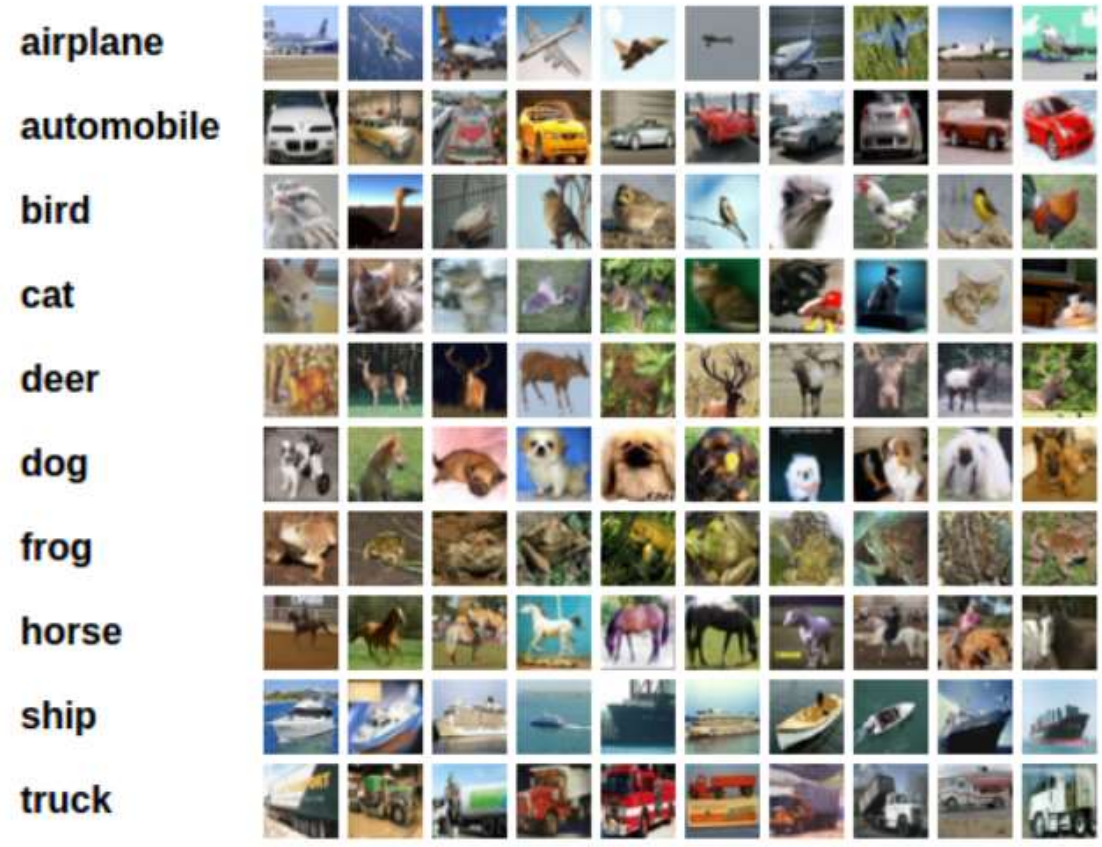
Report for Assignment 6

-Debanshu Biswas (M20MA053)

Neural Network using PyTorch for Classification Task

We used pytorch to implement neural network for classification task. We will use CIFAR10 dataset. It has the classes: ‘airplane’, ‘automobile’, ‘bird’, ‘cat’, ‘deer’, ‘dog’, ‘frog’, ‘horse’, ‘ship’, ‘truck’. The images in CIFAR-10 are of size 3x32x32.



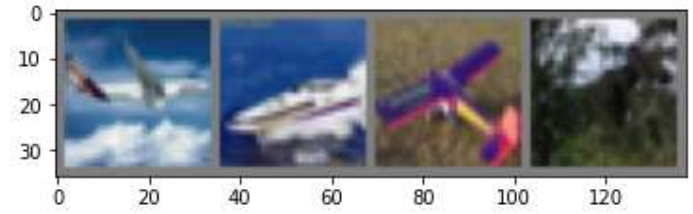
The process in program is as follows,

- We loaded and normalized the CIFAR10 training and test data set. For this we used torch vision here.
- Then we defined Convoluation Neural Network.
- Then defined loss function.

- Train the the network on the training data
- Test the network on the test data

The output of torchvision datasets are PILImages of range [0,1]. And the transformed then to Tensors of normalized range [-1,1].

And we get the training as,



We get overall accuracy on 10000 test 53%

And for individual,

Accuracy for class plane is: 35.1 %
Accuracy for class car is: 69.5 %
Accuracy for class bird is: 44.5 %
Accuracy for class cat is: 21.3 %
Accuracy for class deer is: 56.2 %
Accuracy for class dog is: 49.6 %
Accuracy for class frog is: 47.8 %
Accuracy for class horse is: 61.1 %
Accuracy for class ship is: 91.6 %
Accuracy for class truck is: 27.7 %

Neural Network using PyTorch for Regression Task

I used dataset “heart_failure_clinical_records_dataset.csv” which I imported from Kaggle.com. Here we are trying to find platelets from creatinine_phosphokinase data. Then we build a neutal network like,

```
class MLP(nn.Module):
  #Multilayer Perceptron for regression.

 def __init__(self):
  super().__init__()
  self.layers = nn.Sequential(
   nn.Linear(13, 64),
   nn.ReLU(),
   nn.Linear(64, 32),
   nn.ReLU(),
   nn.Linear(32, 1)
  )


 def forward(self, x):

   #Forward pass

  return self.layers(x)
```

We used ReLU function for pointwise non linearity. Then we used our designed neural network on our dataset. Then we get result for different epochs,

```
Starting epoch 1

Loss after mini-batch     1: 0.043
Loss after mini-batch    11: 0.426
Loss after mini-batch    21: 0.442
Loss after mini-batch    31: 0.461
Loss after mini-batch    41: 0.452
Loss after mini-batch    51: 0.472

Starting epoch 2
Loss after mini-batch     1: 0.047
Loss after mini-batch    11: 0.432
Loss after mini-batch    21: 0.450
Loss after mini-batch    31: 0.434
```

```
Loss after mini-batch    41: 0.485
Loss after mini-batch    51: 0.434

Starting epoch 3
Loss after mini-batch     1: 0.049
Loss after mini-batch    11: 0.458
Loss after mini-batch    21: 0.435
Loss after mini-batch    31: 0.423
Loss after mini-batch    41: 0.417
Loss after mini-batch    51: 0.480

Starting epoch 4
Loss after mini-batch     1: 0.051
Loss after mini-batch    11: 0.436
Loss after mini-batch    21: 0.417
Loss after mini-batch    31: 0.452
Loss after mini-batch    41: 0.447
Loss after mini-batch    51: 0.438

Starting epoch 5
Loss after mini-batch     1: 0.043
Loss after mini-batch    11: 0.442
Loss after mini-batch    21: 0.427
Loss after mini-batch    31: 0.428
Loss after mini-batch    41: 0.424
Loss after mini-batch    51: 0.451
```