

Title of the research Paper: The Role of Complex NLP in Transformers for Text Ranking

Researchers: David Rau and Jaap kamps

Research paper: <https://dl.acm.org/doi/abs/10.1145/3539813.3545144>

Presented By: Kazi Habibur Rahaman

ID: 20101559

CSE431, Section: 02, **Group:** 08

Summary:

While performing text ranking task on an example of NIST 2020 testset, researches saw that for both original passage and shuffled passage the neural ranker estimates their relevance correct. Thus, predicting both of their rank as 1. As the model did not find any difference between the actual and perturbed input, the question arose “how much is the syntactic aspect contribute to the model’s performance”. And to answer this question, David Rau and Jaap Kamps conducted multiple experiments on 2 different datasets. Throughout different experiments they used original texts, shuffled texts and texts with no word position information as inputs for same experiments and compared the result. After inspecting the results and throughout confirmation they gave an estimation of syntactic aspect’s contribution.

Hypothesis:

Neural Ranking models are believed to depend very little on the syntax and word positioning of the input.

Keeping the above hypothesis on mind the experiments were conducted. Every task performed during the research work compares the result with the vanilla model’s efficiency to figure out the significance of the syntactic aspect.

Contribution:

The research paper focuses only on the syntax aspect regarding NLP tasks. It also introduces the numeric comparison between passage with and without word positioning element. This also opens up many future potential to explore the contribution of other language aspects (e.g pragmatic, semantic steps) in NLP tasks.

Methodology:

The research works is conducted by using BERT Cross Encoder (CE). 2 different datasets, (i) MS MARCO dataset, TREC 2020 Deep Learning Track and (ii) TREC 2004 Robust Track, were used to perform the experiments on. The data were entered in original setting, shuffled and with no positioning information settings. The results were compared with the vanilla CE's performance. Moreover, different data representations and evaluation matrices (NDCG@10, MAP and Recall@100) were used to find the best configuration for the experiments.

Conclusion:

After the research, it was proven that, while syntax has a positive impact on the performance of the Cross Encoder, it is not very crucial. Moreover, for few datasets the difference of original and no positioning information inputs were so low that it can be even considered negligible. Furthermore, Few experiments yields better result with no position information dataset that the original dataset. So, the researchers concluded that the syntactic aspects of the passage were not the determining factors for Cross Encoders.

Limitations:

The research paper introduced a very important discussion in NLP field. But through this on research project the vast area of NLP could not be covered. Focusing on the syntactic aspect, the research completely ignores the other steps of the natural language

First Limitation/Critique:

The research only unfolds the contribution of syntax while completely ignoring the other three steps of Natural Language hierarchy.

Second Limitation/Critique:

Though the research work proves the minor influence of the syntactic aspect, it does not mention any collaborating effects. For example, syntax might not have great influence on the models performance but syntax and pragmatic aspect of passage together can have a significant effect on the results.

Synthesis:

The paper inspires others to find out the contribution of each aspects of any passage. If we can get quantified values of these contributions or just a idea of how much impact they can have on NLP task's performance, we can manipulate the input text configuration to produce the best results. Additionally, we can customize the inputs to let the model focus more on the superior aspects while spending less time on the inferior one. Also, the inputs can be simplified by removing less essential aspects. This will reduce the required time for the programs to produce results.