title: “irisData(NNET library, Creating ANN” author: “Niraj” date: “2023-03-09” output: word\_document

library(nnet)  
iris<-read.csv("/Users/nirajkc/Downloads/archive (4)/iris.csv")

data(iris)  
head(iris)

## Sepal.Length Sepal.Width Petal.Length Petal.Width Species  
## 1 5.1 3.5 1.4 0.2 setosa  
## 2 4.9 3.0 1.4 0.2 setosa  
## 3 4.7 3.2 1.3 0.2 setosa  
## 4 4.6 3.1 1.5 0.2 setosa  
## 5 5.0 3.6 1.4 0.2 setosa  
## 6 5.4 3.9 1.7 0.4 setosa

summary(iris)

## Sepal.Length Sepal.Width Petal.Length Petal.Width   
## Min. :4.300 Min. :2.000 Min. :1.000 Min. :0.100   
## 1st Qu.:5.100 1st Qu.:2.800 1st Qu.:1.600 1st Qu.:0.300   
## Median :5.800 Median :3.000 Median :4.350 Median :1.300   
## Mean :5.843 Mean :3.057 Mean :3.758 Mean :1.199   
## 3rd Qu.:6.400 3rd Qu.:3.300 3rd Qu.:5.100 3rd Qu.:1.800   
## Max. :7.900 Max. :4.400 Max. :6.900 Max. :2.500   
## Species   
## setosa :50   
## versicolor:50   
## virginica :50   
##   
##   
##

##fit model

fit <- nnet(Species~., data=iris, size=4, decay=0.0001, maxit=500)

## # weights: 35  
## initial value 173.932133   
## iter 10 value 41.742494  
## iter 20 value 7.269754  
## iter 30 value 6.191668  
## iter 40 value 6.086482  
## iter 50 value 6.052744  
## iter 60 value 5.924074  
## iter 70 value 5.276558  
## iter 80 value 4.627757  
## iter 90 value 4.411580  
## iter 100 value 4.380470  
## iter 110 value 4.270300  
## iter 120 value 4.171966  
## iter 130 value 4.097340  
## iter 140 value 4.060301  
## iter 150 value 3.765804  
## iter 160 value 2.702887  
## iter 170 value 0.999628  
## iter 180 value 0.803207  
## iter 190 value 0.733553  
## iter 200 value 0.683412  
## iter 210 value 0.608999  
## iter 220 value 0.596163  
## iter 230 value 0.562066  
## iter 240 value 0.550830  
## iter 250 value 0.539572  
## iter 260 value 0.468028  
## iter 270 value 0.447759  
## iter 280 value 0.432859  
## iter 290 value 0.415231  
## iter 300 value 0.393822  
## iter 310 value 0.382688  
## iter 320 value 0.369761  
## iter 330 value 0.350442  
## iter 340 value 0.330534  
## iter 350 value 0.312617  
## iter 360 value 0.306355  
## iter 370 value 0.299905  
## iter 380 value 0.295963  
## iter 390 value 0.285692  
## iter 400 value 0.280748  
## iter 410 value 0.279212  
## iter 420 value 0.278427  
## iter 430 value 0.278227  
## iter 440 value 0.278063  
## iter 450 value 0.277933  
## iter 460 value 0.277749  
## iter 470 value 0.277672  
## iter 480 value 0.277650  
## iter 490 value 0.277618  
## iter 500 value 0.277610  
## final value 0.277610   
## stopped after 500 iterations

##summarize the fit

summary(fit)

## a 4-4-3 network with 35 weights  
## options were - softmax modelling decay=1e-04  
## b->h1 i1->h1 i2->h1 i3->h1 i4->h1   
## -13.23 4.09 13.46 -8.99 -2.17   
## b->h2 i1->h2 i2->h2 i3->h2 i4->h2   
## -4.62 -4.52 -10.26 8.37 9.40   
## b->h3 i1->h3 i2->h3 i3->h3 i4->h3   
## 1.74 4.73 11.78 -10.82 -8.01   
## b->h4 i1->h4 i2->h4 i3->h4 i4->h4   
## -0.36 -0.62 -1.98 3.12 1.55   
## b->o1 h1->o1 h2->o1 h3->o1 h4->o1   
## 2.06 2.14 -0.16 3.27 -10.11   
## b->o2 h1->o2 h2->o2 h3->o2 h4->o2   
## -0.20 -14.14 -12.56 11.63 10.61   
## b->o3 h1->o3 h2->o3 h3->o3 h4->o3   
## -1.86 12.00 12.72 -14.89 -0.50

# make predictions

predictions <- predict(fit, iris[,1:4], type="class")

# summarize accuracy

library(caret)

## Loading required package: ggplot2

## Loading required package: lattice

predictions <- factor(predictions, levels = levels(iris$Species))  
confusionMatrix(predictions, iris$Species)

## Confusion Matrix and Statistics  
##   
## Reference  
## Prediction setosa versicolor virginica  
## setosa 50 0 0  
## versicolor 0 50 0  
## virginica 0 0 50  
##   
## Overall Statistics  
##   
## Accuracy : 1   
## 95% CI : (0.9757, 1)  
## No Information Rate : 0.3333   
## P-Value [Acc > NIR] : < 2.2e-16   
##   
## Kappa : 1   
##   
## Mcnemar's Test P-Value : NA   
##   
## Statistics by Class:  
##   
## Class: setosa Class: versicolor Class: virginica  
## Sensitivity 1.0000 1.0000 1.0000  
## Specificity 1.0000 1.0000 1.0000  
## Pos Pred Value 1.0000 1.0000 1.0000  
## Neg Pred Value 1.0000 1.0000 1.0000  
## Prevalence 0.3333 0.3333 0.3333  
## Detection Rate 0.3333 0.3333 0.3333  
## Detection Prevalence 0.3333 0.3333 0.3333  
## Balanced Accuracy 1.0000 1.0000 1.0000