TensorFlow

2016025423 박주언

# Abstraction

This assignment is to make a neural network for binary classification using logistic regression with TensorFlow.

The assignment was done with three different methods. The first one was the method used in last practice. The second one was the one with TF using my own CPU. The last one was the one with Colab GPU.

# Results

## **Table 1**

Table 1 compares the loss functions – binary cross entropy and mean squared error.

|  |  |  |
| --- | --- | --- |
|  | Binary cross entropy | Mean squared error |
| Accuracy with train set | 100% | 87.6% |
| Accuracy with test set | 100% | 92% |

## **Table 2**

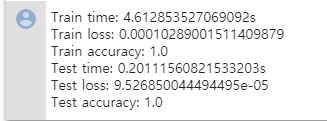
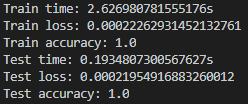
Table 2 compares optimizers – SGD, RMSProp, and Adam

|  |  |  |  |
| --- | --- | --- | --- |
|  | SGD | RMSProp | Adam |
| Accuracy with train set | 100% | 100% | 100% |
| Accuracy with test set | 100% | 100% | 100% |
| Train time | 2.585089921951294s | 2.2060704231262207s | 2.155241012573242s |
| Inference(test) time | 0.232379198074340s | 0.18351101875305176s | 0.192483186721801s |
| Loss type | binary cross entropy | binary cross entropy | binary cross entropy |

## **Table 3**

Table 3 compares the performance with relate to hardwares.

|  |  |  |  |
| --- | --- | --- | --- |
|  | From practice 3 | From TF results  (CPU) | From TF results  (colab GPU ver.) |
| Accuracy with train set | 92.2% | 100% | 100% |
| Accuracy with test set | 93% | 100% | 100% |
| Train time | 0.0901353359222s | 3.580425977706909s | 4.612853527069092s |
| Inference time  (test time) | 0.0010085105895s | 0.193480730056762s | 0.20111560821533203s |
| Loss type | Binary cross entropy | Binary cross entropy | Binary cross entropy |
| Optimizer type | Adam | Adam | Adam |



## **Table 4**

Table 4 compares the result with relate to mini-batch size.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Mini-batch=1 | Mini-batch=32 | Mini-batch=128 | Mini-batch=1000 |
| Accuracy with train set | 100% | 100% | 100% | 100% |
| Accuracy with test set | 100% | 100% | 100% | 100% |
| Train time | 889s | 38.80921602249s | 8.1751470565s | 2.40557003021240s |
| Inference time | 0.2593512535095s | 0.258309602737s | 0.4039268493s | 0.21941351890563s |
| Loss type | Binary cross entropy | Binary cross entropy | Binary cross entropy | Binary cross entropy |
| Optimizer type | Adam | Adam | Adam | Adam |

# Conclusion

With this practice, I have learned that TensorFlow is very convenient and easy to use and is more powerful and accurate compared to my hand-written code. Furthermore, knowing that I can use Google’s hardware encouraged me to challenge with tasks requiring extreme amount of hardware. Convenience can make me code more flexibly.