



University of Antwerp
| Faculty of Science

Neural retrieval model - Document ranking

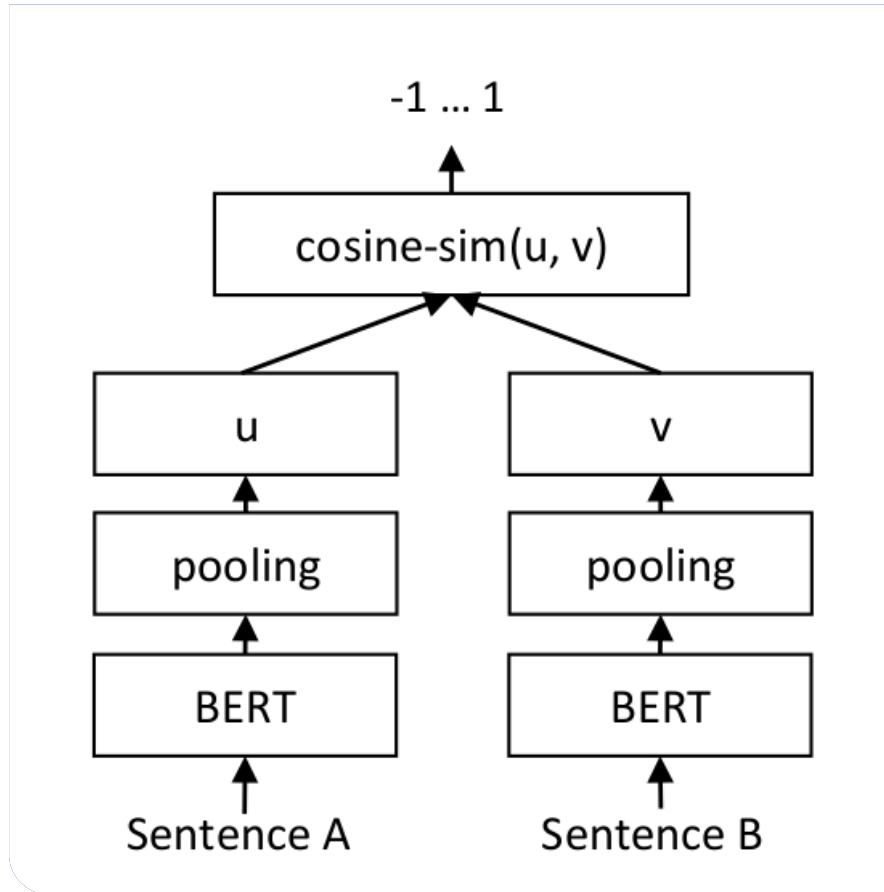
Arno Deceuninck



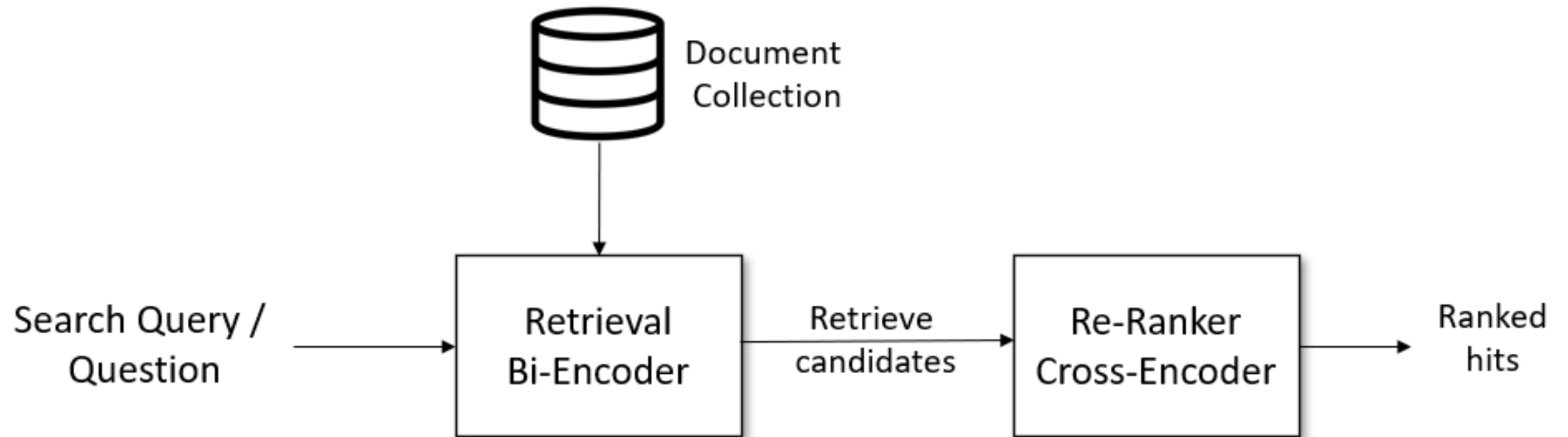
BERT

- Transformer-based
- Neural network model
- Sentence-transformers Python library

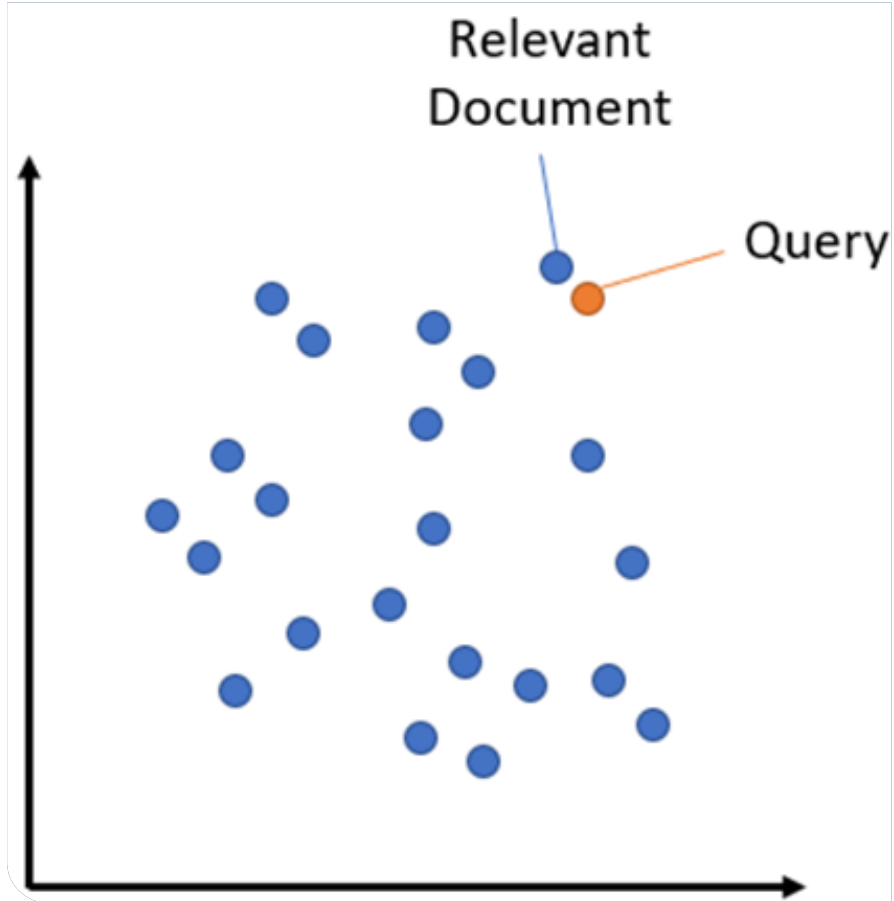
Architecture



- Word token to vector
- Pool vectors of document
- Compare

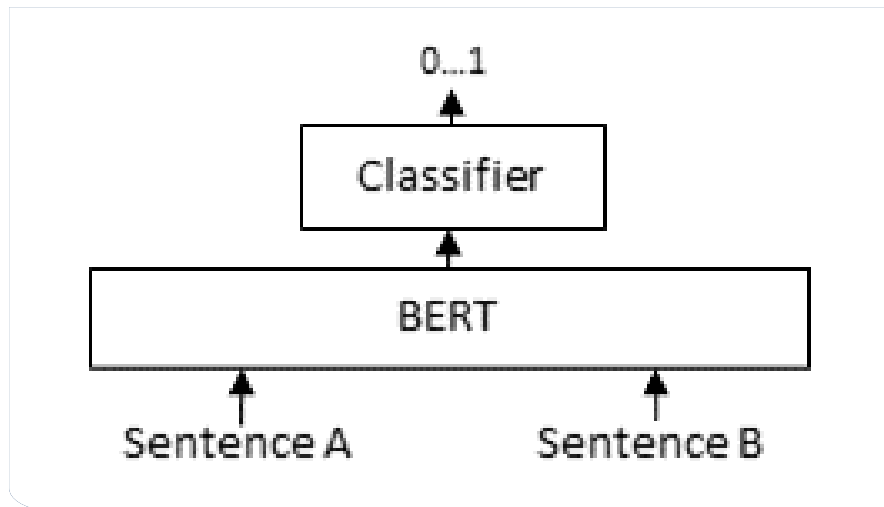


Bi-Encoder

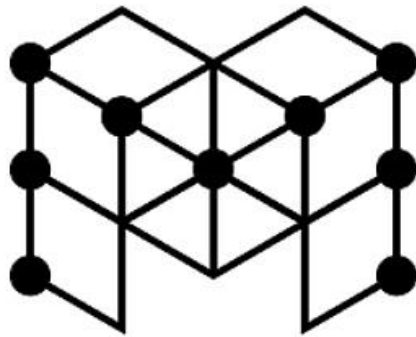


- Embed all documents
- Embed query
- Retrieve candidate set

Cross-Encoder



- Re-Ranker
- Pairwise comparison
- Relevance score 0...1



MS MARCO

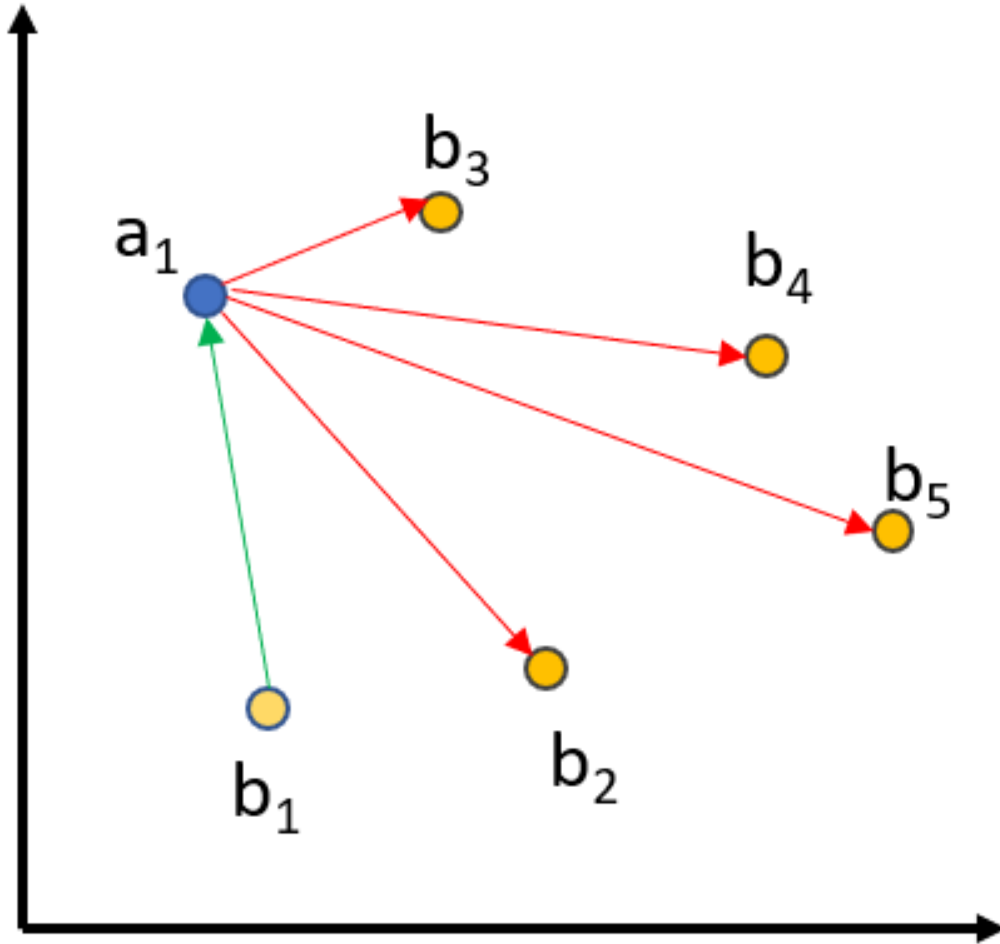
Microsoft MACHine Reading COmprehension Dataset

Pretrained models

- MSMARCO
 - 500k queries from Bing search
- Bi-Encoder
 - msmarco-bert-base-dot-v5
- Cross-Encoder
 - cross-encoder/ms-marco-TinyBERT-L-2-v2

Fine-tune model

- Provided labels



Model Scores

- BiCrossRetriever worse than expected
- LuceneRetriever still best
- LuceneCrossRetriever: combination

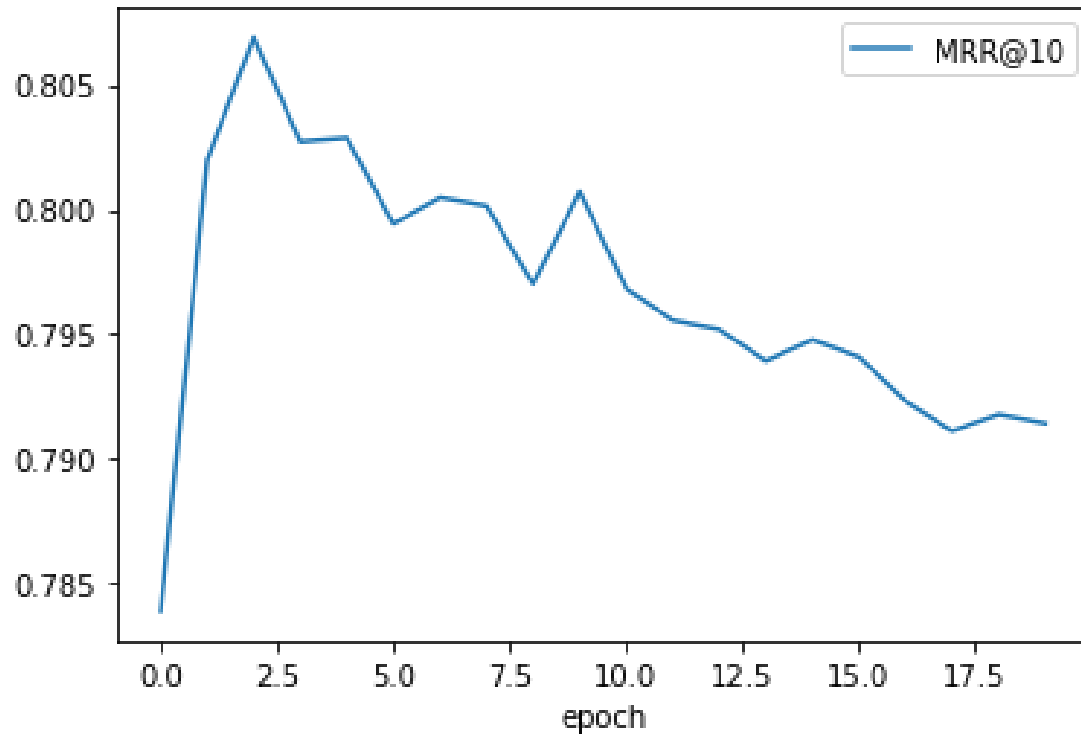
Name	Recall@10	Precision@10
LuceneRetriever	0.49958	0.49642
BiCrossRetriever	0.25137	0.30258
LuceneCrossRetriever	0.43721	0.43416

CrossEncoder selection

Name	Recall@10	precision@10	Time
LuceneRetriever	0.49958	0.49642	431.44it/s
BiCrossRetriever (MsMarco)	0.24137	0.30258	1.62it/s
LuceneCrossRetriever (MsMarco-TinyBERT)	0.43721	0.43416	6.72it/s
LuceneCrossRetriever (MsMarco-MiniLM)	0.45076	0.44782	1.08s/it
LuceneCrossRetriever (QNLI)	0.36328	0.36055	3.20s/it
LuceneCrossRetriever (STSB-TinyBERT)	0.33324	0.33090	3.09it/s

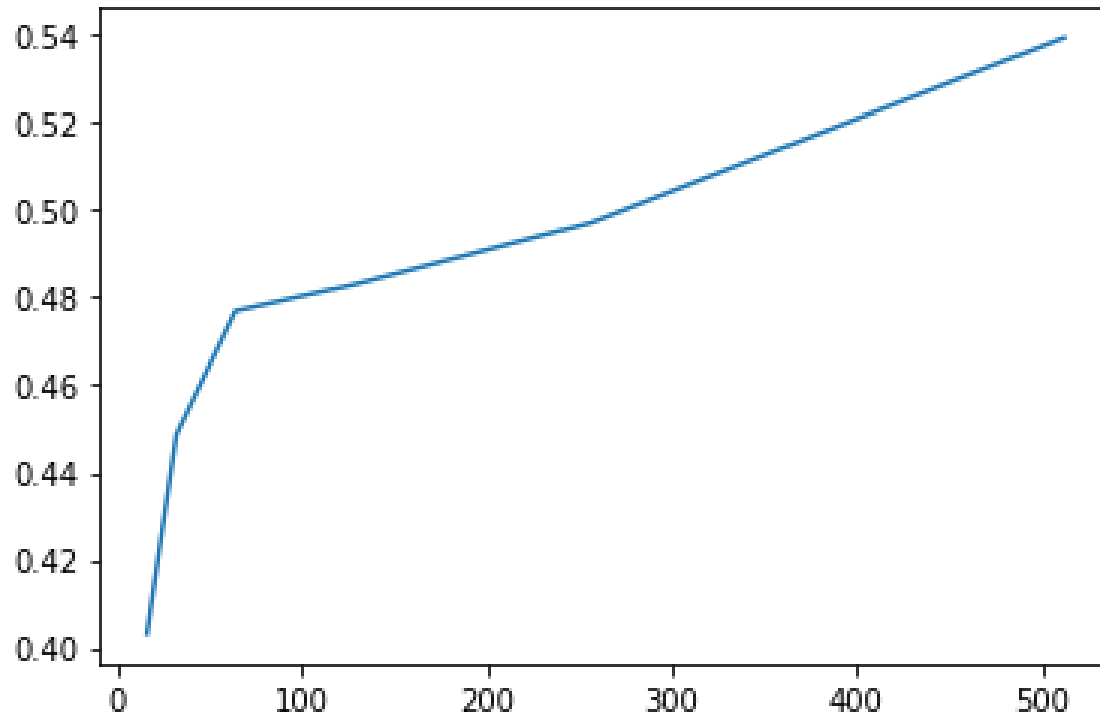
Epochs

- CERerankingEvaluator
- Epochs: 2 or 4?

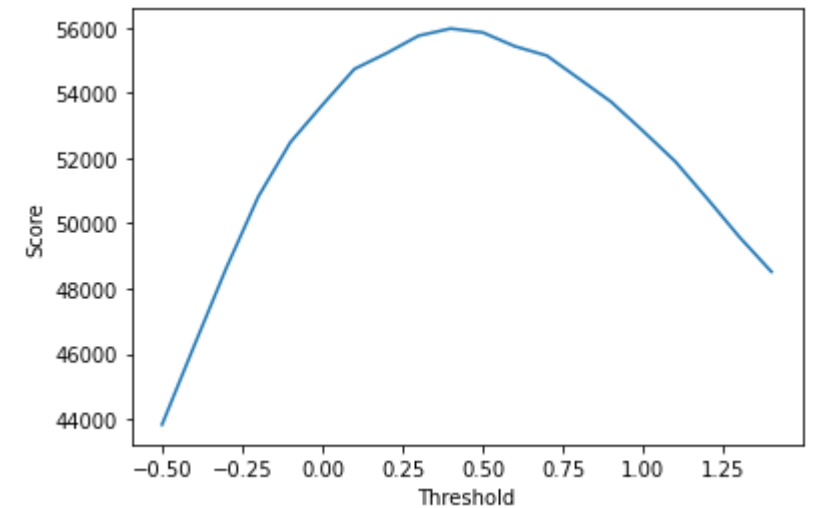
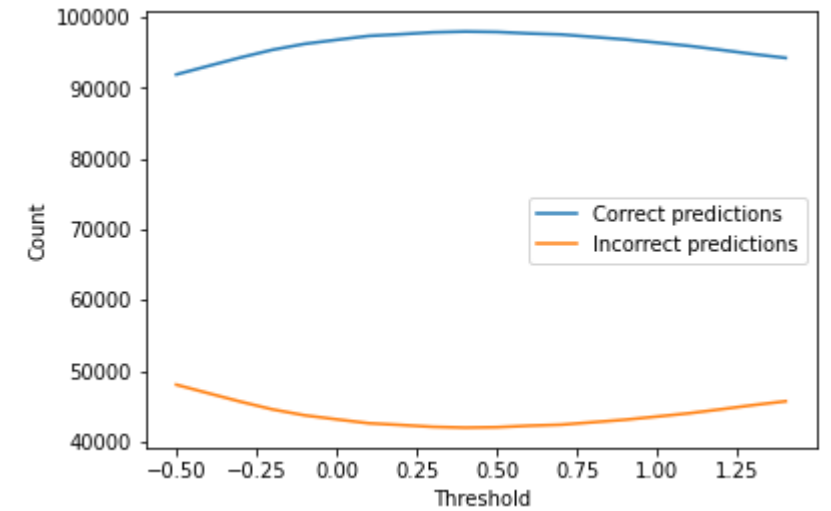
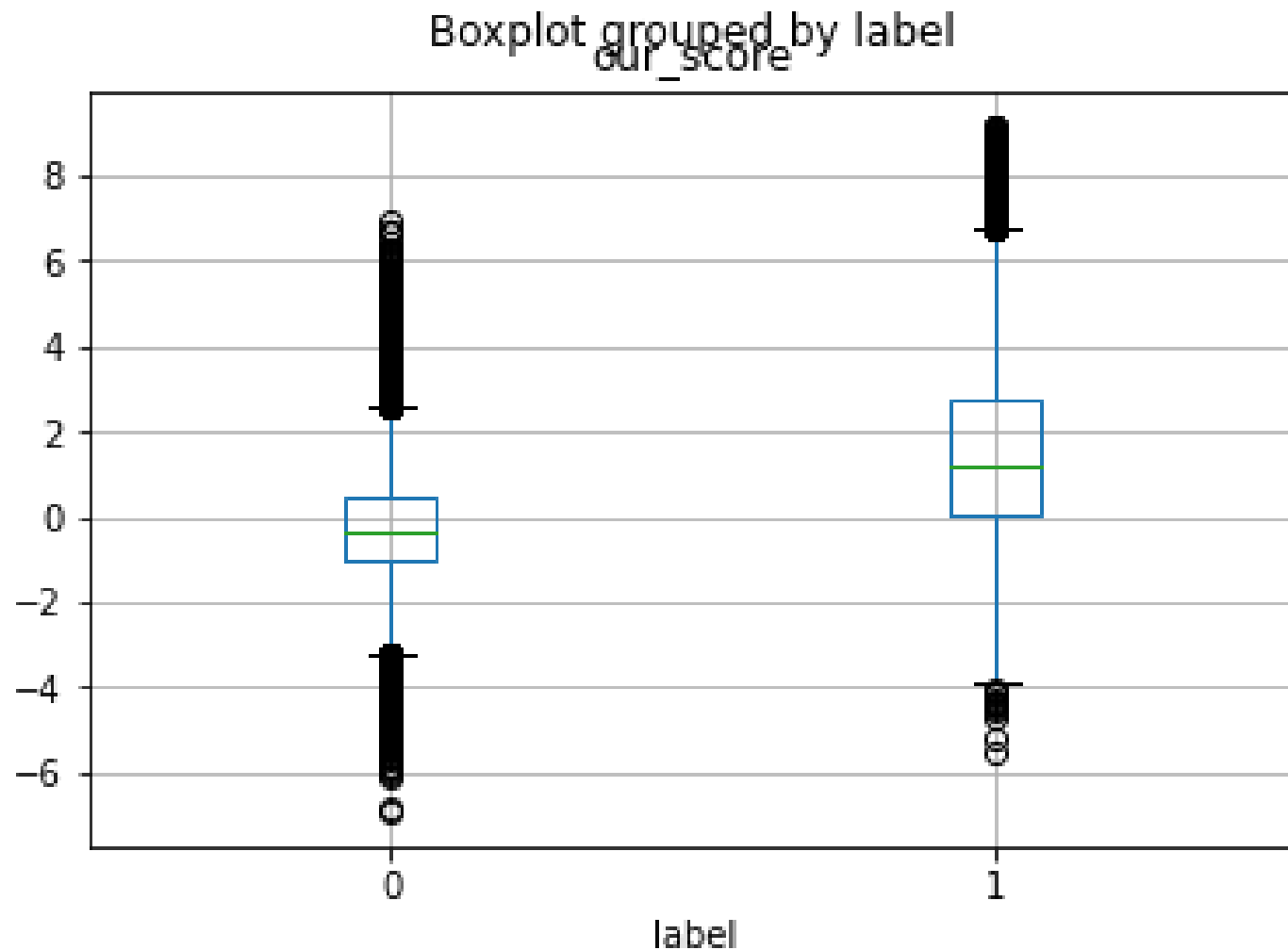


Truncate Length

- No Max Specified
- 512 same as None



Relevant Threshold





Other parameters

- Train batch size
- Warmup size
- ...

Final Results - Recommending

Name	Recall@10	Precision@10
LuceneRetriever	0.49958	0.49642
Optimized LuceneCrossRetriever	0.54272	0.53928
Improvement	0.04314	0.04286

Final Results - Labelling

- **Warning: Those results might not be representative**

Name	Recall	Precision
LuceneRetriever	UNKNOWN	0.49721
Optimized LuceneCrossRetriever	0.59636	0.68022
Improvement	UNKNOWN	0.18301

