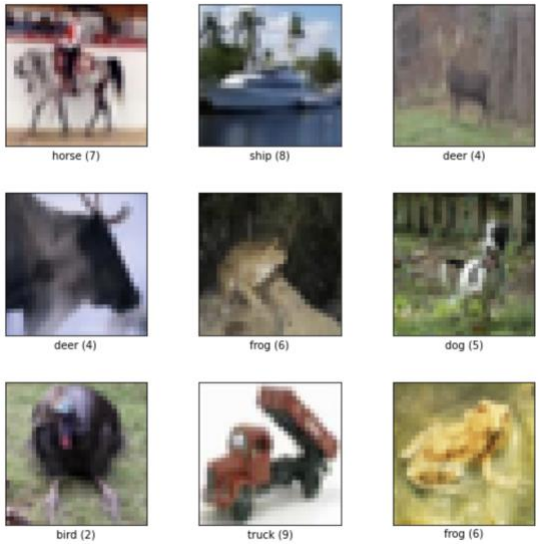
Assignment 4

1. You will work on the "CIFAR-10" dataset for this assignment. The CIFAR-10 dataset (Canadian Institute For Advanced Research) is one of the most widely used datasets for machine learning research. The CIFAR-10 dataset contains 60,000 - 32x32 color images in 10 different classes. The 10 different classes represent airplanes, cars, birds, cats, deer, dogs, frogs, horses, ships, and trucks. There are 6,000 images of each class. Use the following code snippets for downloading the data and divide it into training and test sets. Link :- https://www.cs.toronto.edu/~kriz/cifar.html

```
import tensorflow as tf
(x_train, y_train), (x_test, y_test) = tf.keras.datasets.cifar10.load_data()
```

2. Visualize the one sample image from each class. One potential visualization is shown below.



3. Design and train a convolutional neural network for this dataset. Use multiple convolution layers and hidden units in your network. Play with epochs, learning rate, stride, kernel size, etc. Report your accuracy on test set and observe any underfitting or overfitting.

4. Normalize the dataset before the training and report the differences observed in the test accuracy.

5. Play with different activation functions and report the differences observed in the test accuracy.

6. Play with different initialization methods and report the differences observed in the test accuracy.

7. Make sure you regularize the model and there is no significant overfitting. Try different regularization techniques. See where your model stands in this list - https://benchmarks.ai/cifar-10