The GPU and CPU can be both used for deep learning algorithms. However, they serve as two different purposes of a computer. In the CPU, they serve as the “brain” of the computer, it serves as way to do highly complicated tasks such as running the operating the systems or executing tasks or doing calculations. However, they only have a few cores so it can do only a few calculations at the same time concurrently. The GPU on the other hand, is used many on rendering graphics such as video games. They can do only simple calculations but, since they many more cores, the GPU can do many calculations at the same time.

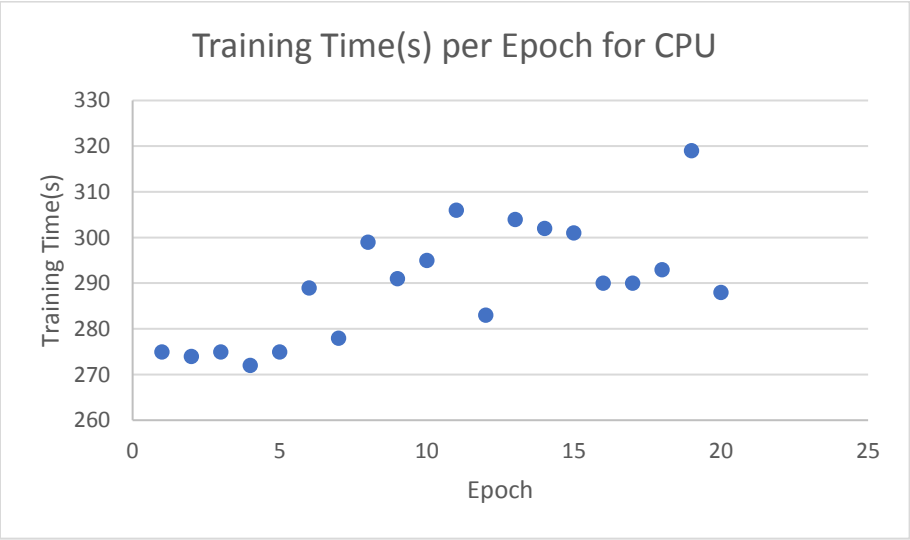
In order to compare the performance of a cpu and the gpu of the of the example code that runs through the CIFAR-10 data set using CNN is used. To run it on the cpu, the code is run on the jupyter notebook on the personal computer. For the GPU base d environment, the Amazon AWS was used using the Ubuntu x64 AMI with TensorFlow (GPU) AMI is used since contains the GPU based tensor flow, keras and also jupyter notebook. Both the codes will run based on the sample code that runs through the CIFAR-10 dataset that uses CNN. Because of time constraints, only 20 epochs will be used for each.

On the CPU code, the script was put before keras is imported since the local environment uses the GPU based Tensorflow

```
os.environ['CUDA_VISIBLE_DEVICES'] = '-1'
```

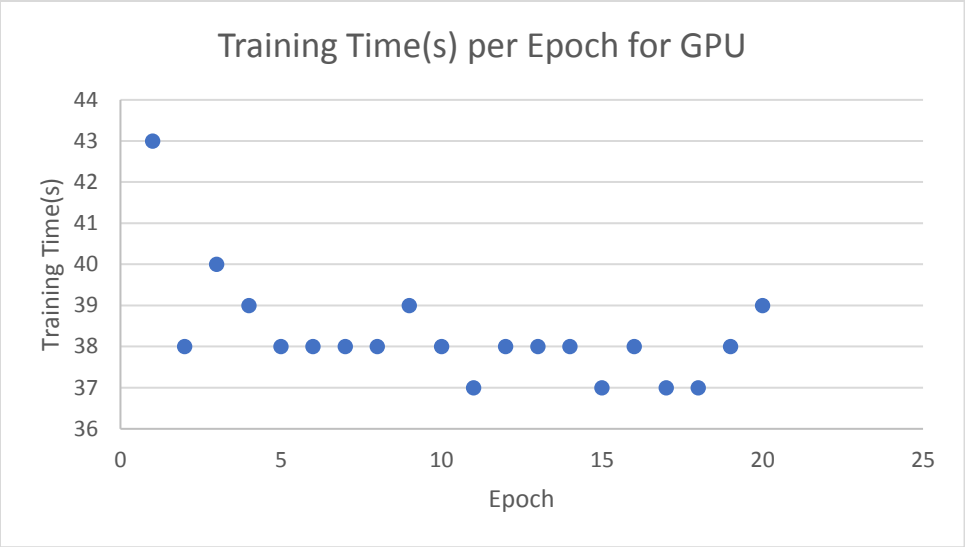
Results

CPU results graph on time vs epoch



CPU time Average: 289.95 seconds

GPU results graph on time vs epoch



GPU Average Time:38.3 seconds

As a result, it seems like the GPU of the results is clearly better option than the CPU. Not only is the time much less time than the CPU, the resulting performance of the accuracy is the same. The reason why a gpu is much better than the cpu for the learning time is that the way that the neural networks are taught with the weights and the neurons are just based on multiplication of matrices therefore, the gpu is sufficient enough to calculate much faster since it could do the much more calculations concurrently.it is concluded that a GPU based environment should be used directly when there is a chance. The only problem is that the connection through the Amazon AWS is that there is no guarantee that the AMI would continue to exist that contains the software that the project is needed therefore as a result, the best type of situation would be having a personal computer with a proper GPU.