English Language Learning

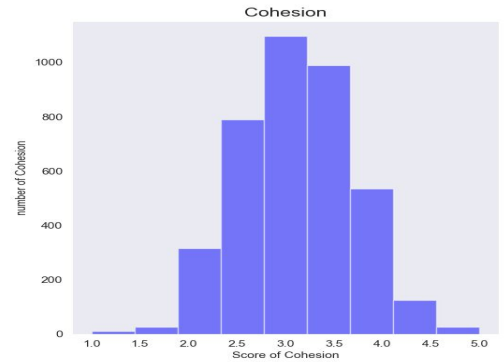
Team 8
Kyuri Kim
Sanchit Vijay

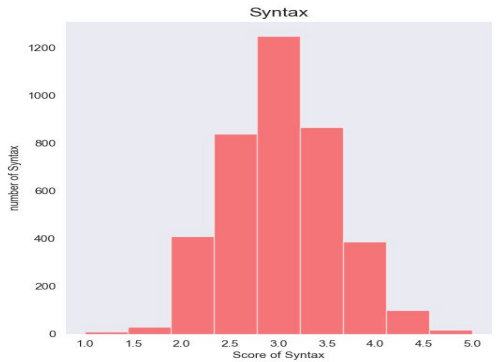
Contents

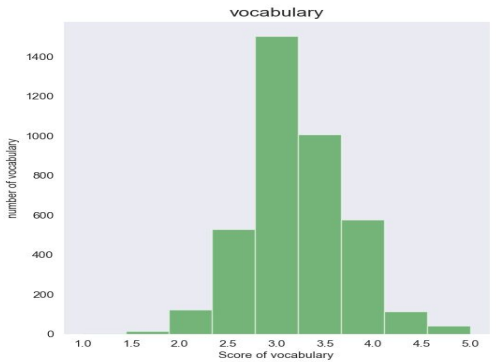
Data Information

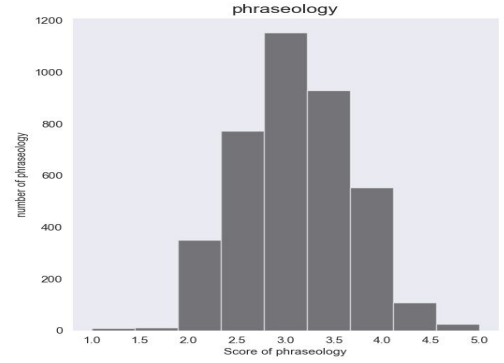
- Collection of argumentative essays crafted by English Language Learners (ELLs) from 8th to 12th grade
- Each essay is scored across six analytical dimensions:
  - Cohesion
  - Syntax
  - Vocabulary
  - Phraseology
  - Grammar
  - Conventions
- Each of these analytical dimensions is assigned a score ranging from 1.0 to 5.0, in 0.5 increments

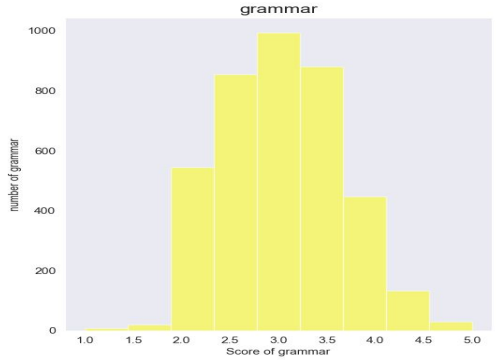
Histogram of Scoring Dimensions

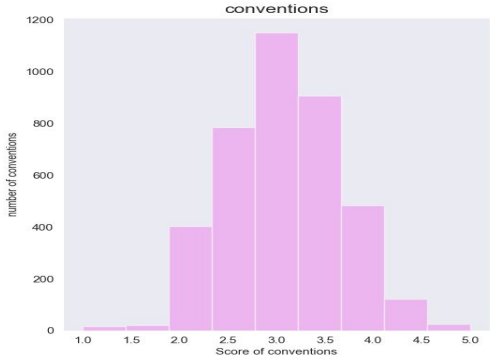








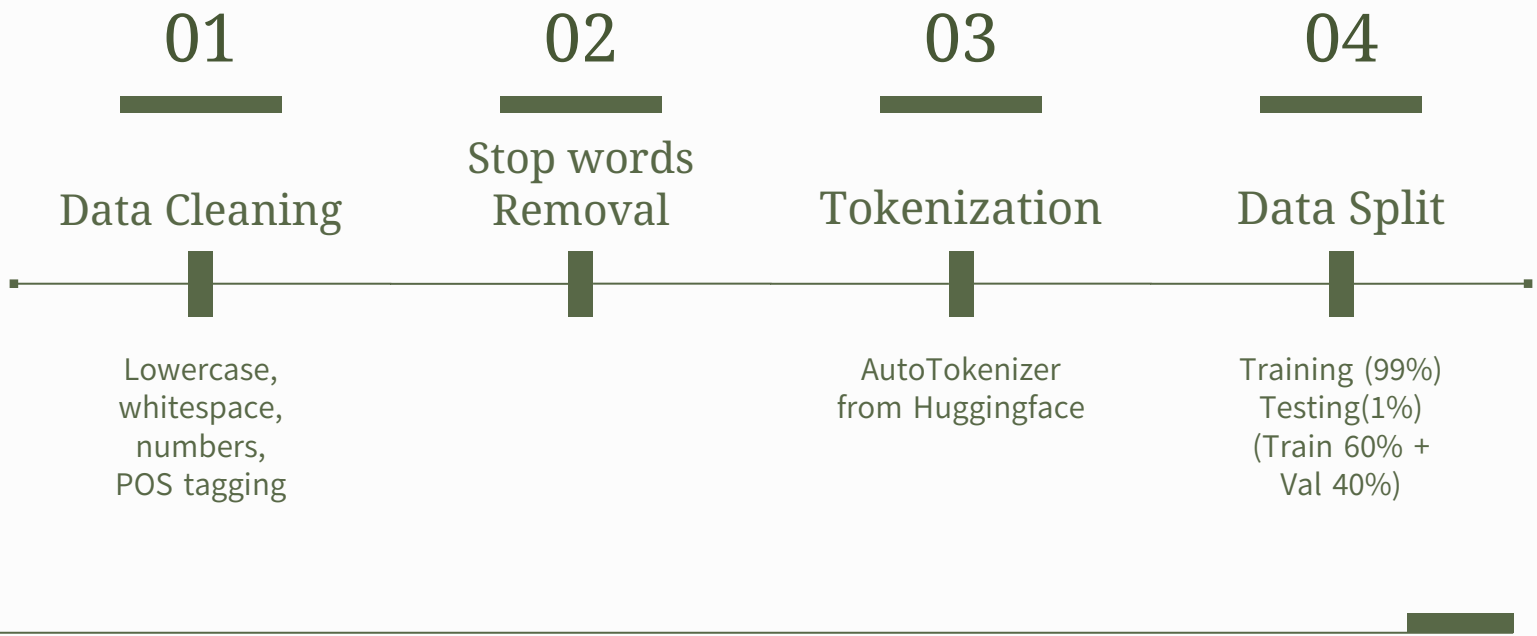




Heatmap


cohesion
syntax
vocabulary
phraseology
grammar
conventions
1
0.7
0.67
0.69
0.64
0.67
0.7
1
0.68
0.73
0.71
0.7
0.67
0.68
1
0.74
0.65
0.66
0.69
0.73
0.74
1
0.72
0.67
0.64
0.71
0.65
0.72
1
0.67
0.67
0.7
0.66
0.67
0.67
1
1.00
0.95
0.90
0.85
0.80
0.75
0.70
0.65

Data Preprocessing



Modeling - Logistic Regression

Target	Accuracy
cohesion	0.63
syntax	0.62
vocabulary	0.67
phraseology	0.62
grammer	0.60
conventions	0.62

Modeling and Pooling

01

BERT

base - uncased

02

RoBERTa

large

03

ELECTRA

base - discriminator

04

DeBERTa

V3 - base / V3 - large

Modeling and Pooling

01

Mean Pooling

02

LSTM Pooling

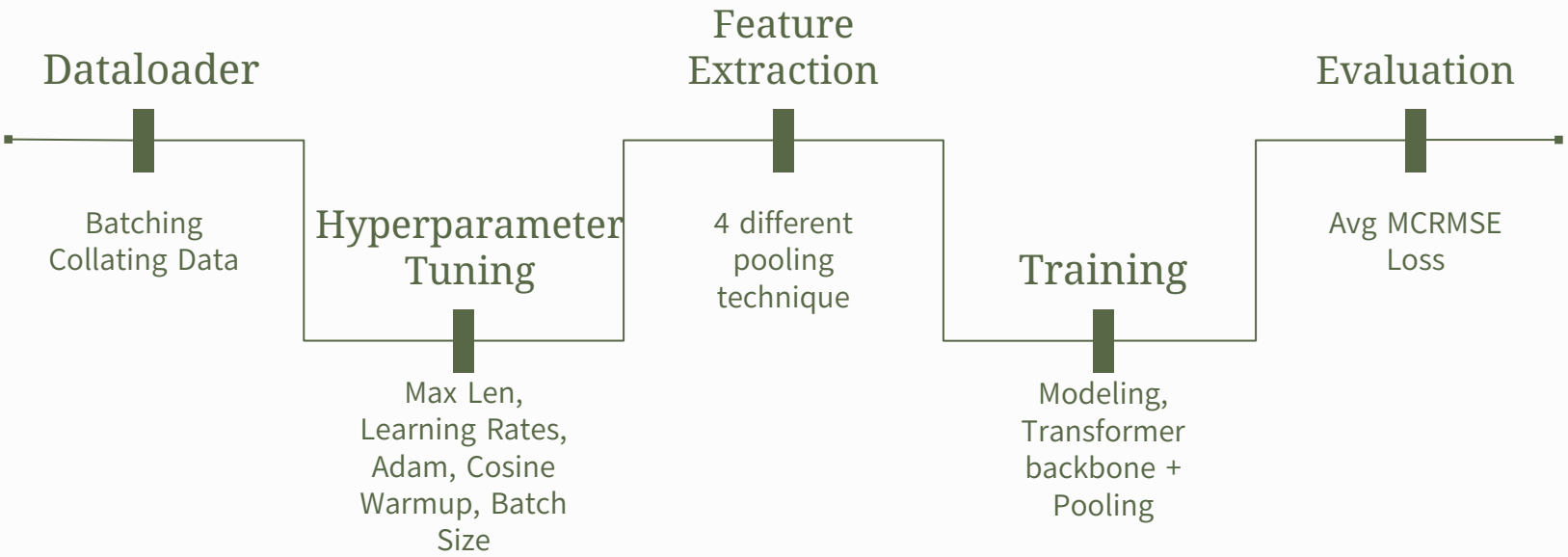
03

Concat Pooling

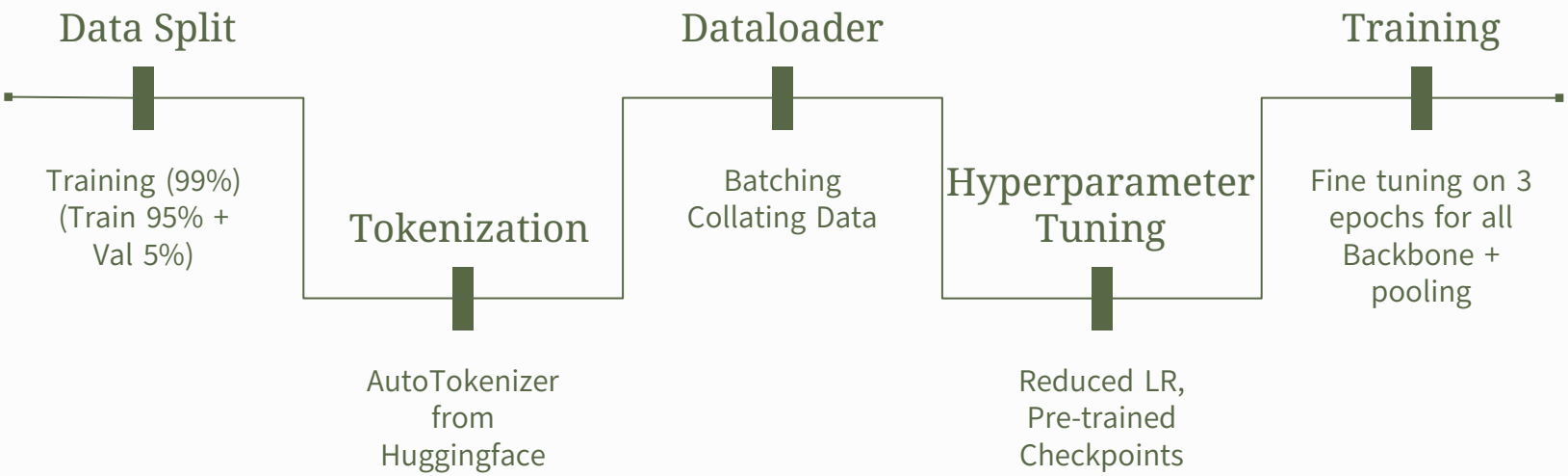
04

Conv1D Pooling

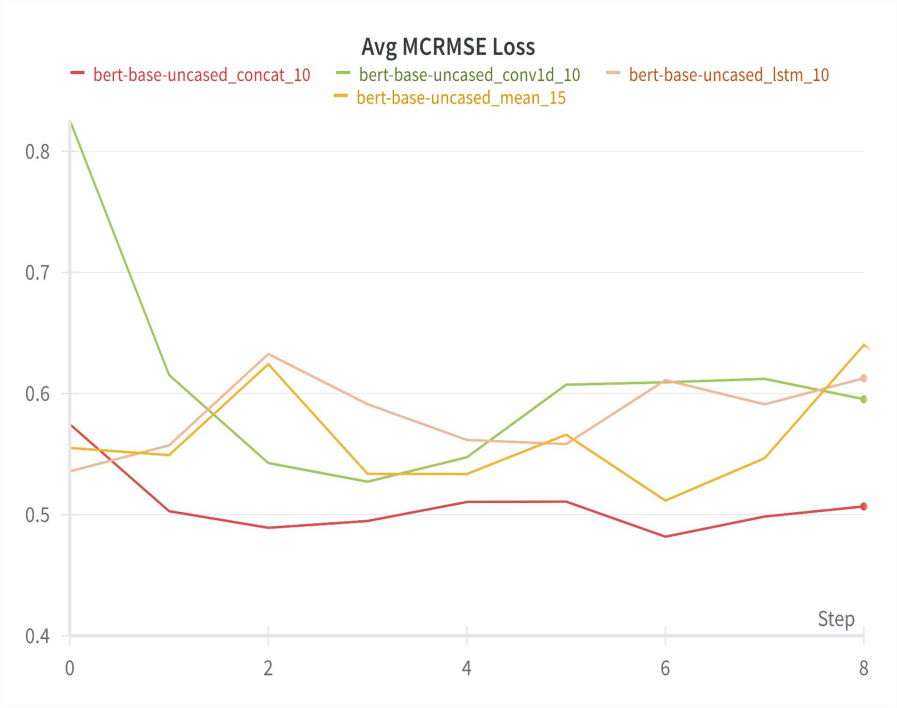
Pre-training

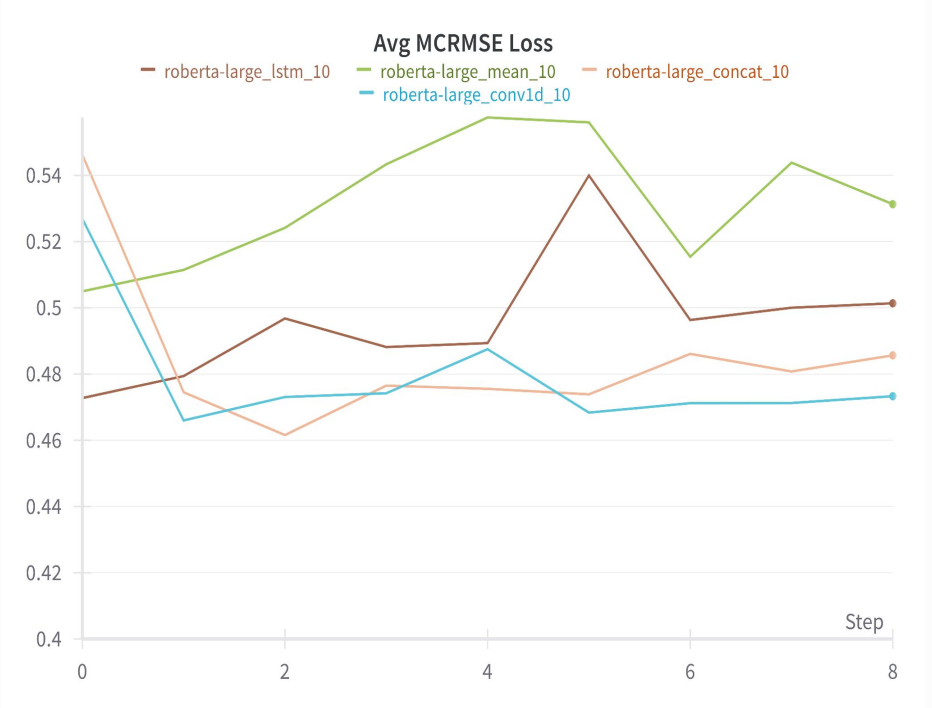


Fine Tuning


Data Split
Training (99%) (Train 95% + Val 5%)
Tokenization
AutoTokenizer from Huggingface
Dataloader
Batching Collating Data
Hyperparameter Tuning
Reduced LR, Pre-trained Checkpoints
Training
Fine tuning on 3 epochs for all Backbone + pooling

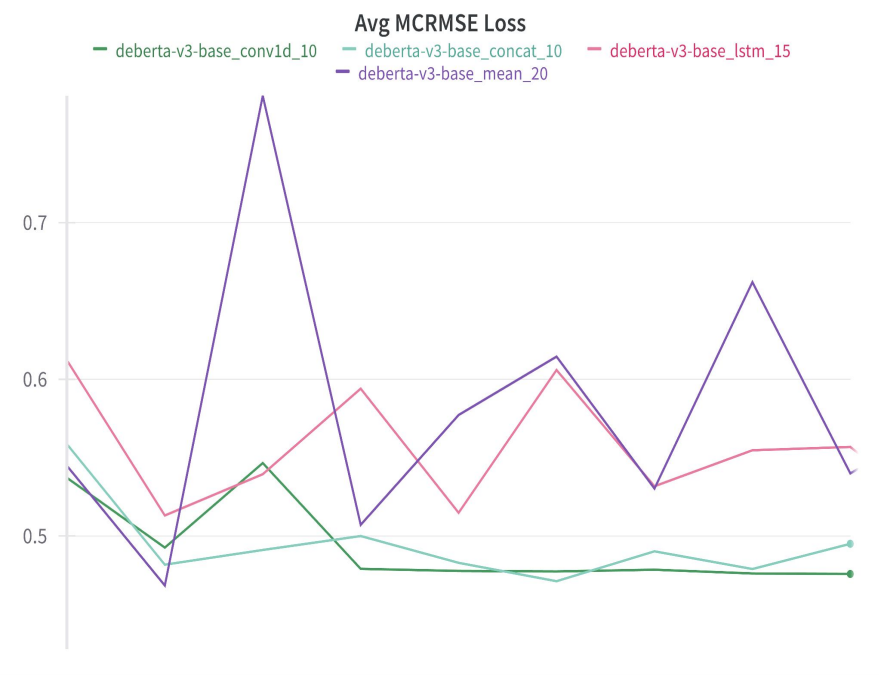
Comparing a Model with different Poolings

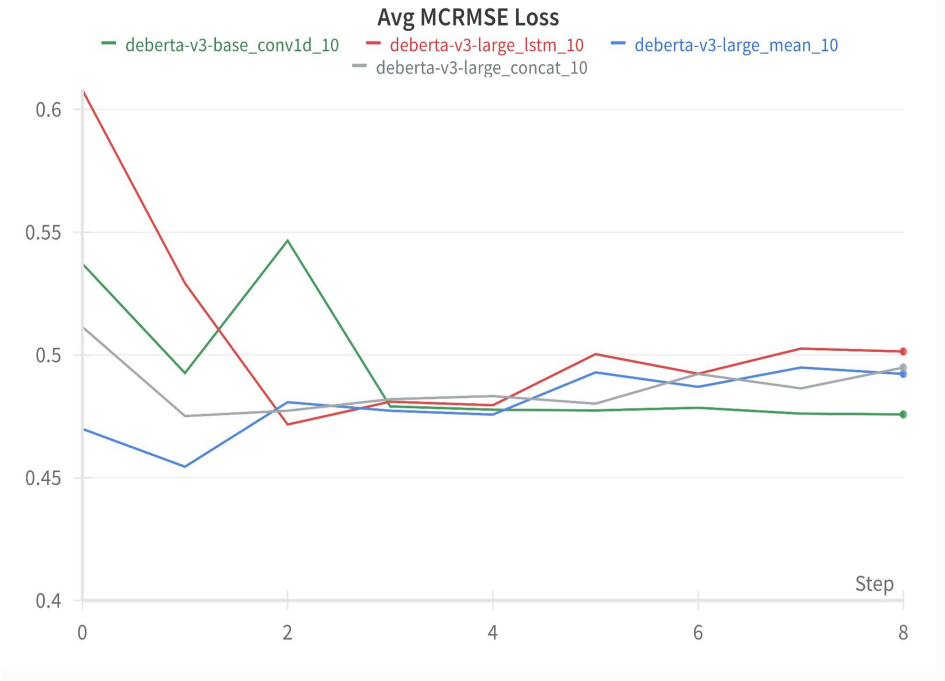




- Bert-base-uncased
- RoBERTa - large

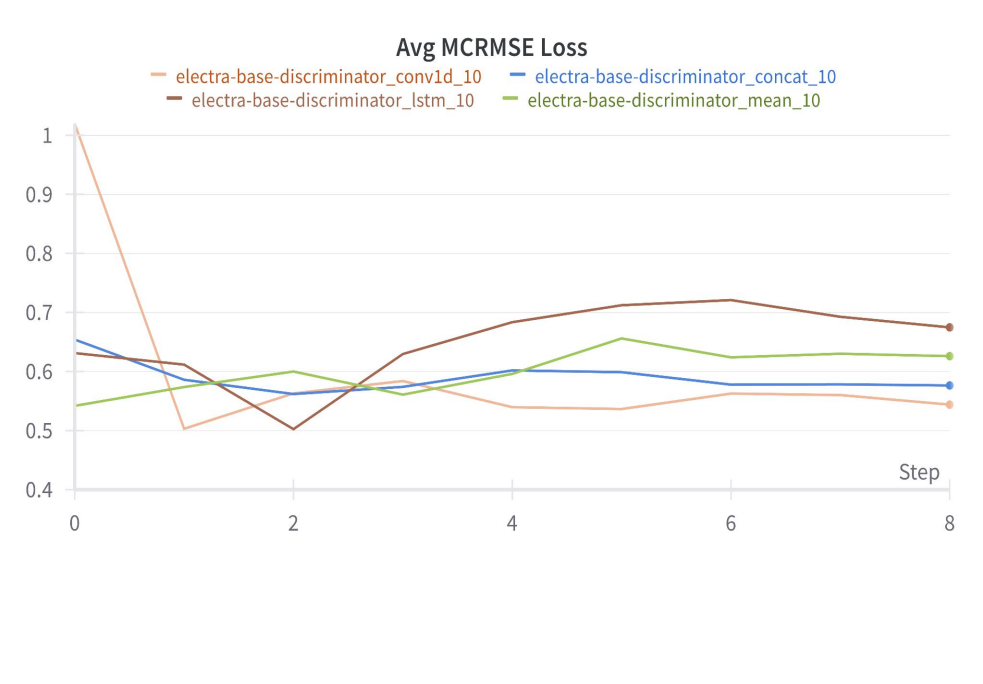
Comparing a Model with different Poolings





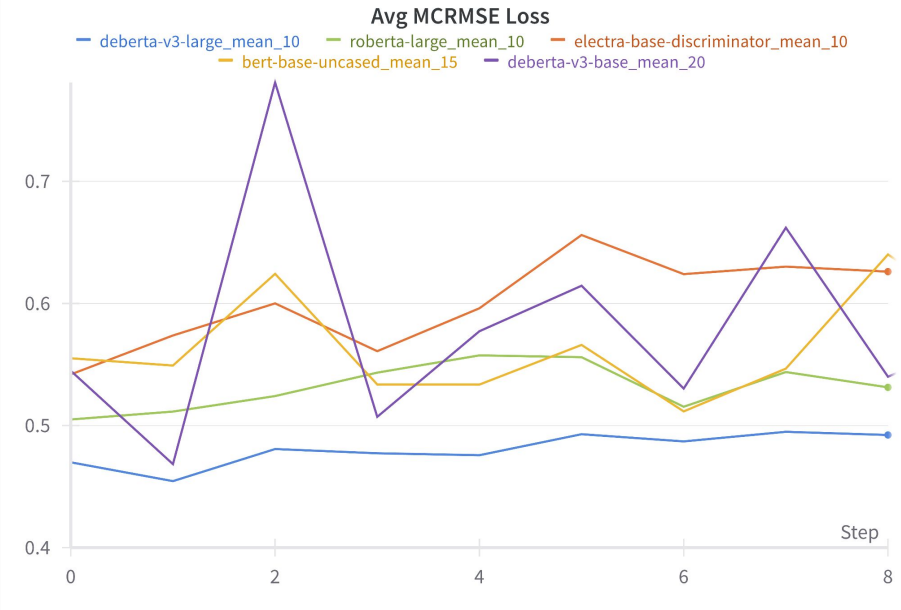
- DeBERTa - v3 - base
- DeBERTa - v3 - large

Comparing a Model with different Poolings

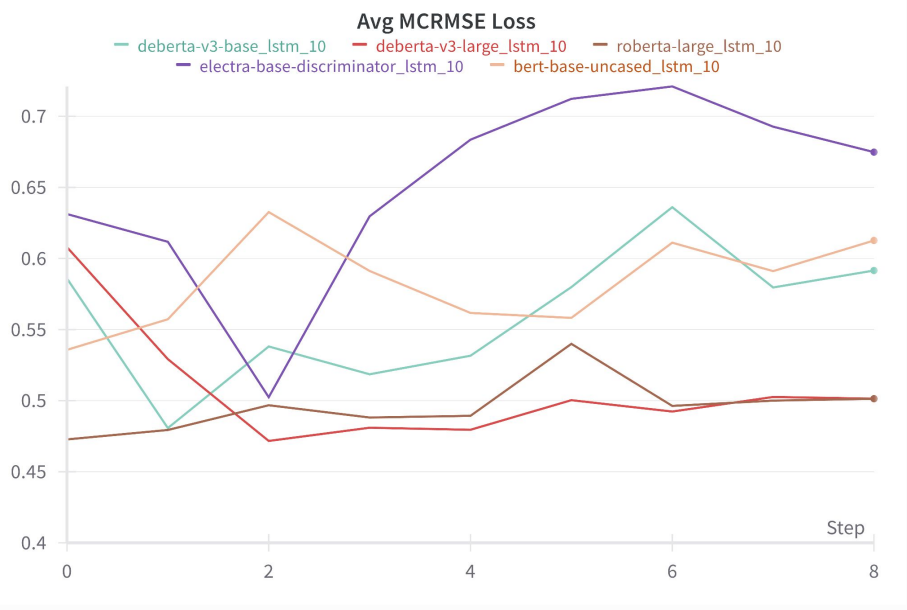


- Electra - base - discriminator

Comparing a Pooling with different Models

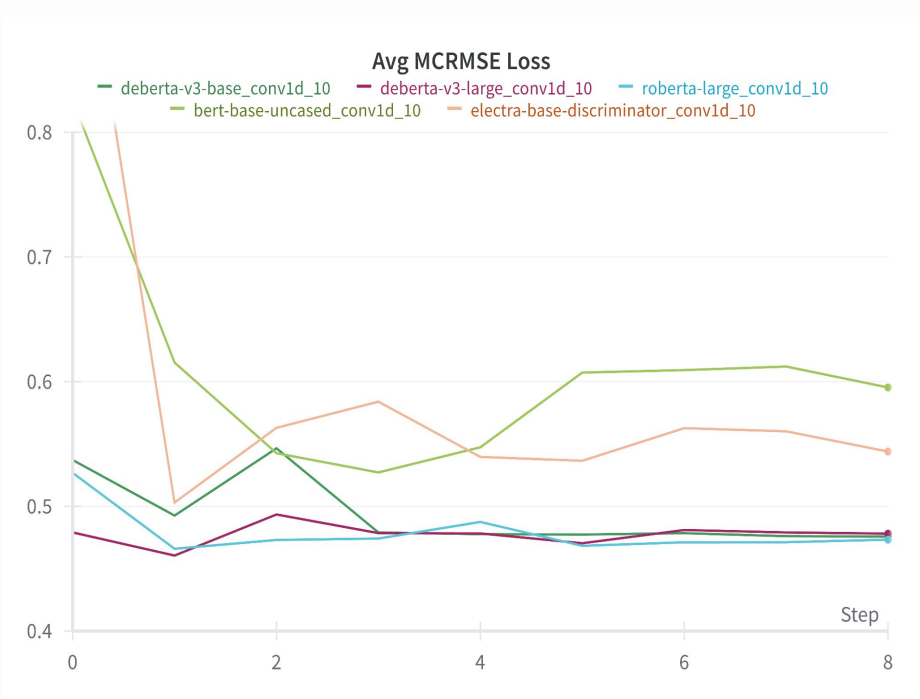


- Mean Pooling

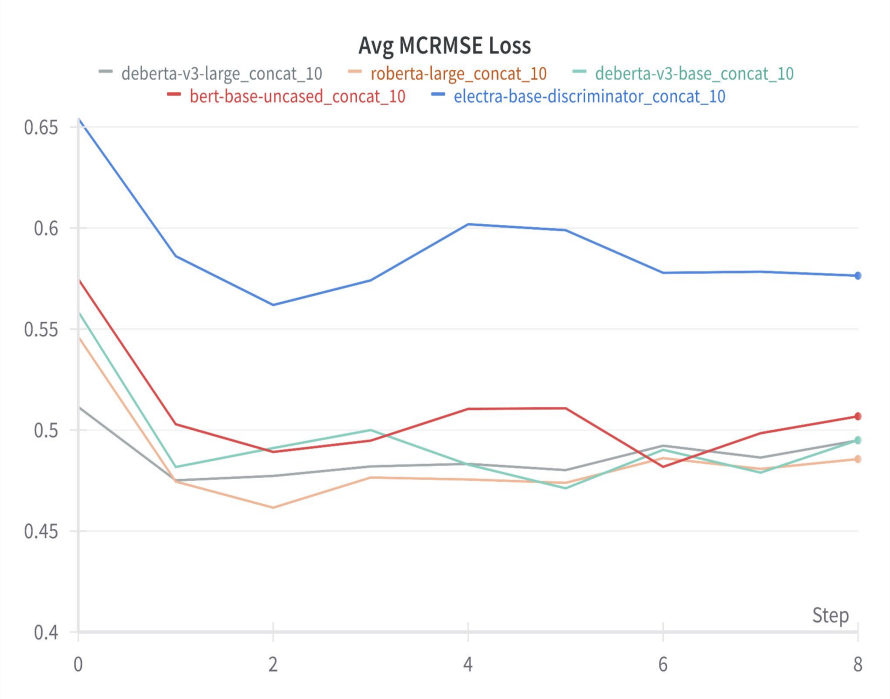


- LSTM Pooling

Comparing a Pooling with different Models



- Conv1D Pooling



- Concat Pooling

Results - Pretraining

	Mean	LSTM	Concat	Conv1D
Bert-base-uncased	0.51	0.53	0.48	0.53
Electra-base-discriminator	0.54	0.50	0.56	0.50
Roberta-large	0.50	0.47	0.46	0.47
Deberta-v3-base	0.46	0.48	0.47	0.48
Deberta-v3-large	0.45	0.47	0.47	0.46

Results - Fine tuning

	Mean	LSTM	Concat	Conv1D
Roberta-large	0.48	0.49	0.41	0.44
Deberta-v3-base	0.45	0.51	0.46	0.43
Deberta-v3-large	0.40	0.42	0.43	0.41

Let’s explore our App!

Conclusion

- Implemented baseline logistic regression model and developed NLP techniques (BERT, RoBERTa, DeBERTa, ELECTRA) to enhance language proficiency assessment for ELLs
- Despite challenges, utilized diverse backbones, multiple pooling methods, and differential learning rates for accurate language proficiency prediction in ELL essays
- For future improvements, a multi-pronged approach can enhance model performance and robustness like pseudo-labeling during pretraining.
- Additionally, experimenting with a broader range of pooling methods could uncover more effective strategies for data representation, particularly in complex models.

Thank you!