



TOHOKU UNIVERSITY



Pseudo Zero Pronoun Resolution Improves Zero Anaphora Resolution

Ryuto Konno¹, Shun Kiyono^{2,3}, Yuichiroh Matsubayashi^{3,2}, Hiroki Ouchi^{4,2}, Kentaro Inui^{3,2}

¹Recruit Co., Ltd. ²RIKEN ³Tohoku University ⁴Nara Institute of Science and Technology

Summary

- We tackled **zero anaphora resolution (ZAR)** in Japanese
- We proposed a new **pretraining task** and a new **finetuning method**
- The two proposals **boost the SoTA** performance of ZAR
- Our analysis provides **new insights on the remaining challenges**

Task: Zero Anaphora Resolution (ZAR)

In Japanese, Chinese, Korean, Italian, Spanish, ...

The **criminal's** weapon was found in the victim's room.

Recognizing the antecedents of zero pronoun

It seems that ~~he~~ ϕ used a hammer.

Pronouns are **omitted**
→ zero pronoun

Pretraining

Previous: Cloze Task

university
↑
[MASK]

No supervision on anaphoric relations

teachers
↑
[MASK]

The **university** has surveyed teachers' means ... most **teachers** use ...

Proposed: Pseudo Zero Pronoun Resolution (PZERO)

Explicit supervision on anaphoric relations

[MASK]

The university has surveyed **teachers'** means ... most **teachers** use ...

Finetuning

Previous: Argument Selection with Label Probability (AS)

↑ NOM ↑ ↑ ↑ ↑ ACC
The criminal's weapon ... that ϕ used a hammer.

※ NOM = nominative
ACC = accusative

Pretrain-finetune discrepancy [Yang+'19]

- [MASK] is not used
- Last Layer is replaced/added

Proposed: Argument Selection as PZERO (AS-PZERO)

The **criminal's** weapon ... that ϕ used a hammer. [MASK] NOM used

Smoother adaptation

- Both training predict antecedents
- We can use the same network structure

Results and analysis

Table1: ZAR F1 score on test set

PT	Further PT		Finetuning		ZAR F1 on Test Set			
	Cloze	PZERO	AS	AS-PZERO	intra	inter	exophoric	All
✓	✓		✓		71.82	44.98	63.94	62.54 ± 0.47
✓	✓			✓	71.52	45.97	64.55	62.85 ± 0.19
✓		✓	✓		71.96	46.37	64.42	63.06 ± 0.19
✓		✓		✓	72.67	48.41	65.40	64.18 ± 0.23

※ PT = Pretraining

Table2: inter recall on dev set

※ Remaining challenge

Type of instances	Cloze + AS	PZERO + AS-PZERO
(I) Number of gold antecedents in input		
Only one / More than one	35.96 / 53.1	39.57 / 54.1
(II) Distance of sentences between argument and the target predicate		
One / Two / More than two	48.86 / 37.7 / 40.5	51.96 / 42.6 / 40.3
(III) Voice of the target predicate		
Active / Passive / Causative	45.02 / 25.2 / 60	47.42 / 29.1 / 60