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DSE 6211

Week 2

September 6, 2023

**1) Using the neural network above, what is the predicted miles per gallon of a vehicle with 8 cylinders, a displacement of 250, and a horsepower of 200?**

```{r}

prediction <- predict(nn_model, array(c(8, 250, 200), dim = c(1, 3)))
prediction

```

```
1/1 [==============================] - 0s 102ms/step
         [,1]
[1,] 20.08393
```

The predicted MPG is 20.08393.

**2) What loss function did we specify when building the neural network model above?**

The predicted loss function we specified when building the neural network in the model above is the mean squared error.

**3) Define the rank of a tensor. What is the rank of a matrix (remember, a matrix is a tensor of a particular rank)?**

The rank of a tensor refers to how many dimensions or axes there are within a tensor. (i.e the rank of a matrix is 2D or a rank of 2 tensors because it has 2 axes)

**4) The data we will be working with throughout the course, including in this lab, is vector data. What is the tensor rank of vector data?**

The tensor rank of vector data is 1D or rank 1 tensors.

**5) Consider the following tensor of ones: array(1, dim = c(500, 256, 256, 3)). What is its rank? What is its shape? What is the dimension of the second axis? If this tensor represented a collection of color images, how many images are there?**

The rank of this tensor is 4D or rank 4 tensors.  The shape is 500 x 256 x 256 x 3. The dimension of the second axis is 256. There are 500 images, with dimensions of 256 x 256 and 3 color channels (RGB).