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# MIS545 Section 01
# Lab12Group10AlmizraqTummuru.R
# Import a dataset of fishing charter. Generate a neural network to predict
# CharteredBoat based on AnnualIncome and CatchRateScaled

# Install the tidyverse and neuralnet packages
# install.packages("tidyverse")
# install.packages("neuralnet")

# Load the tidyverse and neuralnet
library(tidyverse)
library(neuralnet)

# Set the working directory to your Lab11 folder
setwd("/Users/Almiz/Desktop/Lab12")

# Read FishingCharter.csv into a tibble called fishingCharter
fishingCharter <- read_csv(file = "FishingCharter.csv",
                           col_types = "lnn",
                           col_names = TRUE)

# Display fishingCharter in the console
print(fishingCharter)

# Display the structure of fishingCharter in the console
str(fishingCharter)

# Display the summary of fishingCharter in the console
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summary(fishingCharter)

# Scale the AnnualIncome and CatchRate variables
fishingCharter <- fishingCharter %>%
  mutate(AnnualIncomeScaled = (AnnualIncome - min(AnnualIncome)) /
         (max(AnnualIncome) - min(AnnualIncome)))
fishingCharter <- fishingCharter %>%
  mutate(CatchRateScaled = (CatchRate - min(CatchRate)) /
         (max(CatchRate) - min(CatchRate)))

# # Set the random seed to 591
set.seed(591)

# Randomly split the dataset into fishingCharterTraining (75% of records) and
# fishingCharterTesting (25% of records)
sampleSet <- sample(nrow(fishingCharter),
                    round(nrow(fishingCharter) * 0.75),
                    replace = FALSE)

# Set fishingCharterTraining (75% of records)
fishingCharterTraining <- fishingCharter[sampleSet, ]

# Set fishingCharterTesting (25% of records)
fishingCharterTesting <- fishingCharter[-sampleSet, ]

# Generate the neural network model to predict CharteredBoat
fishingCharterNeuralNet <- neuralnet(
  formula = CharteredBoat ~ AnnualIncomeScaled + CatchRateScaled,
  data = fishingCharterTraining,
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  hidden = 3,
  act.fct = "logistic",
  linear.output = FALSE)

# Display the neural network numeric results
print(fishingCharterNeuralNet$result.matrix)

# Visualize the neural network
plot(fishingCharterNeuralNet)

# Use fishingCharterNeuralNet to generate probabilities on the
# fishingCharterTesting data set and store this in fishingCharterProbability
fishingCharterProbability <- compute(fishingCharterNeuralNet,
                                     fishingCharterTesting)

# Display the probabilities from the testing dataset on the console
print(fishingCharterProbability$net.result)

# Convert probability predictions into 0/1 predictions and store this into
# fishingCharterPrediction
fishingCharterPrediction <-
  ifelse(fishingCharterProbability$net.result > 0.5, 1, 0)

# Display the 0/1 predictions on the console
print(fishingCharterPrediction)

# Evaluate the model by forming a confusion matrix
fishingCharterConfusionMatrix <- table(fishingCharterTesting$CharteredBoat,
                                       fishingCharterPrediction)
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# Display the confusion matrix on the console
print(fishingCharterConfusionMatrix)

# Calculate the model predictive accuracy
predictiveAccuracy <- sum(diag(fishingCharterConfusionMatrix)) /
  nrow(fishingCharterTesting)

# Display the predictive accuracy on the console
print(predictiveAccuracy)
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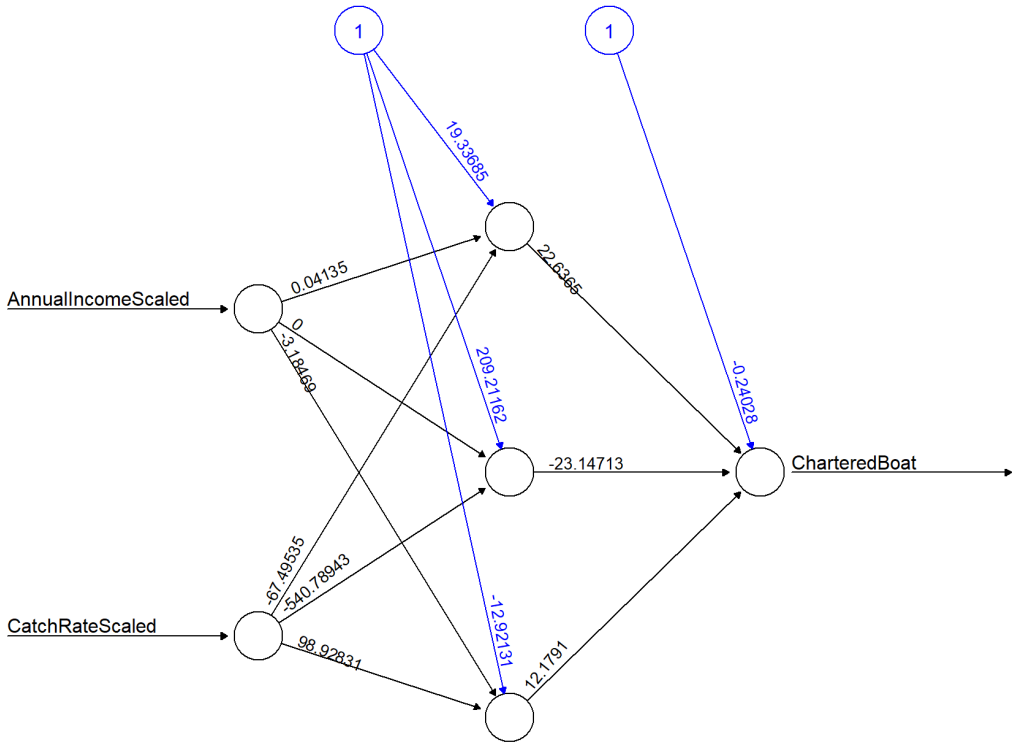

Error: 43.591098 Steps: 10555

1. Answer the following question in a sentence: What is meant by the number of "steps" in the neural network visualization?

   Number of iteration that neural network required in order to converge on a solution.

2. Answer the following question in a sentence: What are the disadvantages in using a neural network to build a supervised model for this context?

   We cannot interpret what hidden layers mean.