Combination of Contextualized and Non-Contextualized Layers for Lexical Substitution in French

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Introduction

— Lexical substitution (LS) task requires to substitute a target word by candidates in a given context. Candidates must keep meaning and grammatically of the sentence.

— LS have two steps: find a list of substitutions for the target word and then rank them in order to find the best substitute in the sentence context.

— We propose an application of the state-of-the-art method based on BERT in French and a novel method using contextualized and non-contextualized layers

Example

Sentence: *Benzema a **marqué** un but.* (Benzema scored a goal.)

Target word: *marqué* (scored)

Substitute candidates from WOLF: *inscrit* (scored), *coché* (mark)

✓ *Benzema a **inscrit** un but.* (Benzema scored a goal.)

✗ *Benzema a **coché** un but.* (Benzema marked a goal.)

State-of-the-art

Propositions of Substitute Candidates:

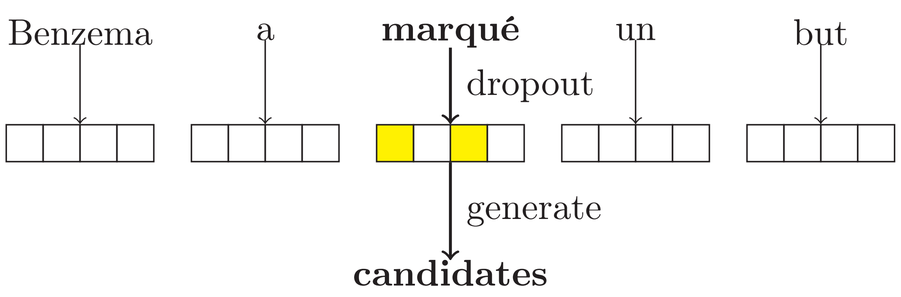
- Lexical resources (WordNet, dictionnaries or both)
- Vector space models
- Pretrained language models

Ranking substitute candidates:

- Classifiers
- Vector space models
- Pretrained language models

Our method

1. Propositions of Substitute Candidates:



2. Ranking substitute candidates:

- Similarity in the first and last layer which include non-contextualized and contextualized information for the target word and a candidates
- Similarity foreach other word in sentence in order to compare the impact of the substitution on the meaning and choose the best candidate.

3. Post process:
Substitution words are lemmatized in the gold standard. We make two steps of post process to match with them:

- Lemmatization (inscrit→ inscrire)
- Remove duplicated candidates

Evaluation Tasks

Evaluation tasks	SemDis 2014 V1	SemDis 2014 V2
#Sentences	300	285
#Unique target words	10	10
#Candidates	1,771	6,034

Example of sentence in second gold standard:
*90 % de ces hommes ont été **arrêtés** pour des délits liés à la drogue*
Substitution words from gold standard for this sentence:
coffrer ; appréhender ; inculper ; écrouer ; emprisonner

Evaluation measures

$$best_{norm}(i) = \frac{score_i(best_i)}{score_i(max_i)} \quad (1)$$

$$oot_{norm}(i) = \frac{\sum_{b \epsilon P_i} score_i(b)}{\sum_{a \epsilon M_i \subset G_i} score_i(a)} \quad (2)$$

$score_i(candidate)$: The score of candidate in the gold standard
$best_i$: Best candidate proposed by the system
P_i: List of candidates proposed by the system
max_i: Best candidate from the gold standard
M_i: the subset of G_i which contains the 10 best scores

Evaluations

Method	BEST	OOT
Desalle et al. (2014)	**0.29**	**0.41**
Zhou et al. (2019)	**0.29**	0.31
Our method	0.25	0.32
Ferret (2014)	0.23	0.29
Gábor (2014)	0.17	0.22
Fabre et al. (2014)	0.13	0.33

Evaluation on first gold standard

Method	BEST	OOT
Desalle et al. (2014)	**0.48**	**0.38**
Ferret (2014)	0.33	0.33
Our method	0.30	0.24
Zhou et al. (2019)	0.30	0.23
Gábor (2014)	0.29	0.19
Fabre et al. (2014)	0.17	0.28

Evaluation on second gold standard

Conclusions

— Our method increases on the OOT but decreases on the BEST measure in the SemDis 2014 benchmark in comparison with Zhou et al. (2019) but do not have a better score than (Desalle et al., 2014)

— We want to applied our method in English to have better comparison with the BERT-based method (Zhou et al., 2019)

— A method that can consider a multi-word like a target and replace this with a single word substitute or a multi word substitute.

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