

Vanilla Neural Networks

```
library(ISLR)
library(mlbench)
library(caret)
library(pROC)
```

Regression

We fit a single-hidden-layer neural network to the `Hitters` data.

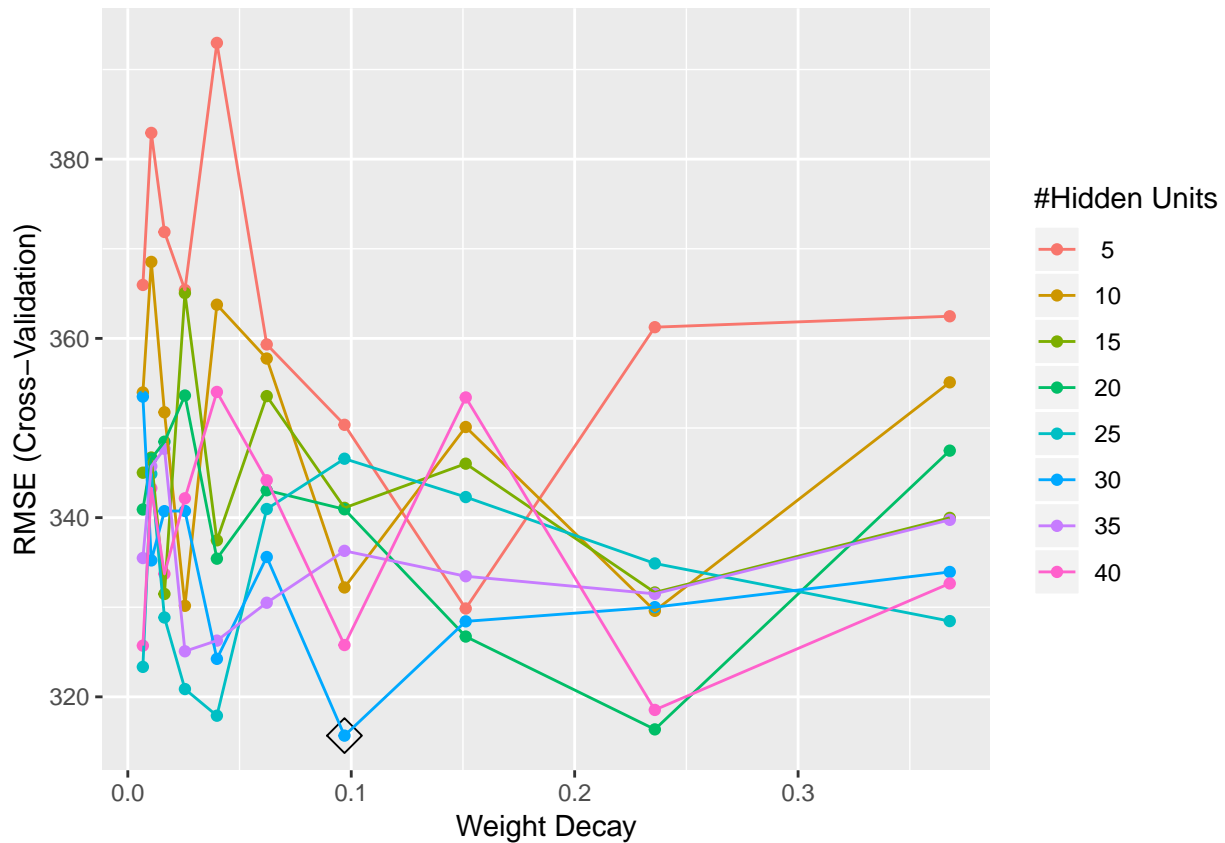
```
data(Hitters)
Hitters <- na.omit(Hitters)
x <- model.matrix(Salary~., Hitters)[,-1]
y <- Hitters$Salary
```

Using caret

```
ctrl <- trainControl(method = "cv")

nnetGrid <- expand.grid(size = seq(from = 5, to = 40, by = 5),
                        decay = exp(seq(from = -5, to = -1, length = 10)))

set.seed(1)
rnnet.fit <- train(x = x, y = y,
                  method = "nnet",
                  tuneGrid = nnetGrid,
                  preProcess = c("center", "scale"),
                  trControl = ctrl,
                  linout = TRUE,
                  trace = FALSE)
ggplot(rnnet.fit, highlight = TRUE) + scale_shape_manual(values = rep(19,10),
                                                         guide = FALSE)
```



Classification

We next consider the diabetes data and fit a single-hidden-layer neural network on this dataset.

```
data(PimaIndiansDiabetes)
dat <- PimaIndiansDiabetes
dat$diabetes <- factor(dat$diabetes, c("pos", "neg"))

set.seed(1)
rowTrain <- createDataPartition(y = dat$diabetes,
                                p = 0.75,
                                list = FALSE)
```

Using caret

```
nnetGrid <- expand.grid(size = seq(from = 1, to = 12, by = 1),
                        decay = exp(seq(from = -3, to = 1, length = 10)))

ctrl2 <- trainControl(method = "cv", summaryFunction = twoClassSummary,
                      classProbs = TRUE)

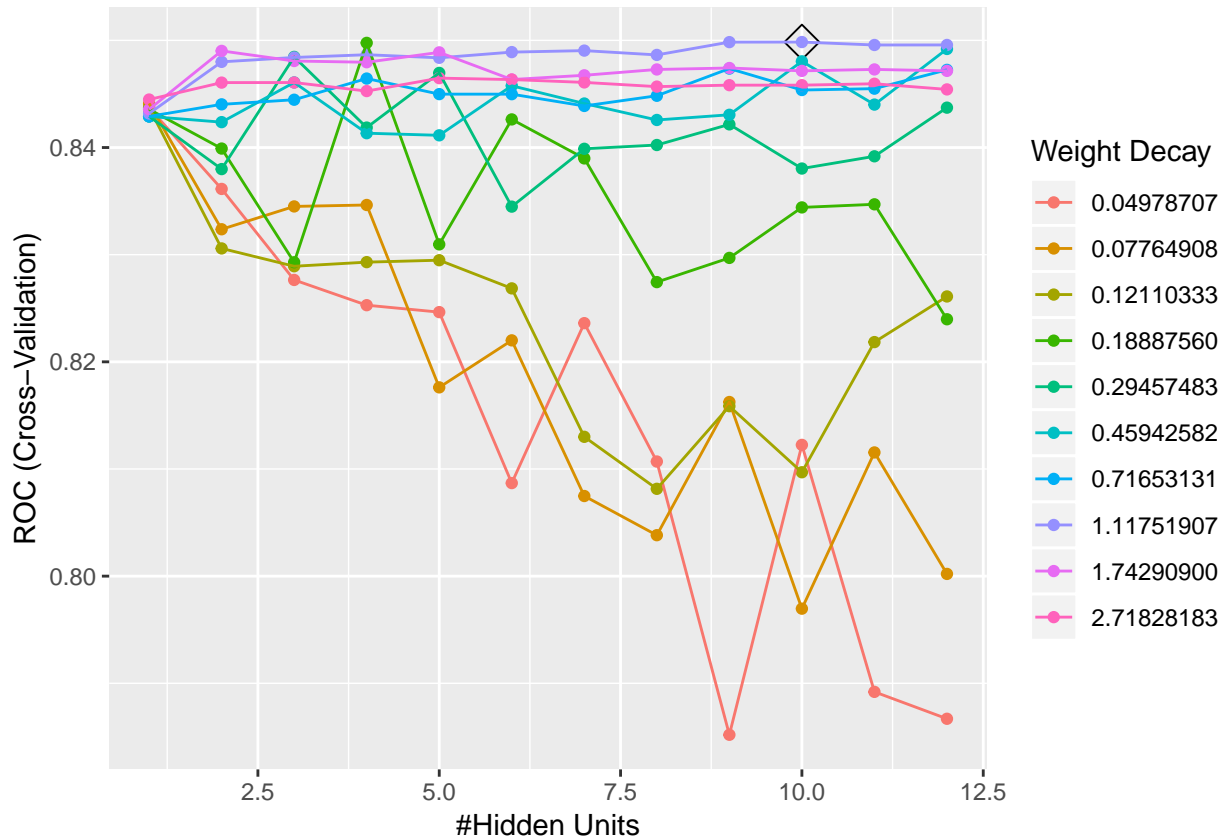
set.seed(1)
cnnet.fit <- train(diabetes~., dat,
                  subset = rowTrain,
                  method = "nnet",
```

```

tuneGrid = nnetGrid,
preProcess = c("center", "scale"),
trControl = ctrl2,
metric = "ROC",
trace = FALSE)

ggplot(cnnnet.fit, highlight = TRUE) + scale_shape_manual(values = rep(19, 10),
                                                         guide = FALSE)

```



```

cnnnet.pred <- predict(cnnnet.fit, newdata = dat[-rowTrain,], type = "prob")[,1]
roc.cnnnet <- roc(dat$diabetes[-rowTrain], cnnnet.pred)
plot(roc.cnnnet, print.auc=TRUE)

```

