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NTTD at the NTCIR-16 Real-MedNLP Task

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Overview

- We participated in the **Subtask1-CR-JA & Subtask1-RR-JA**, which were NER tasks with limited labeled data of Japanese medical documents.

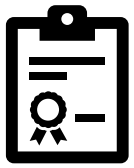
- We trained 2 models respectively with **augmented labeled data** to extract named entities from the provided Japanese case reports and radiographic reports.

- From the aspect of **Entity-F1** of all entities, our models ranked **2nd in Subtask1-CR-JA** and **3rd in Subtask1-RR-JA**.

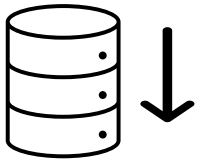
Challenges & Approaches

- Challenges:
  - Deep Learning applications need a huge amount of data, and Japanese medical documents are relatively difficult to acquire and annotate.
  - The inconsistency in a small dataset may affect models' output. [1]

- Approaches:
  - To assure the annotation quality

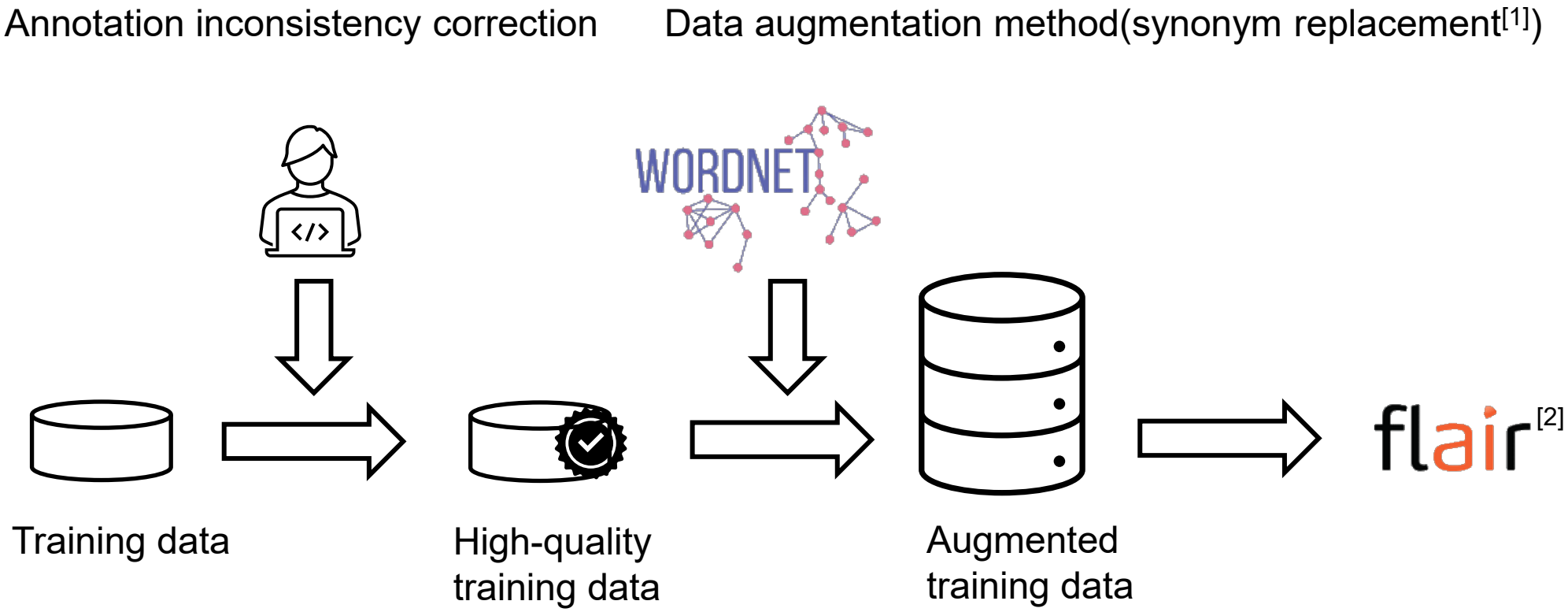


  - To reduce the necessary data volume



[1] Qingkai Zeng, Mengxia Yu, Wenhao Yu, Tianwen Jiang and Meng Jiang. 2021. Validating Label Consistency in NER Data Annotation. arXiv preprint arXiv:2101.08698.

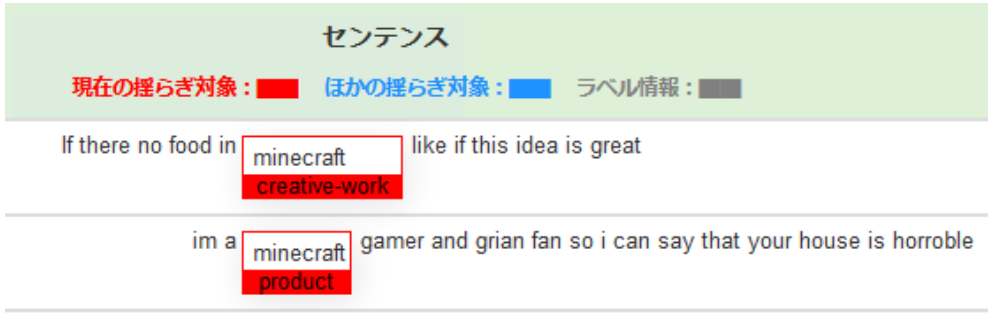
Our approach



[1] Xiang Dai and Heike Adel. 2020. An Analysis of Simple Data Augmentation for Named Entity Recognition. In Proceedings of the 28th International Conference on Computational Linguistics.
[2] Alan Akbik, Tanja Bergmann, Duncan Blythe, Kashif Rasul, Stefan Schweter, and Roland Vollgraf. 2019. Flair: An easy-to-use framework for state-of-the-art nlp. In Proceedings of the 2019 Conference of the North American Chapter of the Association for Computational Linguistics (Demonstrations), pages 54–59. aclweb.org.

Annotation Inconsistency Detection

- Showing entities labeled with different tags in KWIC (Keyword in Context)
- Manually correcting inappropriate tags



Labels	Sentences
a	<a>**口腔粘膜**および口唇に広範囲に糜爛 Widespread erosions of <a>**oral mucosa** and lips
a	<a>顔の一部と**口腔粘膜**にびらんを認めた Erosions on part of the <a>face and **oral mucosa**.
(missing)	豆腐と比べて**口腔粘膜**からの吸収性が良く Better absorption from the **oral mucosa** compared to tofu

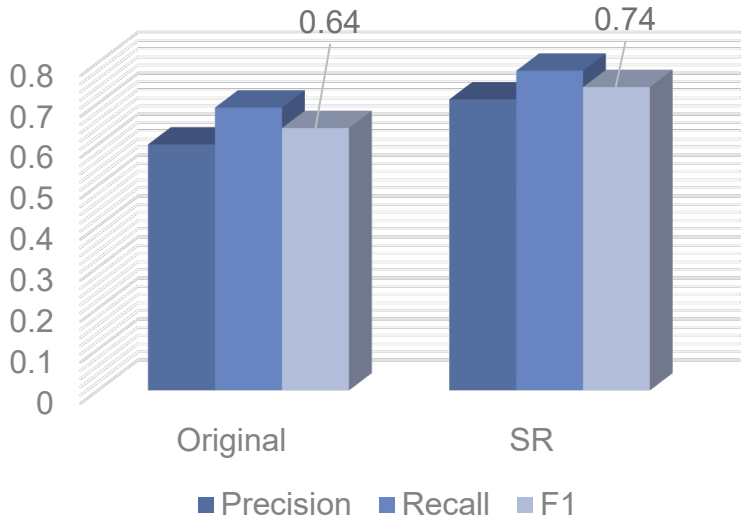
Data Augmentation by Synonym Replacement

- Using a binomial distribution to determine whether each token should be replaced.
- Using synonyms from WordNet to replace a token.

	Sentences
Original	今回は**眼瞼**周囲の**浮腫**, 紫斑と呼吸**困難**の**ため緊急**入院した。 This time, the patient was **urgently hospitalized because of periocular edema**, purpura and **dyspnea**.
Augmented by SR	今回は**目縁**周囲の**水症**,紫斑と呼吸**作用波乱**の**悧巧事変**入院した。 This time, the patient was **hospitalized for the obedient incident** of **periorbital hydrops**, purpura and **respiratory disturbance**.

Results

- Results of a 3-fold validation experiment (dividing CR training data into 3 pairs of training and test sets by ratio of 8:2)



- Official Results of Entity level

Subtask	P	R	F1	Rank
CR-JA	**62.26**	61.53	61.89	2
Others' Best	61.96	68.91	65.25	
RR-JA	86.96	87.09	87.03	3
Others' Best	89.07	89.45	89.26	

Conclusion

- Annotation inconsistency detection & simple synonym replacement can boost the NER model's performance even in the field which needs high level of expertise.
- Specific augmentation strategy on different tag types & ensemble of multiple augmentation methods should be considered.

Thanks for your attention!

Any questions?

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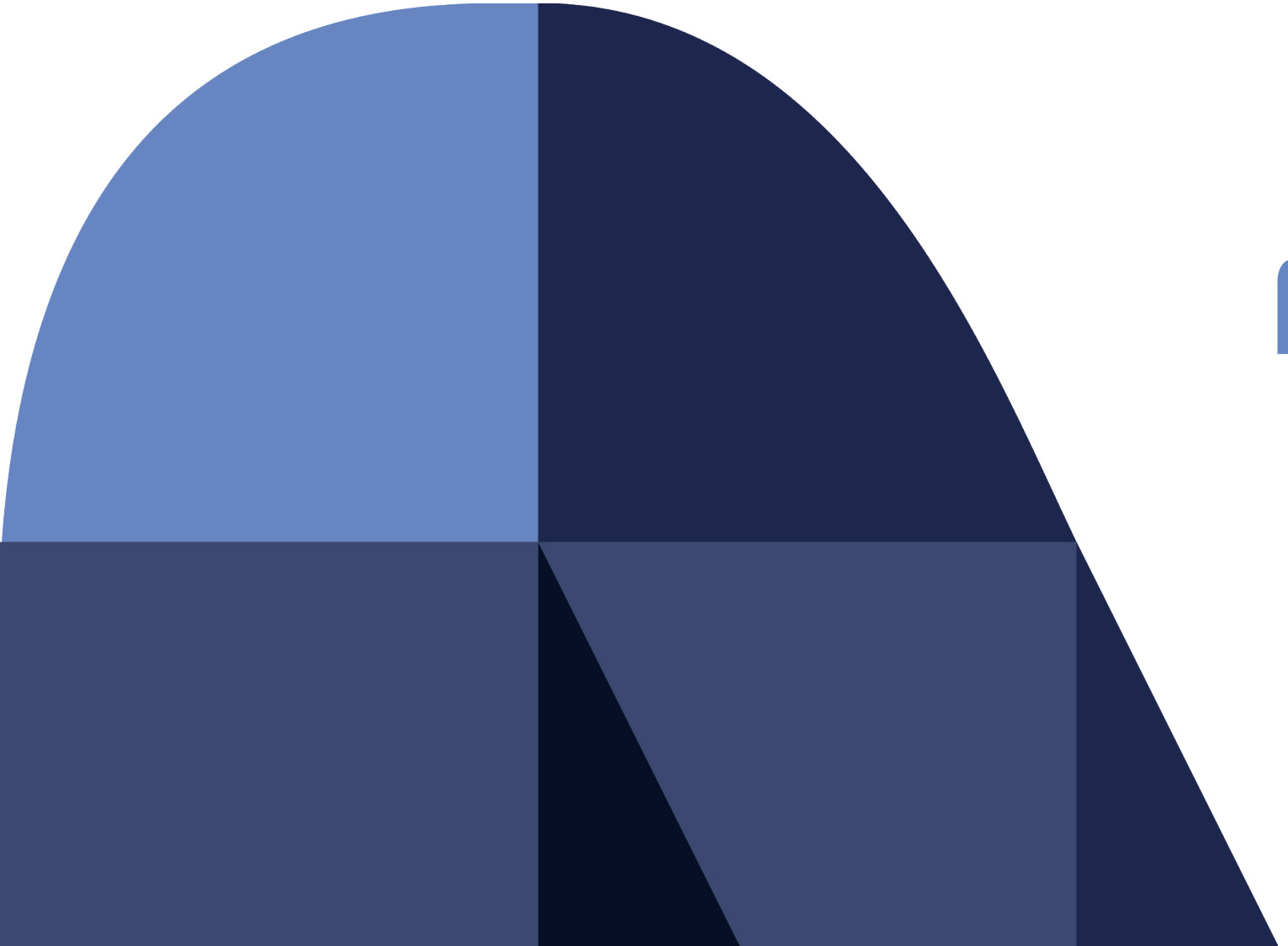

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