STAT8021 Assignment3 Report

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April 1, 2025

1 Introduction

Finetune a pre-trained Transformer model from hugging face. The dataset in this part is part of AG News.

2 Q1

2.1 (a)

The first 3 samples in the train set are:

```
{'label': tensor([0, 3, 1]),
 'input_ids': tensor([[ 101, 2634, 1998,  ...,    0,    0,    0],
        [ 101, 3042, 2194,  ...,    0,    0,    0],
        [ 101, 2148, 4420,  ...,    0,    0,    0]]),
 'attention_mask': tensor([[1, 1, 1,  ..., 0, 0, 0],
        [1, 1, 1,  ..., 0, 0, 0],
        [1, 1, 1,  ..., 0, 0, 0]])}
```

2.2 (b)

When using the pre-trained DistilBertForSequenceClassification, I selected a batch size of 8, a learning rate of 5e-5, and conducted three epochs of training. Below are the details and results for each epoch:

Epoch 1:	train acc = 0.7217	test acc = 0.8750
Epoch 2:	train acc = 0.9209	test acc = 0.8984
Epoch 3:	train acc = 0.9658	test acc = 0.8906
	Time Consume:	25.5 min

2.3 (c)

Subsequently, the testing results on the four test samples are as follows:

News: In an exciting match last night, the Los Angeles Lakers defeated the Brooklyn Nets 115-110. Lakers' LeBron James made a comeback after missing several games due to injury and scored 25 points while teammate Anthony Davis added 28 points. Nets' star player Kevin Durant scored 32 points but couldn't lead his team to victory.
Result: Sports

News: Scientists have discovered a new species of dinosaur that roamed the earth 80 million years ago. The species, named Almatherium, was found in Uzbekistan and is believed to be an ancestor of the modern-day armadillo. The discovery sheds new light on the evolution of mammals and their relationship with dinosaurs.
Result: Sci/Tech

News: The United Nations has called for an immediate ceasefire in Yemen as the country faces a growing humanitarian crisis. The UN's special envoy for Yemen, Martin Griffiths, urged all parties

to end the violence and engage in peace talks. The conflict has left millions of Yemenis at risk of famine and disease.
Result: World

News: Amazon has announced that it will be opening its first fulfillment center in New Zealand, creating more than 500 new jobs. The center will be located in Auckland and is expected to open in 2022. This move will allow Amazon to expand its operations in the region and improve delivery times for customers.
Result: Business

2.4 (d)

Finally, I chose to use RobertaForSequenceClassification along with its corresponding tokenizer, RobertaTokenizer, for testing. The testing parameters were the same as in question b. The final results are as follows:

Epoch 1:	train acc = 0.7285	test acc = 0.8438
Epoch 2:	train acc = 0.9131	test acc = 0.8672
Epoch 3:	train acc = 0.9492	test acc = 0.9141
	Time Consume:	46.5 min

Comparation:

From the testing results, it can be observed that DistilBertForSequenceClassification and RobertaForSequenceClassification exhibit different strengths in terms of training and testing accuracy. DistilBERT has a shorter training time (25.5 minutes) and achieves a training accuracy (train acc) of 0.9658 at the third epoch. However, its improvement in testing accuracy is relatively limited, with a final test accuracy of 0.8906, indicating slightly weaker robustness on the test set. In contrast, Roberta has a longer training time (46.5 minutes) but demonstrates better optimization in testing accuracy, achieving a final test accuracy of 0.9141, which reflects stronger robustness and generalization. Overall, Roberta is more suitable for tasks requiring higher accuracy and robustness, while DistilBERT achieves a better trade-off between time and performance.