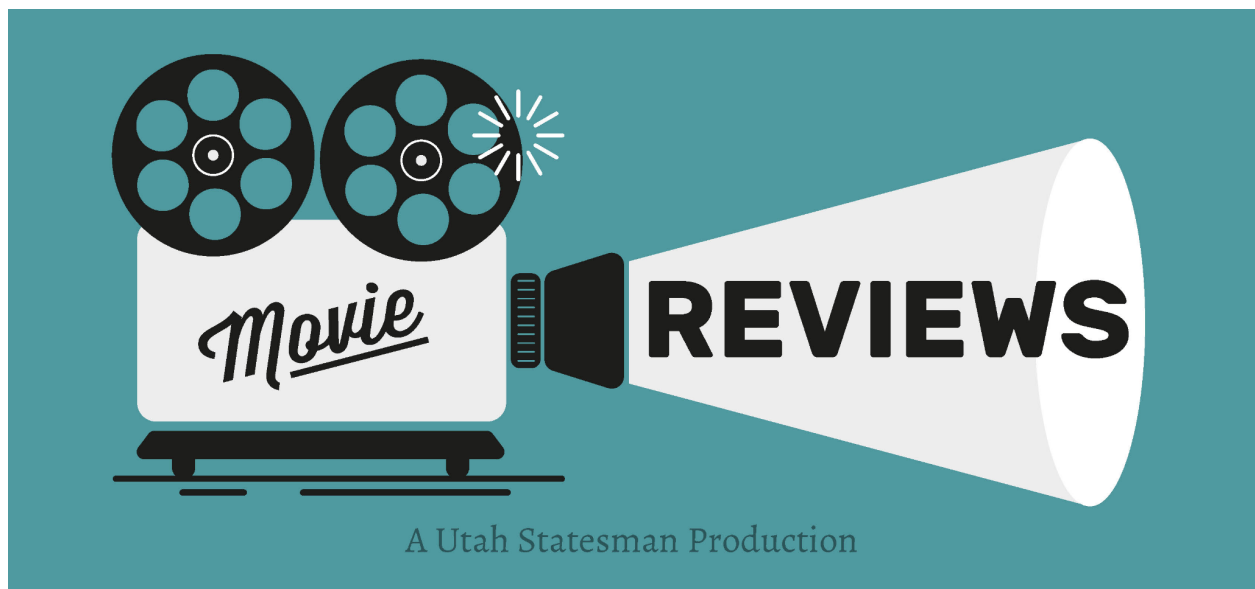


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# Assignment 4

## Sentiment Analysis

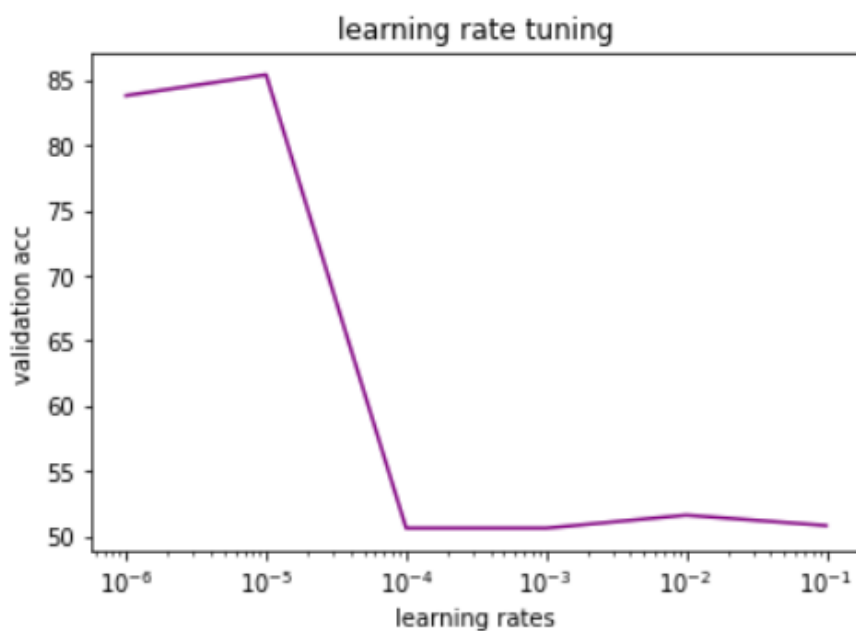


Ahmad Waleed Othman	180 150 28
Asmaa Ramadan Khamis	180 150 29
Mariam Ahmed Ghazi	180 150 32
Mo'men Mohamed Hamdy	180 119 07

## Learning rate vs validation accuracy

```
lrs = [0.1, 0.01, 0.001, 0.0001, 0.00001, 0.000001]
acc = [50.8, 51.6, 50.6, 50.6, 85.4, 83.8]

plt.plot(lrs, acc, color='purple')
plt.xlabel('learning rates')
plt.ylabel('validation acc')
plt.title('learning rate tuning')
plt.xscale('log')
plt.show()
```



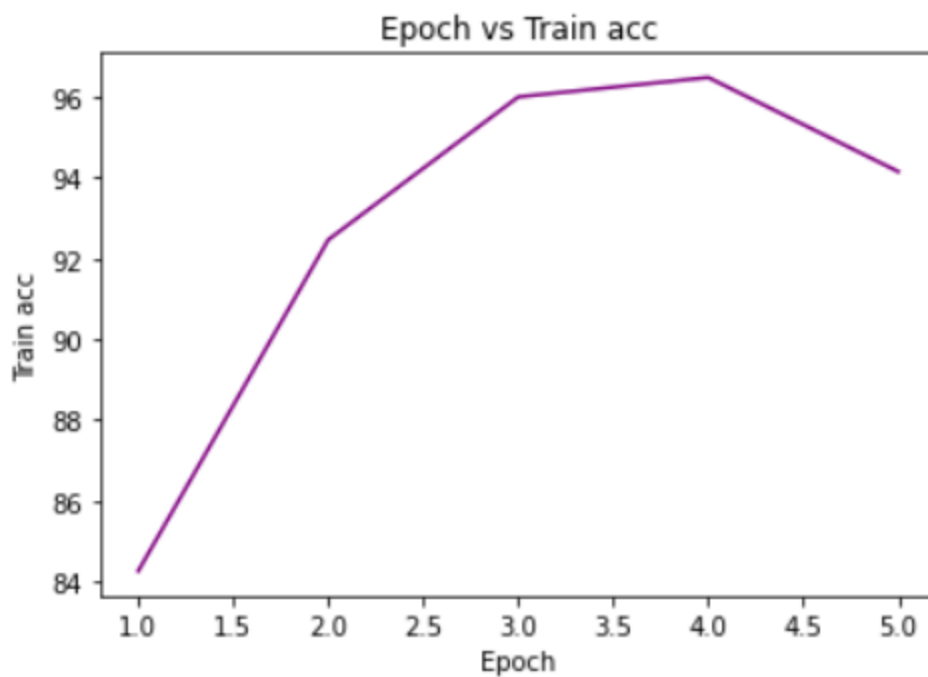
- Best validation accuracy at  $10e-5$
- Starting with 0.1 and decrementing the learning rate, validation accuracy increases as learning rate decreases in the interval  $[0.1, 10e-5]$ , at learning rate =  $10e-6$  the validation accuracy increases which indicates overfitting.

---

## Train Validation accuracies vs epoch

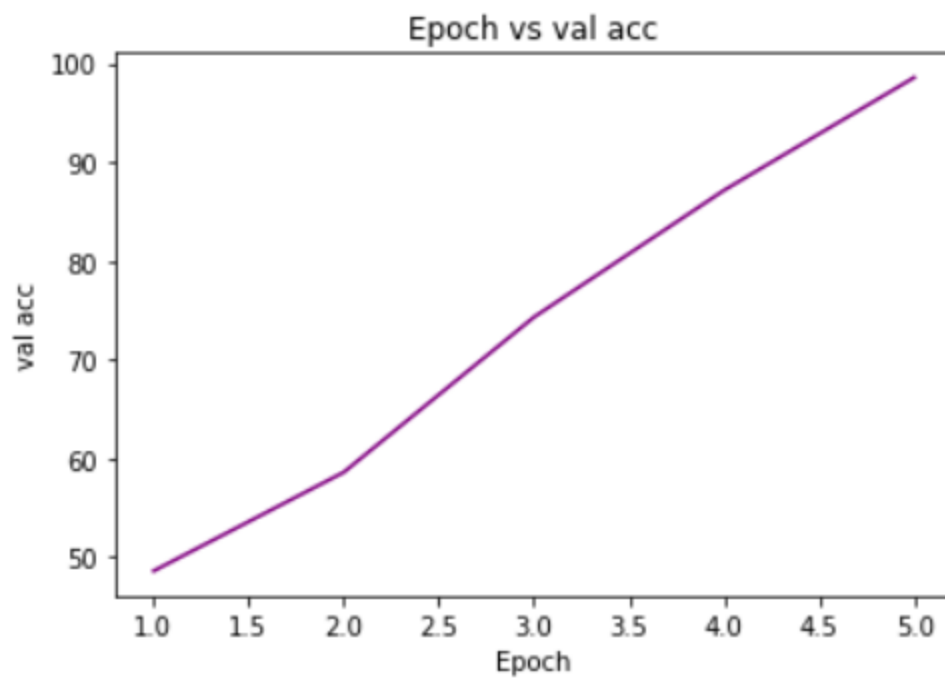
With preprocessing

Epoch vs train acc for 5 epochs



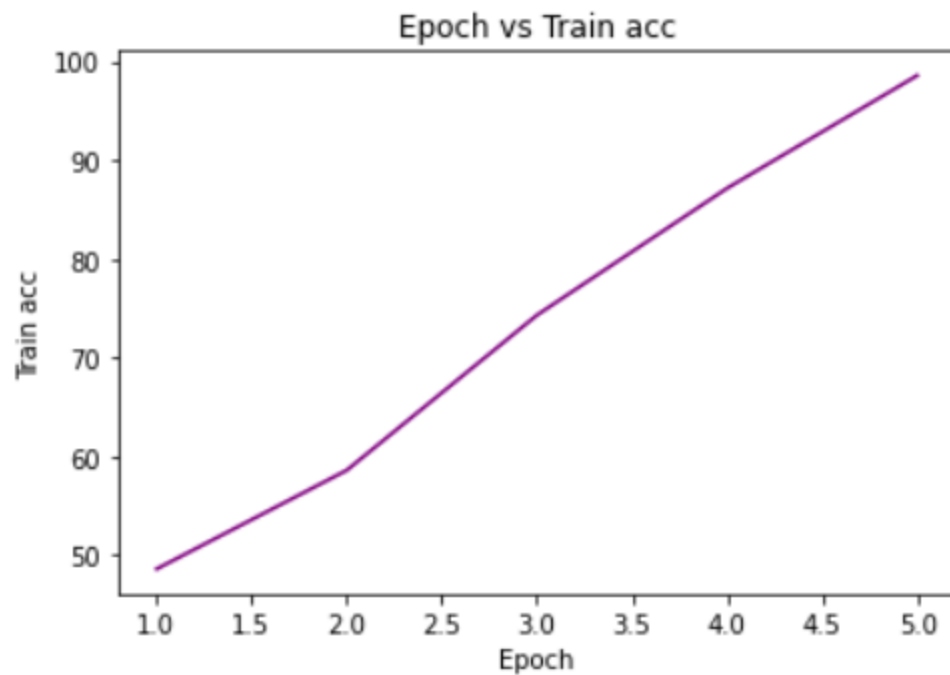
- Accuracy increases until the 4th epoch, then it decreases at the 5th epoch.
- Max training accuracy at epoch 4

### Epoch vs val accuracy with preprocessing



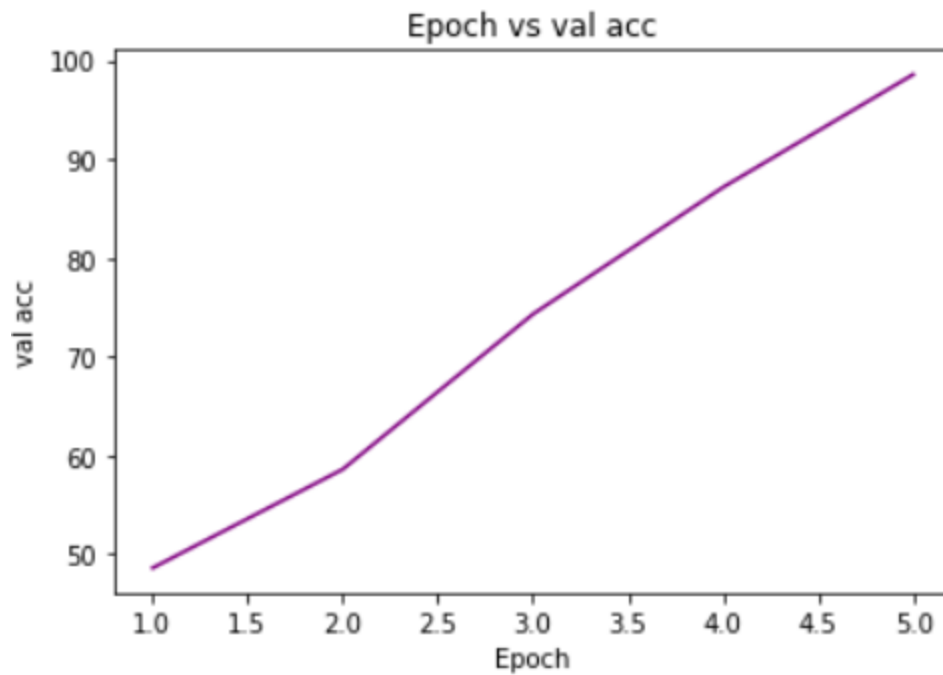
## Without preprocessing

---



- Accuracy is too low at beginning then it is max at 5th epoch
- No preprocessing made the model perform poorly at the beginning, then it performed highly due to the large data set, so the effect of preprocessing wasn't major.

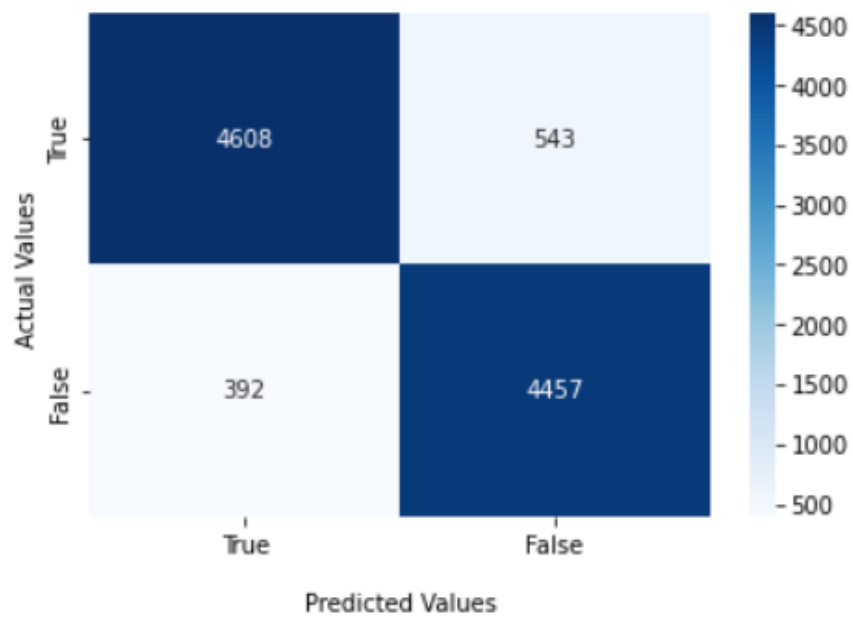
## Epoch vs val accuracy without preprocessing



Note that the validation accuracy monotonically increased with the number of epochs, this indicates that no overfitting occurred so far.

# Test results

With preprocessing



Accuracy = 90.65%

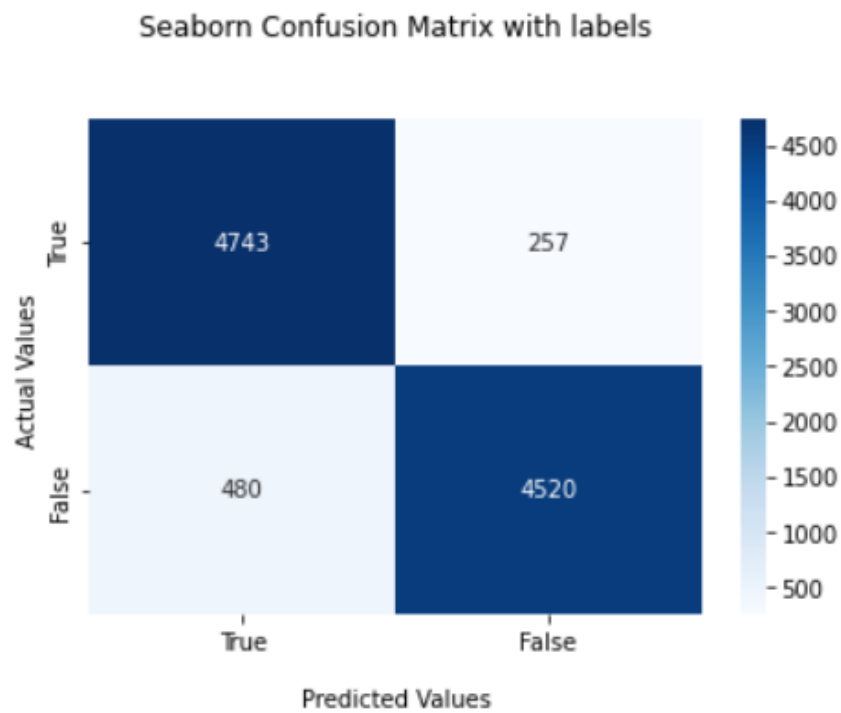
Precision = 0.8945

Recall = 0.9216

Specificity = 0.8914

F1-score = 0.9078

Without preprocessing



Accuracy = 92.7%

Precision = 0.948

Recall = 0.908

Specificity = 0.946

F1-score = 0.9275



### With vs Without preprocessing

- The accuracy for the model without preprocessing is slightly better than that model with preprocessing. That is predictable as the preprocessing affects the semantics of the sentence. However, it reduces the size of the input sample so it might be faster.
- Preprocessing effects can be significant when the dataset is small, but since our dataset is huge it didn't make a significant difference.
- Bert already uses word piece embeddings which helps with dirty data.