 103.338191  
## iter 170 value 102.836868  
## iter 180 value 101.969496  
## iter 190 value 97.937505  
## iter 200 value 94.764549  
## iter 210 value 88.877834  
## iter 220 value 84.720028  
## iter 230 value 81.532786  
## iter 240 value 81.121735  
## iter 250 value 80.791433  
## iter 260 value 77.456513  
## iter 270 value 76.120777  
## iter 280 value 72.311377  
## iter 290 value 68.379663  
## iter 300 value 64.517289  
## final value 64.517289   
## stopped after 300 iterations  
## # weights: 218  
## initial value 146.141199   
## iter 10 value 125.455076  
## iter 20 value 116.139886  
## iter 30 value 112.819327  
## iter 40 value 105.044168  
## iter 50 value 98.233376  
## iter 60 value 93.291847  
## iter 70 value 92.623421  
## iter 80 value 92.479043  
## iter 90 value 92.321626  
## iter 100 value 92.292636  
## iter 110 value 91.385072  
## iter 120 value 88.340885  
## iter 130 value 86.872572  
## iter 140 value 86.388774  
## iter 150 value 86.367487  
## iter 160 value 86.342466  
## iter 170 value 86.131731  
## iter 180 value 85.752338  
## iter 190 value 85.667989  
## iter 200 value 85.056532  
## iter 210 value 84.846087  
## iter 220 value 84.444667  
## iter 230 value 84.284620  
## iter 240 value 84.233093  
## iter 250 value 82.637693  
## iter 260 value 81.114611  
## iter 270 value 77.103563  
## iter 280 value 72.487394  
## iter 290 value 64.576114  
## iter 300 value 56.728328  
## final value 56.728328   
## stopped after 300 iterations  
## # weights: 218  
## initial value 141.283323   
## iter 10 value 132.083200  
## iter 20 value 124.821842  
## iter 30 value 119.366461  
## iter 40 value 112.581931  
## iter 50 value 107.704585  
## iter 60 value 105.140593  
## iter 70 value 104.897881  
## iter 80 value 104.168004  
## iter 90 value 102.571931  
## iter 100 value 101.910324  
## iter 110 value 100.088931  
## iter 120 value 96.614778  
## iter 130 value 96.065320  
## iter 140 value 95.965684  
## iter 150 value 95.909465  
## iter 160 value 95.823270  
## iter 170 value 95.444526  
## iter 180 value 95.344211  
## iter 190 value 95.288643  
## iter 200 value 95.107730  
## iter 210 value 94.866228  
## iter 220 value 94.818644  
## iter 230 value 94.698443  
## iter 240 value 94.563538  
## iter 250 value 94.547873  
## iter 260 value 94.488317  
## iter 270 value 94.110164  
## iter 280 value 93.969662  
## iter 290 value 93.259367  
## iter 300 value 92.830215  
## final value 92.830215   
## stopped after 300 iterations  
## # weights: 218  
## initial value 136.496719   
## iter 10 value 120.151974  
## iter 20 value 108.400395  
## iter 30 value 100.989384  
## iter 40 value 99.620447  
## iter 50 value 99.592825  
## iter 60 value 99.576032  
## iter 70 value 99.567328  
## iter 80 value 99.303559  
## iter 90 value 95.329847  
## iter 100 value 93.189798  
## iter 110 value 91.834919  
## iter 120 value 88.519723  
## iter 130 value 87.545123  
## iter 140 value 84.180103  
## iter 150 value 81.107534  
## iter 160 value 80.145983  
## iter 170 value 78.882053  
## iter 180 value 78.517200  
## iter 190 value 78.303126  
## iter 200 value 75.914892  
## iter 210 value 72.496654  
## iter 220 value 70.548975  
## iter 230 value 69.920515  
## iter 240 value 69.588225  
## iter 250 value 69.440840  
## iter 260 value 69.347242  
## iter 270 value 69.315862  
## iter 280 value 69.305151  
## iter 290 value 69.231448  
## iter 300 value 69.171719  
## final value 69.171719   
## stopped after 300 iterations  
## # weights: 218  
## initial value 136.088912   
## iter 10 value 129.134230  
## iter 20 value 122.588791  
## iter 30 value 118.229967  
## iter 40 value 112.930075  
## iter 50 value 106.950178  
## iter 60 value 103.995282  
## iter 70 value 100.628414  
## iter 80 value 97.928295  
## iter 90 value 97.666728  
## iter 100 value 97.635173  
## iter 110 value 97.609407  
## iter 120 value 97.520483  
## iter 130 value 93.560121  
## iter 140 value 92.700242  
## iter 150 value 92.286028  
## iter 160 value 91.986349  
## iter 170 value 91.976925  
## iter 180 value 91.031512  
## iter 190 value 90.737638  
## iter 200 value 89.807624  
## iter 210 value 88.694955  
## iter 220 value 87.109320  
## iter 230 value 87.016399  
## iter 240 value 86.971660  
## iter 250 value 86.939922  
## iter 260 value 86.728308  
## iter 270 value 86.690473  
## iter 280 value 86.677293  
## iter 290 value 86.635330  
## iter 300 value 86.450055  
## final value 86.450055   
## stopped after 300 iterations  
## # weights: 218  
## initial value 170.732609   
## iter 10 value 125.490208  
## iter 20 value 113.670482  
## iter 30 value 103.124723  
## iter 40 value 94.707057  
## iter 50 value 93.469703  
## iter 60 value 93.388760  
## iter 70 value 92.981817  
## iter 80 value 92.669091  
## iter 90 value 92.384664  
## iter 100 value 91.429542  
## iter 110 value 90.442128  
## iter 120 value 90.194858  
## iter 130 value 89.438530  
## iter 140 value 88.337609  
## iter 150 value 88.170261  
## iter 160 value 87.831750  
## iter 170 value 87.309089  
## iter 180 value 86.880679  
## iter 190 value 86.672358  
## iter 200 value 86.492187  
## iter 210 value 86.456841  
## iter 220 value 86.440416  
## iter 230 value 86.261022  
## iter 240 value 85.487151  
## iter 250 value 85.443735  
## iter 260 value 85.428843  
## iter 270 value 85.402291  
## iter 280 value 84.488818  
## iter 290 value 80.795307  
## iter 300 value 79.400811  
## final value 79.400811   
## stopped after 300 iterations  
## # weights: 218  
## initial value 182.236787   
## iter 10 value 136.000405  
## iter 20 value 134.359539  
## iter 30 value 122.695956  
## iter 40 value 112.988689  
## iter 50 value 110.069743  
## iter 60 value 101.877086  
## iter 70 value 92.408261  
## iter 80 value 87.573467  
## iter 90 value 86.648331  
## iter 100 value 85.253854  
## iter 110 value 82.115492  
## iter 120 value 80.822544  
## iter 130 value 80.689131  
## iter 140 value 80.496912  
## iter 150 value 78.506466  
## iter 160 value 75.642064  
## iter 170 value 72.171432  
## iter 180 value 69.431986  
## iter 190 value 68.876756  
## iter 200 value 68.767421  
## iter 210 value 68.708137  
## iter 220 value 68.444267  
## iter 230 value 67.048244  
## iter 240 value 63.705046  
## iter 250 value 59.340411  
## iter 260 value 58.245589  
## iter 270 value 57.767638  
## iter 280 value 57.628524  
## iter 290 value 57.473285  
## iter 300 value 57.402439  
## final value 57.402439   
## stopped after 300 iterations  
## # weights: 218  
## initial value 302.017774   
## iter 10 value 122.830646  
## iter 20 value 111.935705  
## iter 30 value 106.034403  
## iter 40 value 103.079351  
## iter 50 value 100.923445  
## iter 60 value 100.824055  
## iter 70 value 100.756851  
## iter 80 value 100.235219  
## iter 90 value 98.544910  
## iter 100 value 97.435922  
## iter 110 value 96.332578  
## iter 120 value 96.286939  
## iter 130 value 96.232630  
## iter 140 value 95.695718  
## iter 150 value 95.438807  
## iter 160 value 95.004318  
## iter 170 value 94.588826  
## iter 180 value 94.152586  
## iter 190 value 87.972382  
## iter 200 value 85.034910  
## iter 210 value 84.565938  
## iter 220 value 84.028879  
## iter 230 value 83.961012  
## iter 240 value 83.628153  
## iter 250 value 83.525449  
## iter 260 value 83.152211  
## iter 270 value 82.659680  
## iter 280 value 81.505429  
## iter 290 value 73.764125  
## iter 300 value 68.084237  
## final value 68.084237   
## stopped after 300 iterations  
## # weights: 230  
## initial value 150.917078   
## iter 10 value 123.161644  
## iter 20 value 114.690380  
## iter 30 value 105.979125  
## iter 40 value 95.915707  
## iter 50 value 90.660705  
## iter 60 value 90.064200  
## iter 70 value 89.750702  
## iter 80 value 88.715960  
## iter 90 value 86.527964  
## iter 100 value 86.015232  
## iter 110 value 85.891795  
## iter 120 value 84.443478  
## iter 130 value 83.739046  
## iter 140 value 83.340863  
## iter 150 value 83.263814  
## iter 160 value 83.214734  
## iter 170 value 82.682268  
## iter 180 value 80.861111  
## iter 190 value 77.445333  
## iter 200 value 76.470281  
## iter 210 value 76.230597  
## iter 220 value 75.528218  
## iter 230 value 74.110306  
## iter 240 value 72.204995  
## iter 250 value 71.288938  
## iter 260 value 68.746655  
## iter 270 value 62.946370  
## iter 280 value 59.780327  
## iter 290 value 58.367007  
## iter 300 value 58.009720  
## final value 58.009720   
## stopped after 300 iterations  
## # weights: 230  
## initial value 363.521594   
## iter 10 value 136.001013  
## iter 20 value 134.001894  
## iter 30 value 127.452127  
## iter 40 value 118.858019  
## iter 50 value 116.930760  
## iter 60 value 116.740280  
## iter 70 value 116.725086  
## iter 80 value 116.707648  
## iter 90 value 115.560956  
## iter 100 value 113.631846  
## iter 110 value 113.088989  
## iter 120 value 108.989780  
## iter 130 value 104.222594  
## iter 140 value 102.323468  
## iter 150 value 102.008020  
## iter 160 value 101.997155  
## iter 170 value 101.926019  
## iter 180 value 101.142008  
## iter 190 value 95.248954  
## iter 200 value 89.604256  
## iter 210 value 84.769521  
## iter 220 value 81.730806  
## iter 230 value 79.560440  
## iter 240 value 78.049364  
## iter 250 value 77.872135  
## iter 260 value 77.659907  
## iter 270 value 77.029838  
## iter 280 value 76.373645  
## iter 290 value 75.928578  
## iter 300 value 75.110571  
## final value 75.110571   
## stopped after 300 iterations  
## # weights: 230  
## initial value 132.926860   
## iter 10 value 118.426964  
## iter 20 value 111.263638  
## iter 30 value 104.378815  
## iter 40 value 97.370528  
## iter 50 value 85.106344  
## iter 60 value 79.957196  
## iter 70 value 77.526391  
## iter 80 value 75.685730  
## iter 90 value 70.708404  
## iter 100 value 63.845230  
## iter 110 value 59.154915  
## iter 120 value 57.247302  
## iter 130 value 56.900122  
## iter 140 value 56.688300  
## iter 150 value 56.595407  
## iter 160 value 56.571524  
## iter 170 value 56.172883  
## iter 180 value 53.795928  
## iter 190 value 50.718021  
## iter 200 value 48.740692  
## iter 210 value 46.574501  
## iter 220 value 44.869402  
## iter 230 value 44.080312  
## iter 240 value 43.576842  
## iter 250 value 43.455183  
## iter 260 value 43.095334  
## iter 270 value 42.865315  
## iter 280 value 42.653712  
## iter 290 value 42.540052  
## iter 300 value 42.400675  
## final value 42.400675   
## stopped after 300 iterations  
## # weights: 230  
## initial value 200.267757   
## iter 10 value 121.699264  
## iter 20 value 115.031521  
## iter 30 value 108.634322  
## iter 40 value 107.055166  
## iter 50 value 106.940771  
## iter 60 value 106.744489  
## iter 70 value 106.575537  
## iter 80 value 105.664653  
## iter 90 value 103.774253  
## iter 100 value 103.752099  
## iter 110 value 103.717973  
## iter 120 value 101.892510  
## iter 130 value 98.837078  
## iter 140 value 92.960565  
## iter 150 value 91.114702  
## iter 160 value 90.967706  
## iter 170 value 90.721801  
## iter 180 value 90.178989  
## iter 190 value 86.897486  
## iter 200 value 85.139391  
## iter 210 value 84.032572  
## iter 220 value 83.848488  
## iter 230 value 83.636344  
## iter 240 value 82.611440  
## iter 250 value 82.533658  
## iter 260 value 82.489922  
## iter 270 value 82.366762  
## iter 280 value 80.690919  
## iter 290 value 78.369675  
## iter 300 value 77.501649  
## final value 77.501649   
## stopped after 300 iterations  
## # weights: 230  
## initial value 153.373685   
## iter 10 value 130.828158  
## iter 20 value 125.165991  
## iter 30 value 115.614798  
## iter 40 value 113.952085  
## iter 50 value 111.512899  
## iter 60 value 107.681088  
## iter 70 value 104.635359  
## iter 80 value 104.390295  
## iter 90 value 104.363871  
## iter 100 value 104.344966  
## iter 110 value 104.331869  
## iter 120 value 104.323265  
## iter 130 value 104.261577  
## iter 140 value 102.148006  
## iter 150 value 97.194144  
## iter 160 value 93.117607  
## iter 170 value 91.175564  
## iter 180 value 90.626742  
## iter 190 value 90.249700  
## iter 200 value 87.718249  
## iter 210 value 85.383311  
## iter 220 value 83.661485  
## iter 230 value 78.569774  
## iter 240 value 76.653958  
## iter 250 value 75.876986  
## iter 260 value 75.167491  
## iter 270 value 74.801516  
## iter 280 value 74.645344  
## iter 290 value 74.191343  
## iter 300 value 73.892665  
## final value 73.892665   
## stopped after 300 iterations  
## # weights: 230  
## initial value 267.742542   
## iter 10 value 133.072578  
## iter 20 value 132.940129  
## iter 30 value 132.919191  
## iter 40 value 132.554318  
## iter 50 value 127.398153  
## iter 60 value 116.926900  
## iter 70 value 114.144121  
## iter 80 value 112.750836  
## iter 90 value 111.326810  
## iter 100 value 108.828239  
## iter 110 value 107.987467  
## iter 120 value 107.345172  
## iter 130 value 105.317309  
## iter 140 value 102.015369  
## iter 150 value 101.067473  
## iter 160 value 99.966208  
## iter 170 value 99.052599  
## iter 180 value 96.997901  
## iter 190 value 96.277484  
## iter 200 value 96.103591  
## iter 210 value 96.053876  
## iter 220 value 95.943183  
## iter 230 value 95.692517  
## iter 240 value 95.154567  
## iter 250 value 91.989323  
## iter 260 value 90.227559  
## iter 270 value 89.654732  
## iter 280 value 86.973288  
## iter 290 value 85.362330  
## iter 300 value 84.248427  
## final value 84.248427   
## stopped after 300 iterations  
## # weights: 230  
## initial value 160.324980   
## iter 10 value 130.311735  
## iter 20 value 117.782089  
## iter 30 value 105.610537  
## iter 40 value 100.692039  
## iter 50 value 99.078426  
## iter 60 value 97.370324  
## iter 70 value 93.823780  
## iter 80 value 91.854885  
## iter 90 value 91.726541  
## iter 100 value 91.705270  
## iter 110 value 91.696891  
## iter 120 value 91.692251  
## iter 130 value 91.688203  
## iter 140 value 91.481301  
## iter 150 value 90.484447  
## iter 160 value 86.086707  
## iter 170 value 83.222757  
## iter 180 value 81.781236  
## iter 190 value 81.218555  
## iter 200 value 81.168610  
## iter 210 value 81.141266  
## iter 220 value 81.090383  
## iter 230 value 79.927906  
## iter 240 value 76.904683  
## iter 250 value 73.866079  
## iter 260 value 71.874539  
## iter 270 value 70.393959  
## iter 280 value 68.539398  
## iter 290 value 65.426335  
## iter 300 value 62.281579  
## final value 62.281579   
## stopped after 300 iterations  
## # weights: 230  
## initial value 162.005186   
## iter 10 value 125.709925  
## iter 20 value 118.899519  
## iter 30 value 113.667989  
## iter 40 value 112.081671  
## iter 50 value 110.640046  
## iter 60 value 107.129580  
## iter 70 value 100.963032  
## iter 80 value 99.207257  
## iter 90 value 98.055529  
## iter 100 value 97.875147  
## iter 110 value 97.835699  
## iter 120 value 97.796123  
## iter 130 value 97.773421  
## iter 140 value 97.635597  
## iter 150 value 96.943674  
## iter 160 value 94.409238  
## iter 170 value 93.155423  
## iter 180 value 92.727416  
## iter 190 value 92.388036  
## iter 200 value 89.761781  
## iter 210 value 86.492492  
## iter 220 value 84.964853  
## iter 230 value 84.775397  
## iter 240 value 84.634878  
## iter 250 value 84.553188  
## iter 260 value 84.474401  
## iter 270 value 84.422955  
## iter 280 value 83.830657  
## iter 290 value 83.260654  
## iter 300 value 81.234266  
## final value 81.234266   
## stopped after 300 iterations  
## # weights: 230  
## initial value 366.065030   
## iter 10 value 132.232822  
## iter 20 value 124.229151  
## iter 30 value 121.412583  
## iter 40 value 120.284306  
## iter 50 value 120.026156  
## iter 60 value 119.429517  
## iter 70 value 118.745591  
## iter 80 value 118.079120  
## iter 90 value 117.519592  
## iter 100 value 117.354997  
## iter 110 value 117.058979  
## iter 120 value 117.016125  
## iter 130 value 116.958106  
## iter 140 value 116.538659  
## iter 150 value 116.393220  
## iter 160 value 116.378201  
## iter 170 value 115.429053  
## iter 180 value 114.036822  
## iter 190 value 113.364971  
## iter 200 value 112.335503  
## iter 210 value 107.531206  
## iter 220 value 104.032220  
## iter 230 value 103.180054  
## iter 240 value 103.123788  
## iter 250 value 103.111617  
## iter 260 value 103.101691  
## iter 270 value 103.094001  
## iter 280 value 103.039013  
## iter 290 value 102.290887  
## iter 300 value 98.995525  
## final value 98.995525   
## stopped after 300 iterations  
## # weights: 230  
## initial value 142.191340   
## iter 10 value 132.156435  
## iter 20 value 120.150245  
## iter 30 value 116.630574  
## iter 40 value 116.313763  
## iter 50 value 115.271583  
## iter 60 value 115.159272  
## iter 70 value 114.876388  
## iter 80 value 111.802273  
## iter 90 value 110.829405  
## iter 100 value 105.442915  
## iter 110 value 102.631190  
## iter 120 value 100.747724  
## iter 130 value 100.570527  
## iter 140 value 100.288268  
## iter 150 value 100.113207  
## iter 160 value 100.023992  
## iter 170 value 99.792660  
## iter 180 value 99.393793  
## iter 190 value 99.011885  
## iter 200 value 98.887992  
## iter 210 value 98.852126  
## iter 220 value 98.792138  
## iter 230 value 98.768879  
## iter 240 value 98.762938  
## iter 250 value 98.760111  
## iter 260 value 98.758843  
## iter 270 value 98.758167  
## final value 98.757706   
## converged  
## # weights: 242  
## initial value 247.642457   
## iter 10 value 124.129162  
## iter 20 value 119.646072  
## iter 30 value 114.243396  
## iter 40 value 112.233616  
## iter 50 value 112.217697  
## iter 60 value 112.204774  
## iter 70 value 111.843646  
## iter 80 value 104.332747  
## iter 90 value 100.020249  
## iter 100 value 97.573133  
## iter 110 value 94.239128  
## iter 120 value 92.737838  
## iter 130 value 92.702363  
## iter 140 value 92.293612  
## iter 150 value 86.726500  
## iter 160 value 85.580302  
## iter 170 value 85.312914  
## iter 180 value 85.296137  
## iter 190 value 85.285576  
## iter 200 value 85.135476  
## iter 210 value 84.845745  
## iter 220 value 83.081637  
## iter 230 value 81.744944  
## iter 240 value 81.722449  
## iter 250 value 81.633047  
## iter 260 value 78.655668  
## iter 270 value 77.861162  
## iter 280 value 77.578196  
## iter 290 value 77.492361  
## iter 300 value 77.263789  
## final value 77.263789   
## stopped after 300 iterations  
## # weights: 242  
## initial value 176.383446   
## iter 10 value 126.639865  
## iter 20 value 120.033577  
## iter 30 value 112.449121  
## iter 40 value 106.859842  
## iter 50 value 104.816219  
## iter 60 value 102.419354  
## iter 70 value 89.779372  
## iter 80 value 82.197902  
## iter 90 value 79.296954  
## iter 100 value 79.140532  
## iter 110 value 78.517714  
## iter 120 value 75.672694  
## iter 130 value 73.980974  
## iter 140 value 73.312777  
## iter 150 value 72.950626  
## iter 160 value 72.583406  
## iter 170 value 72.518238  
## iter 180 value 71.953838  
## iter 190 value 71.597737  
## iter 200 value 71.503886  
## iter 210 value 71.274192  
## iter 220 value 70.629146  
## iter 230 value 70.440773  
## iter 240 value 70.372192  
## iter 250 value 70.154704  
## iter 260 value 68.741111  
## iter 270 value 66.380588  
## iter 280 value 63.644493  
## iter 290 value 63.085419  
## iter 300 value 62.730672  
## final value 62.730672   
## stopped after 300 iterations  
## # weights: 242  
## initial value 240.542120   
## iter 10 value 122.414681  
## iter 20 value 113.293235  
## iter 30 value 100.210704  
## iter 40 value 89.446270  
## iter 50 value 84.716917  
## iter 60 value 83.647165  
## iter 70 value 82.544715  
## iter 80 value 81.942185  
## iter 90 value 80.803241  
## iter 100 value 80.631463  
## iter 110 value 80.590012  
## iter 120 value 80.162876  
## iter 130 value 79.549209  
## iter 140 value 79.311812  
## iter 150 value 78.395720  
## iter 160 value 77.424132  
## iter 170 value 77.055192  
## iter 180 value 76.739271  
## iter 190 value 76.213378  
## iter 200 value 76.038612  
## iter 210 value 75.992685  
## iter 220 value 75.956511  
## iter 230 value 75.746236  
## iter 240 value 75.473386  
## iter 250 value 74.173669  
## iter 260 value 73.736095  
## iter 270 value 73.660018  
## iter 280 value 73.615032  
## iter 290 value 73.383875  
## iter 300 value 72.933848  
## final value 72.933848   
## stopped after 300 iterations  
## # weights: 242  
## initial value 339.413190   
## iter 10 value 126.410487  
## iter 20 value 116.637051  
## iter 30 value 109.124061  
## iter 40 value 101.687233  
## iter 50 value 94.722182  
## iter 60 value 92.449354  
## iter 70 value 91.348510  
## iter 80 value 90.835836  
## iter 90 value 90.622932  
## iter 100 value 90.453625  
## iter 110 value 90.027091  
## iter 120 value 89.871033  
## iter 130 value 89.833460  
## iter 140 value 89.100967  
## iter 150 value 87.571913  
## iter 160 value 81.698422  
## iter 170 value 78.582370  
## iter 180 value 77.264600  
## iter 190 value 76.753945  
## iter 200 value 76.299319  
## iter 210 value 76.210051  
## iter 220 value 75.902621  
## iter 230 value 75.164860  
## iter 240 value 72.922137  
## iter 250 value 72.385579  
## iter 260 value 71.243626  
## iter 270 value 70.929143  
## iter 280 value 70.196459  
## iter 290 value 69.752728  
## iter 300 value 68.033988  
## final value 68.033988   
## stopped after 300 iterations  
## # weights: 242  
## initial value 561.277508   
## iter 10 value 133.865588  
## iter 20 value 127.875659  
## iter 30 value 123.943151  
## iter 40 value 115.722852  
## iter 50 value 107.359548  
## iter 60 value 106.891116  
## iter 70 value 106.659231  
## iter 80 value 106.643064  
## iter 90 value 106.590463  
## iter 100 value 105.705130  
## iter 110 value 104.716867  
## iter 120 value 103.114550  
## iter 130 value 102.579399  
## iter 140 value 102.551184  
## iter 150 value 101.754771  
## iter 160 value 99.142097  
## iter 170 value 98.350254  
## iter 180 value 92.534186  
## iter 190 value 88.415620  
## iter 200 value 87.988409  
## iter 210 value 87.576431  
## iter 220 value 86.961351  
## iter 230 value 86.519773  
## iter 240 value 86.306973  
## iter 250 value 86.274799  
## iter 260 value 86.250949  
## iter 270 value 85.340460  
## iter 280 value 83.238216  
## iter 290 value 82.119984  
## iter 300 value 79.805359  
## final value 79.805359   
## stopped after 300 iterations  
## # weights: 242  
## initial value 143.408109   
## iter 10 value 128.418102  
## iter 20 value 120.340504  
## iter 30 value 113.509588  
## iter 40 value 110.997020  
## iter 50 value 110.749880  
## iter 60 value 110.733711  
## iter 70 value 110.670923  
## iter 80 value 108.888714  
## iter 90 value 103.679150  
## iter 100 value 95.591945  
## iter 110 value 90.401513  
## iter 120 value 87.694653  
## iter 130 value 87.288864  
## iter 140 value 83.969564  
## iter 150 value 79.494080  
## iter 160 value 77.134089  
## iter 170 value 72.761583  
## iter 180 value 68.975157  
## iter 190 value 68.290396  
## iter 200 value 68.152700  
## iter 210 value 68.023039  
## iter 220 value 67.762321  
## iter 230 value 67.624859  
## iter 240 value 67.455113  
## iter 250 value 67.390849  
## iter 260 value 66.697287  
## iter 270 value 64.634832  
## iter 280 value 64.351695  
## iter 290 value 64.232993  
## iter 300 value 64.171723  
## final value 64.171723   
## stopped after 300 iterations  
## # weights: 242  
## initial value 172.881262   
## iter 10 value 127.415571  
## iter 20 value 122.606519  
## iter 30 value 105.506498  
## iter 40 value 102.015322  
## iter 50 value 100.459884  
## iter 60 value 100.427431  
## iter 70 value 100.407251  
## iter 80 value 100.398164  
## iter 90 value 97.851723  
## iter 100 value 91.365367  
## iter 110 value 85.664053  
## iter 120 value 76.986388  
## iter 130 value 72.847304  
## iter 140 value 69.570449  
## iter 150 value 68.426942  
## iter 160 value 68.289813  
## iter 170 value 68.129818  
## iter 180 value 67.698419  
## iter 190 value 67.254679  
## iter 200 value 66.947242  
## iter 210 value 66.283912  
## iter 220 value 64.878725  
## iter 230 value 64.710192  
## iter 240 value 64.618844  
## iter 250 value 64.413188  
## iter 260 value 61.994225  
## iter 270 value 60.915338  
## iter 280 value 60.696222  
## iter 290 value 60.388741  
## iter 300 value 59.582541  
## final value 59.582541   
## stopped after 300 iterations  
## # weights: 242  
## initial value 152.551572   
## iter 10 value 123.224756  
## iter 20 value 115.502762  
## iter 30 value 103.776998  
## iter 40 value 99.669901  
## iter 50 value 94.473257  
## iter 60 value 92.044868  
## iter 70 value 88.500589  
## iter 80 value 87.420279  
## iter 90 value 86.768474  
## iter 100 value 86.498264  
## iter 110 value 86.100892  
## iter 120 value 84.411811  
## iter 130 value 83.839545  
## iter 140 value 83.637101  
## iter 150 value 82.954494  
## iter 160 value 82.257969  
## iter 170 value 81.947656  
## iter 180 value 81.794844  
## iter 190 value 81.590065  
## iter 200 value 81.275359  
## iter 210 value 81.244101  
## iter 220 value 81.235279  
## iter 230 value 80.536075  
## iter 240 value 78.564848  
## iter 250 value 77.904318  
## iter 260 value 77.527999  
## iter 270 value 77.335946  
## iter 280 value 77.249772  
## iter 290 value 77.233783  
## iter 300 value 77.215310  
## final value 77.215310   
## stopped after 300 iterations  
## # weights: 242  
## initial value 145.590106   
## iter 10 value 127.863542  
## iter 20 value 123.935587  
## iter 30 value 121.022967  
## iter 40 value 120.119314  
## iter 50 value 119.798965  
## iter 60 value 119.770348  
## iter 70 value 119.726350  
## iter 80 value 117.794767  
## iter 90 value 116.587197  
## iter 100 value 116.261507  
## iter 110 value 115.108495  
## iter 120 value 112.647400  
## iter 130 value 111.508501  
## iter 140 value 110.912307  
## iter 150 value 109.771590  
## iter 160 value 109.158761  
## iter 170 value 109.048001  
## iter 180 value 108.608756  
## iter 190 value 106.446379  
## iter 200 value 105.698634  
## iter 210 value 105.400524  
## iter 220 value 105.305755  
## iter 230 value 105.214265  
## iter 240 value 105.109763  
## iter 250 value 104.673902  
## iter 260 value 99.256934  
## iter 270 value 94.985315  
## iter 280 value 93.041265  
## iter 290 value 91.754275  
## iter 300 value 91.715408  
## final value 91.715408   
## stopped after 300 iterations  
## # weights: 242  
## initial value 194.143110   
## iter 10 value 127.809363  
## iter 20 value 120.367749  
## iter 30 value 110.951601  
## iter 40 value 106.594769  
## iter 50 value 100.315002  
## iter 60 value 96.944090  
## iter 70 value 95.849545  
## iter 80 value 94.908423  
## iter 90 value 94.745717  
## iter 100 value 94.643832  
## iter 110 value 93.779705  
## iter 120 value 93.014517  
## iter 130 value 91.510082  
## iter 140 value 89.263027  
## iter 150 value 88.106043  
## iter 160 value 87.637629  
## iter 170 value 87.278856  
## iter 180 value 87.231729  
## iter 190 value 86.851733  
## iter 200 value 86.163270  
## iter 210 value 85.807301  
## iter 220 value 84.984545  
## iter 230 value 81.852207  
## iter 240 value 80.608406  
## iter 250 value 80.318222  
## iter 260 value 79.585451  
## iter 270 value 79.482616  
## iter 280 value 79.438617  
## iter 290 value 79.401468  
## iter 300 value 79.385066  
## final value 79.385066   
## stopped after 300 iterations

plot(sizes, miscl.cv, type="l", xlab="size", ylab="misclassification rate", ylim=c(0.3, 0.5)  
 , main="Cross-validation of ANN", lwd=2)  
abline(v=sizes[which.min(miscl.cv)], col="red", lty=3)



cat("The best size for ANN is :", sizes[which.min(miscl.cv)],"\n")

## The best size for ANN is : 2

set.seed(345)  
ideal <- class.ind(trainSet$chd)  
ANN <- nnet(trainSet[,-10], ideal, size=2, softmax=TRUE, maxit = 300, decay = 5e-4)

## # weights: 26  
## initial value 157.951648   
## iter 10 value 150.259617  
## iter 20 value 144.766737  
## iter 30 value 137.735324  
## iter 40 value 135.837205  
## iter 50 value 135.568013  
## iter 60 value 135.553163  
## iter 70 value 134.067545  
## iter 80 value 129.454830  
## iter 90 value 124.422583  
## iter 100 value 122.581245  
## iter 110 value 122.517402  
## iter 120 value 122.451933  
## iter 130 value 122.437841  
## iter 140 value 122.393578  
## iter 150 value 122.307510  
## iter 160 value 122.302696  
## iter 170 value 122.301466  
## final value 122.301390   
## converged

mean(predict(ANN, trainSet[, -10], type="class") == trainSet$chd)

## [1] 0.6926407

mean(predict(ANN, testSet[, -10], type="class") == testSet$chd)

## [1] 0.6363636

### 7. Summarize the classification results obtained for the "South African Heart Disease" in homework 3 and 4. Which method performed better, which performed worse? Discuss the possible reasons.

# lda  
scores <- predict(lda.fit, newdata= testPredictors)$posterior[,2]  
pred <- prediction( scores, labels= testResponse )  
perf <- performance(pred, "tpr", "fpr")  
plot(perf, col= 1, main="ROCs on validation set")  
  
  
# naive bayes  
pred <- prediction(naiveBayes.scores, labels=testResponse)  
perf <- performance(pred, "tpr", "fpr")  
  
# plot the ROC curve  
plot(perf, col= 2, add=T)  
  
  
# single pruned tree  
# ROC on the validation set  
scores <- predict(prune.tree, newdata= testSet[,-10], type="vector")[,2]  
pred <- prediction(scores, labels= testSet$chd )  
perf <- performance(pred, "tpr", "fpr")  
plot(perf, col= 3, add=T)  
# AUC  
single.tree.test <- unlist(attributes(performance(pred, "auc"))$y.values)  
  
# bagging  
bagging.tree <- randomForest(as.factor(chd)~.,data=trainSet , mtry=9, importance =TRUE, ntree = 31)  
pred.bagging <- predict(bagging.tree ,newdata =testSet, type="prob")[,2]  
pred <- prediction(pred.bagging, labels= testSet$chd )  
perf <- performance(pred, "tpr", "fpr")  
plot(perf, col= 4, add=T)  
  
# AUC  
bagging.test <- unlist(attributes(performance(pred, "auc"))$y.values)  
  
  
# random forest  
rf.sqrt.tree <- randomForest(as.factor(chd)~.,data=trainSet , mtry=sqrt(9), importance =TRUE, ntree = 79)  
pred.rf.sqrt <- predict(rf.sqrt.tree ,newdata =testSet, type="prob")[,2]  
pred <- prediction(pred.rf.sqrt, labels= testSet$chd )  
perf <- performance(pred, "tpr", "fpr")  
plot(perf, col= 5, add=T)  
# AUC for rf.sqrt  
rf.sqrt.test <- unlist(attributes(performance(pred, "auc"))$y.values)  
  
rf.by2.tree <- randomForest(as.factor(chd)~.,data=trainSet , mtry=9/2, importance =TRUE, ntree = 13)  
pred.rf.by2 <- predict(rf.by2.tree ,newdata =testSet, type="prob")[,2]  
pred <- prediction(pred.rf.by2, labels= testSet$chd )  
perf <- performance(pred, "tpr", "fpr")  
plot(perf, col= 6, add=T)  
# AUC for rf.by2  
rf.by2.test <- unlist(attributes(performance(pred, "auc"))$y.values)  
  
# boosting  
boosting.pred <- predict(boosting.tree, testSet, type='response', n.trees=1000)  
pred <- prediction(boosting.pred, labels= testSet$chd )  
perf <- performance(pred, "tpr", "fpr")  
plot(perf, col= 7, add=T)  
  
# AUC for boosting  
boosting.test <- unlist(attributes(performance(pred, "auc"))$y.values)  
  
# SVM  
scores <- attributes(predict(svm.best, svm.testSet, decision.values =TRUE))$decision.values  
pred <- prediction(scores, svm.testSet$chd)  
perf <- performance(pred, "tpr", "fpr")  
plot(perf, col = 8, add=T)  
# AUC for svm  
svm.test <- unlist(attributes(performance(pred, "auc"))$y.values)  
  
# ANN  
scores <- predict(ANN, testSet[,-10], type="raw")[,2]  
pred <- prediction(scores, svm.testSet$chd)  
perf <- performance(pred, "tpr", "fpr")  
plot(perf, col = "darkgreen", add=T)  
# AUC for ANN  
  
ANN.test <- unlist(attributes(performance(pred, "auc"))$y.values)  
legend(0.8,0.5, c("lda", "naive bayes", "single tree", "bagging", "RF m=sqrt(p)",  
 "RF m=p/2", "boosting", "SVM", "ANN") ,col=c(1:8, "darkgreen"), lty=1, cex=0.6)

