Sentiment Analysis using large movie review data

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Background:
The main goal of the project was to:
- Learn and explore traditional and state of the art sentiment analysis techniques.
- Achieve equal or better results than Andrew Maas et al. (2011) with traditional and state of the art methods.

In the original work on same dataset, Andrew Maas et al. (2011) :
- presented a model that uses a mix of unsupervised and supervised techniques to learn word vectors capturing semantic term–document information as well as rich sentiment content.
- achieved accuracy of 89%

Problem: How to do sentiment analysis/classification of movie reviews data with different approaches? How well different approaches perform compared to Andrew Maas et al. (2011) ?

Approach:
- Machine Learning models with TF-IDF tokenizer
- Deep Learning models with GloVe Word-Embeddings
- Classification with Transformers based Pretrained language models
- **Code location:**
  https://github.com/fkirmani/csce771/tree/main/project-home

XLNet Confusion Matrix
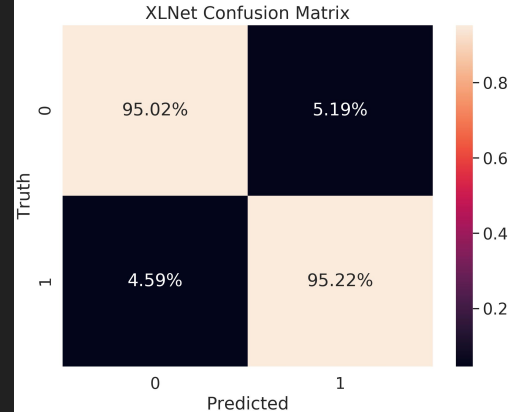
Evaluation:
- The goal to learn and implement traditional and state of the art sentiment classification methods have been achieved.
- Achieved equal or better results compared to Andrew Maas et al. (2011) with GloVe word-embeddings and transformers based pretrained models.
- Didn't achieved good results with TF-IDF vectorization.

Discussion:
- **Achieved:** Best accuracy of 95% with XLNet. Original XLNet paper achieved accuracy of 96%
- **Challenges faced:** Hyperparameter tuning for transformer based models because of GPU resources and time.
- **Future work:**
  - Exploring more on hyperparameters of transformers.
  - Exploring state of the art methods not based on transformers