National Tsing Hua University
Fall 2023 11210IPT 553000
Deep Learning in Biomedical Optical Imaging
Homework 2

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1. Report

1.1 Task A: Performance between BCE loss and CE loss

我的比較基準模型為：

```
Sequential(
  (0): Flatten(start_dim=1, end_dim=-1)
  (1): Linear(in_features=65536, out_features=64, bias=True)
  (2): BatchNorm1d(64, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
  (3): ReLU()
  (4): Dropout(p=0.5, inplace=False)
  (5): Linear(in_features=64, out_features=64, bias=True)
  (6): BatchNorm1d(64, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
  (7): ReLU()
  (8): Dropout(p=0.5, inplace=False)
  (9): Linear(in_features=64, out_features=64, bias=True)
  (10): BatchNorm1d(64, eps=1e-05, momentum=0.1, affine=True, track_running_stats=True)
  (11): ReLU()
  (12): Dropout(p=0.5, inplace=False)
  (13): Linear(in_features=64, out_features=1, bias=True)
)
```

BCE 及 CE 於 training 及 testing 上的表現

Table 1. Performance berween BCE loss and BC loss

Loss function	BCE Loss		CE Loss	
	Training	Testing	Training	Testing
Loss	0.0708		0.1153	
Accuracy	97.69%	74.75%	95.88%	98.75%

從實驗結果而言，CE Loss 在測試集上準確率有顯著提升。

1.2 Task B: Performance between Different Hyperparameters

Table 2. Performance berween Different Hyperparameters

Hyperparameters		Number of neurons for each layer	
		16	128
	2	74.75%	79.50%
Number of layers	4	94.50%.	97.50%
	6	94.75%	98.0%

Testing Accuracy(%)

神經網路層數增加及提高神經元數量有更高的準確率，但兩者到一定深度、數量後準確率相差不多，再增加對增加準確率不會有更好的幫助。