

Rhetorical role prediction in case law

What advances in the use of encoders (BERT) and decoders (GPT)?

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Motivations, issues and task definition

- ANR-22-CE38-0004 Lexhnology project
- Support the search for similar cases, understand successful reasoning, make it easier to read the full text, improve the ability to understand legal texts...
- Very long texts, specific to the legal field and jurisdiction of each country
- LegalEval dataset @ SemEval2023
- Best system, AntContentTech, equipped SciBERT-HSLN with domain-adaptive pretraining, data augmentation strategies, as well as auxiliary-task learning techniques

The problem of rhetorical role prediction as...

IN THE COURT OF THE V ADDL SESSIONS JUDGE, MYSORE. Dated this the 23rd day of May 2013 ... The Petitioner is a businessman and he is permanent resident of Mysore City... On behalf of the Prosecution he learned Public Prosecutor has filed objection to the bail Petition stating that, there ...Now, the points that arise for consideration of the Court are: 1. Whether the Petitioner has made out sufficient grounds to release him on Anticipatory Bail? ... Heard the arguments advanced by the learned advocate for the Petitioner and the learned Public Prosecutor... Considering all these aspects, the Court is of the view that, ...Point No.2: For the foregoing reasons and in view of my above discussions, I proceed to pass the following...The High Court by its order dated October 26, 1982 set aside the order of the Tribunal and also the assessment on the ground ...The petitioners are falsely implicated and the charge sheet has been filed against the petitioners merely... My findings on the above points are as follows: Point No.1: In the Positive Point No.2: As per final order for the following...In a decision reported in (2013) 1 KCCR 334 case of K.Ramachandra Reddy Vs. State of Karnataka by the Statute House Officer...The decision of the Andhra Pradesh High Court ... are not relevant for purposes of deciding the question which has arisen before us...

sentence sequence labelling task

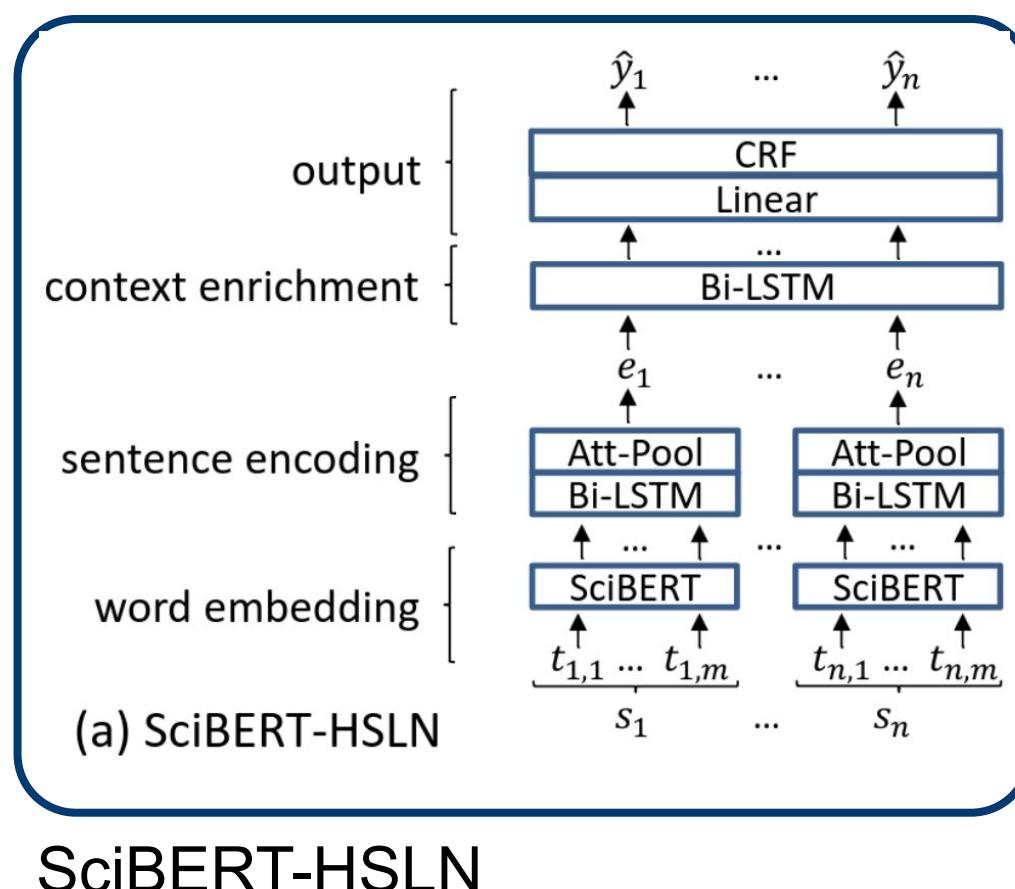
multi-class sentence labelling task

IN THE COURT OF THE V ADDL SESSIONS JUDGE, MYSORE. Dated this the 23rd day of May 2013 ... Preamble
The Petitioner is a businessman and he is permanent resident of Mysore City... Fact
On behalf of the Prosecution he learned Public Prosecutor has filed objection to the bail Petition stating that, there ... Arg by Respondent
Now, the points that arise for consideration of the Court are: 1. Whether the Petitioner has made out sufficient grounds to release him on Anticipatory Bail? ... Arg
Heard the arguments advanced by the learned advocate for the Petitioner and the learned Public Prosecutor... None
Considering all these aspects, the Court is of the view that, ... Point No.2: For the foregoing reasons and in view of my above discussions, I proceed to pass the following... Ruling by present court
The High Court by its order dated October 26, 1982 set aside the order of the Tribunal and also the assessment on the ground ... Ruling by lower court
The petitioners are falsely implicated and the charge sheet has been filed against the petitioners merely ... Arg by Petitioner
My findings on the above points are as follows: Point No.1: In the Positive Point No.2: As per final order for the following... In a decision reported in (2013) 1 KCCR 334 case of K.Ramachandra Reddy Vs. State of Karnataka by the Statute House Officer... Precedent Relied upon
The decision of the Andhra Pradesh High Court ... are not relevant for purposes of deciding the question which has arisen before us... Precedent not Relied upon

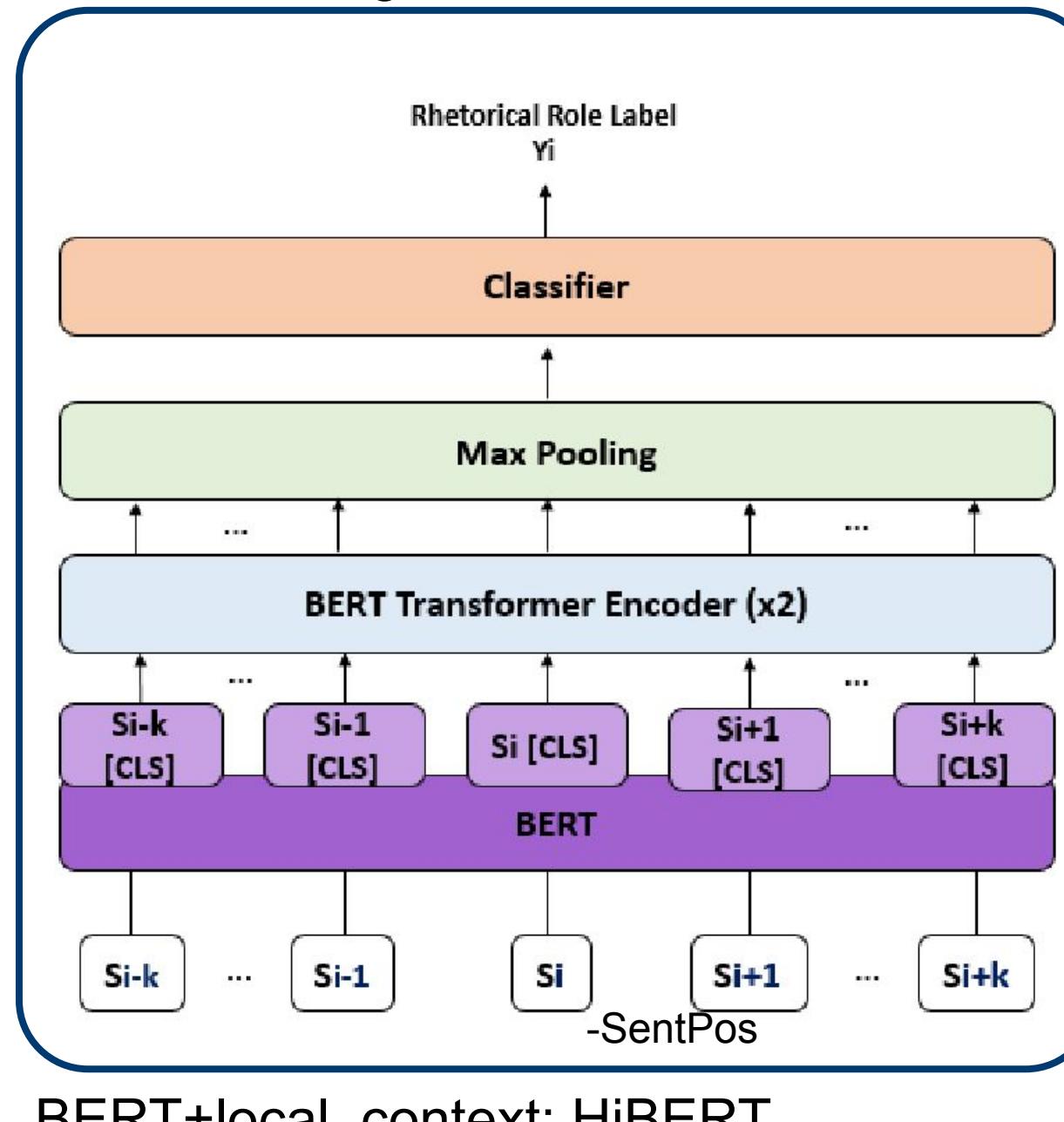
Approaches

Encoder (BERT-based)

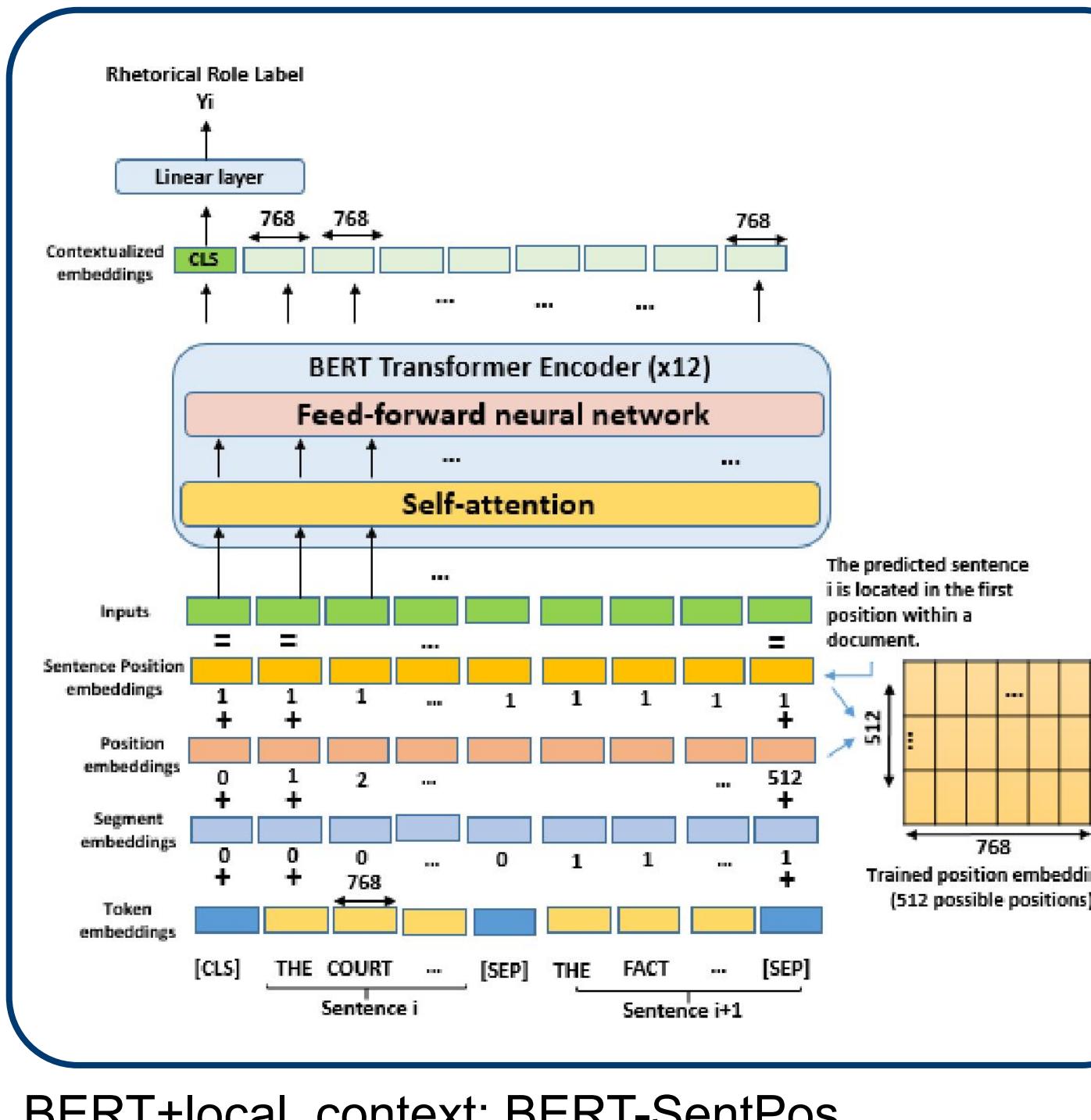
INPUT: Full text



INPUT: A globally positioned sentence and its surrounding context



INPUT: Pair of sentences wi global position



Decoder (GPT-3.5-turbo)

INPUT: A sentence

Prompt template and strategies

- PREAMBLE (a);
- EXAMPLES or CHAIN-of-THOUGHTS
 - with Few-Shot Prompting (b),
 - with Label definitions (c),
 - with Clarification of label ambiguities (d)
 - in extension of (c),
 - with labelled textual context (e);
- INPUT TEXT
- REQUEST to encourage the model to reason (f),
 - with specific questions (g)



Results

Weighted F1

	wP	wR	A	wF1	MF1
zero-shot example	0.42	0.34	0.34	0.33	0.29
one-shot example	0.45	0.33	0.33	0.33	0.30
2-shot example	0.45	0.34	0.34	0.36	0.29
4-shot example	0.46	0.35	0.35	0.37	0.28
definition	0.46	0.42	0.42	0.42	0.33
definition+clarification	0.46	0.41	0.41	0.41	0.32
definition+examples	0.49	0.41	0.41	0.42	0.33
context-2	0.45	0.39	0.39	0.39	0.32
context-8	0.45	0.36	0.37	0.36	0.29
context+2	0.46	0.43	0.43	0.42	0.36
context+8	0.43	0.39	0.39	0.38	0.31
labelled_context-2	0.66	0.63	0.63	0.63	0.50
labelled_context-8	0.71	0.68	0.68	0.68	0.50
labelled_context+2	0.69	0.66	0.66	0.66	0.51
labelled_context+8	0.72	0.70	0.70	0.70	0.53
zero-shot-cot	0.46	0.29	0.29	0.31	0.27
cot-by-queries	0.77	0.71	0.71	0.72	0.61
BERT [5]				0.65	
BERT+local_context [5]				0.75-0.77	
SciBERT-HSLN [3]				0.79	
AntContentTech [24]				0.8593	



	Analysis	ARG-PET	ARG-RES	FACTS	ISSUE	NONE	PRML	PRE-NOT	PRE-R.	RATIO	RLC	RPC	STA
zero-shot example	0.36	0.21	0.29	0.46	0.44	0.27	0.27	0.29	0.22	0.00	0.21	0.50	0.26
one-shot example	0.32	0.12	0.32	0.48	0.46	0.27	0.26	0.31	0.32	0.00	0.26	0.51	0.23
2-shot example	0.36	0.20	0.24	0.45	0.45	0.22	0.40	0.22	0.29	0.00	0.26	0.47	0.21
4-shot example	0.40	0.17	0.20	0.47	0.45	0.25	0.38	0.12	0.29	0.00	0.25	0.48	0.23
definition	0.45	0.26	0.26	0.54	0.49	0.13	0.50	0.20	0.22	0.09	0.30	0.58	0.22
definition+clarification	0.47	0.21	0.15	0.55	0.44	0.17	0.41	0.25	0.31	0.08	0.27	0.62	0.26
definition+examples	0.46	0.23	0.22	0.53	0.49	0.23	0.46	0.17	0.33	0.04	0.28	0.62	0.20
context-2	0.43	0.26	0.31	0.55	0.48	0.22	0.36	0.24	0.33	0.07	0.20	0.46	0.24
context-8	0.38	0.10	0.28	0.52	0.51	0.24	0.36	0.10	0.29	0.11	0.23	0.42	0.25
context+2	0.47	0.22	0.25	0.55	0.49	0.24	0.44	0.44	0.30	0.09	0.25	0.53	0.34
context+8	0.43	0.19	0.19	0.52	0.41	0.23	0.39	0.36	0.27	0.09	0.19	0.49	0.31
labelled_context-2	0.67	0.32	0.70	0.74	0.47	0.65	0.71	0.18	0.50	0.10	0.37	0.61	0.48
labelled.context-8	0.74	0.34	0.67	0.79	0.49	0.54	0.76	0.00	0.65	0.00	0.55	0.54	0.45
labelled.context+2	0.71	0.30	0.61	0.80	0.49	0.55	0.77	0.33	0.58	0.10	0.45	0.53	0.38
labelled.context+8	0.78	0.27	0.44	0.79	0.59	0.58	0.78	0.50	0.64	0.09	0.58	0.50	0.38
cot-by-queries	0.79	0.36	0.55	0.75	0.61	0.57	0.84	0.86	0.75	0.35	0.60	0.46	0.42

Conclusions

- About the generative approach
 - Addition of examples benefits the well represented classes (Weighted-F1 score increases, but Macro-F1 score slightly decreases)
 - Learns better from definitions than from examples -> how to select examples
 - Do not assimilate knowledge from annotators' mistakes and the inherent ambiguity, when presented as mere declarations
 - Few-shot examples, unlabelled contextual sentences and labelled contextual sentences as three types of examples with increasing similarity and precision
- Comparing to a fine-tuned BERT-based classifier with a context representation
 - A gap for a generative approach with one-shot prompting strategies to reach the performance of such systems
 - Which, on the other hand, require dedicated resources, architectures and training

Enhancing
Pre-Trained Language
Models with Sentence
Position Embeddings
@ ASAIL 2023



Harnessing
GPT-3.5-turbo
@ JURIX2023

