https://arxiv.org/abs/1910.04519

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Language Transfer for Early Warning of Epidemics from Social Media

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Motivation

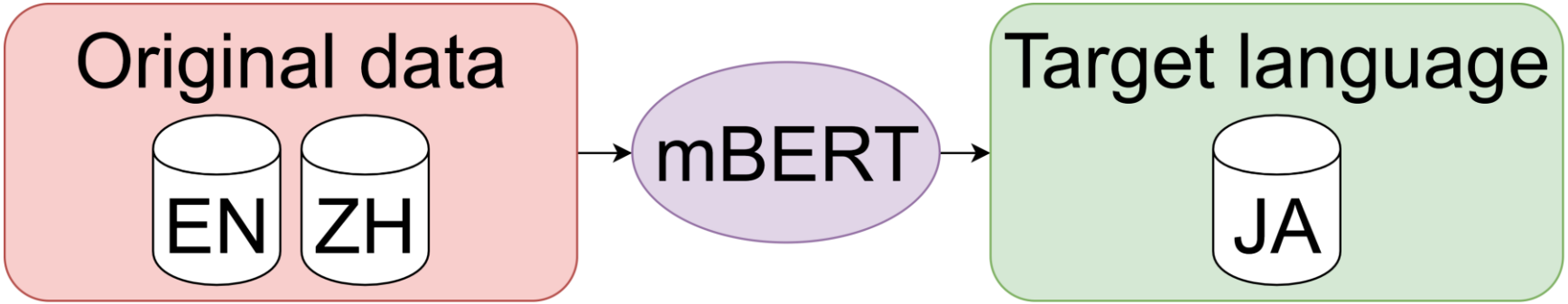
- Diseases spread across populations speaking different languages
- To track red flag medical symptoms in epidemics we need models that work across multiple languages
- It is difficult, time-consuming and expensive to construct training datasets in many languages

Data (MedWeb NTCIR-13 challenge [1])

Dataset	#Pseudo-Tweets	Mean #labels per example	Influenza	Diarrhoea	Hayfever	Cough	Headache	Fever	Runny nose	Cold	#Examples with no labels
Training	1,920	0.997	106	182	163	227	251	345	375	265	530
Test	640	0.933	24	64	46	80	77	93	123	90	195

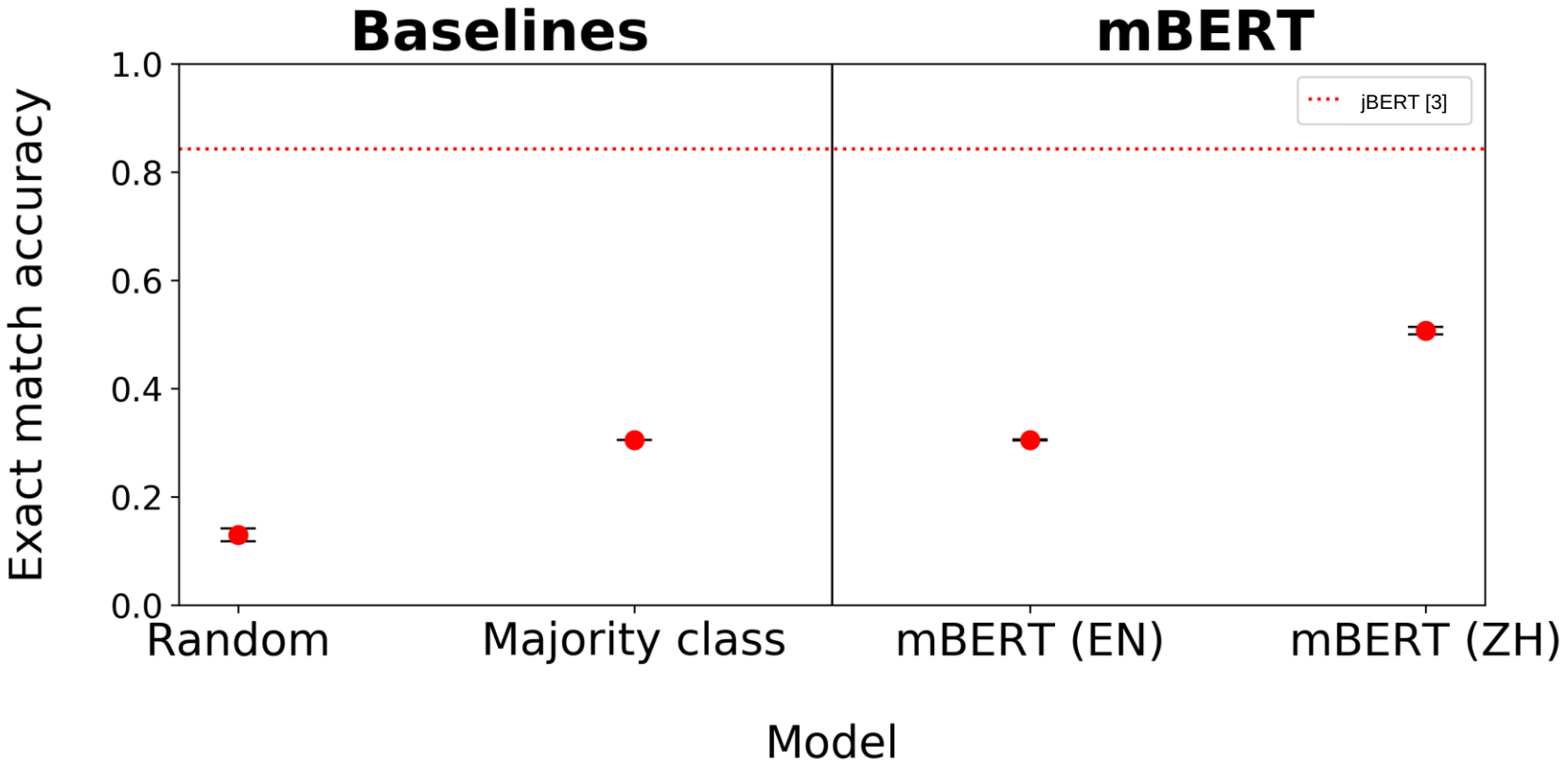
	Pseudo-tweet	Labels
(ja)	風邪を引くと全身がだるくなる。	Cold
(en)	The cold makes my whole body weak.	
(zh)	一感冒就身酸无力。	

Experiment – Zero-shot language transfer

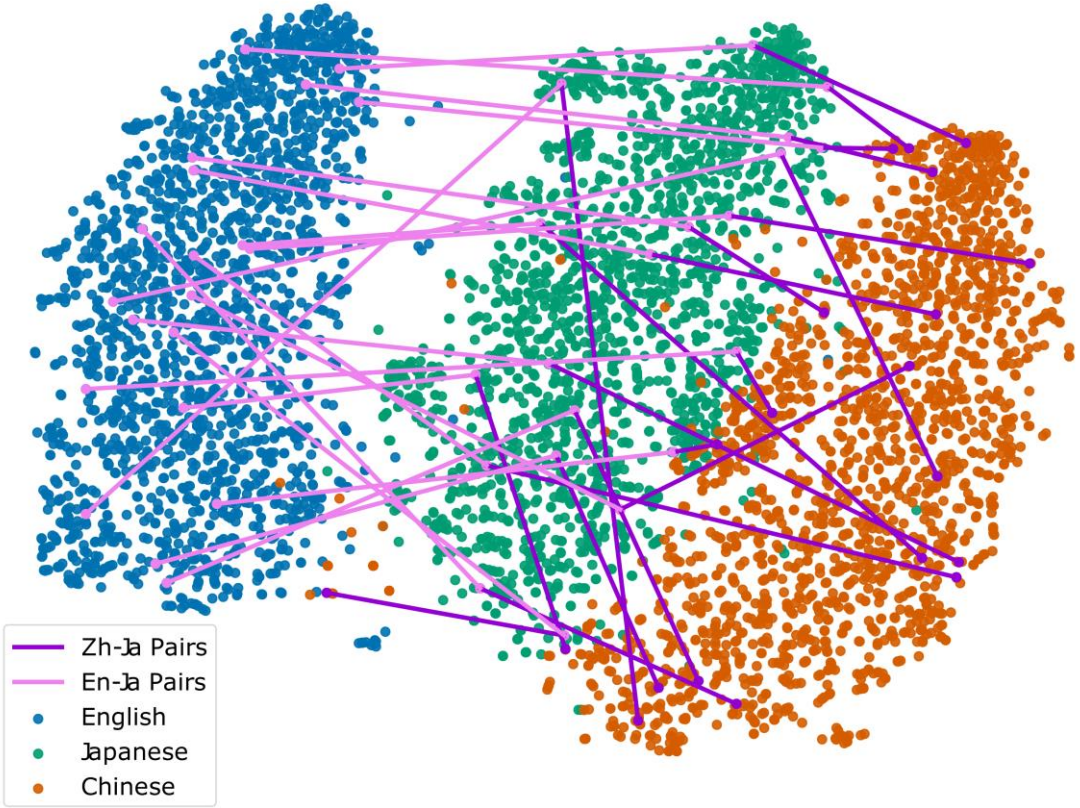


Multilingual BERT (mBERT) [2]

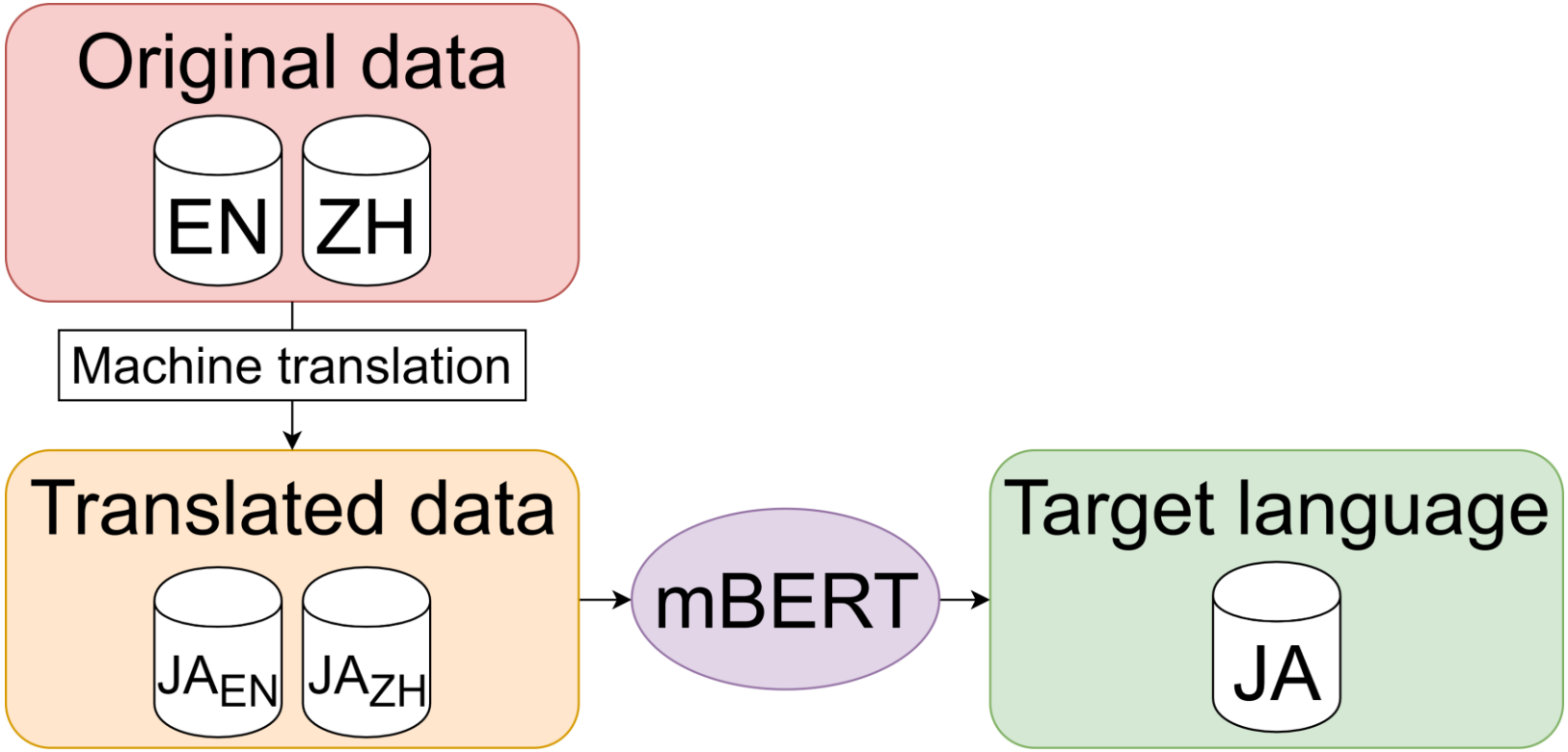
Results – Zero-shot language transfer



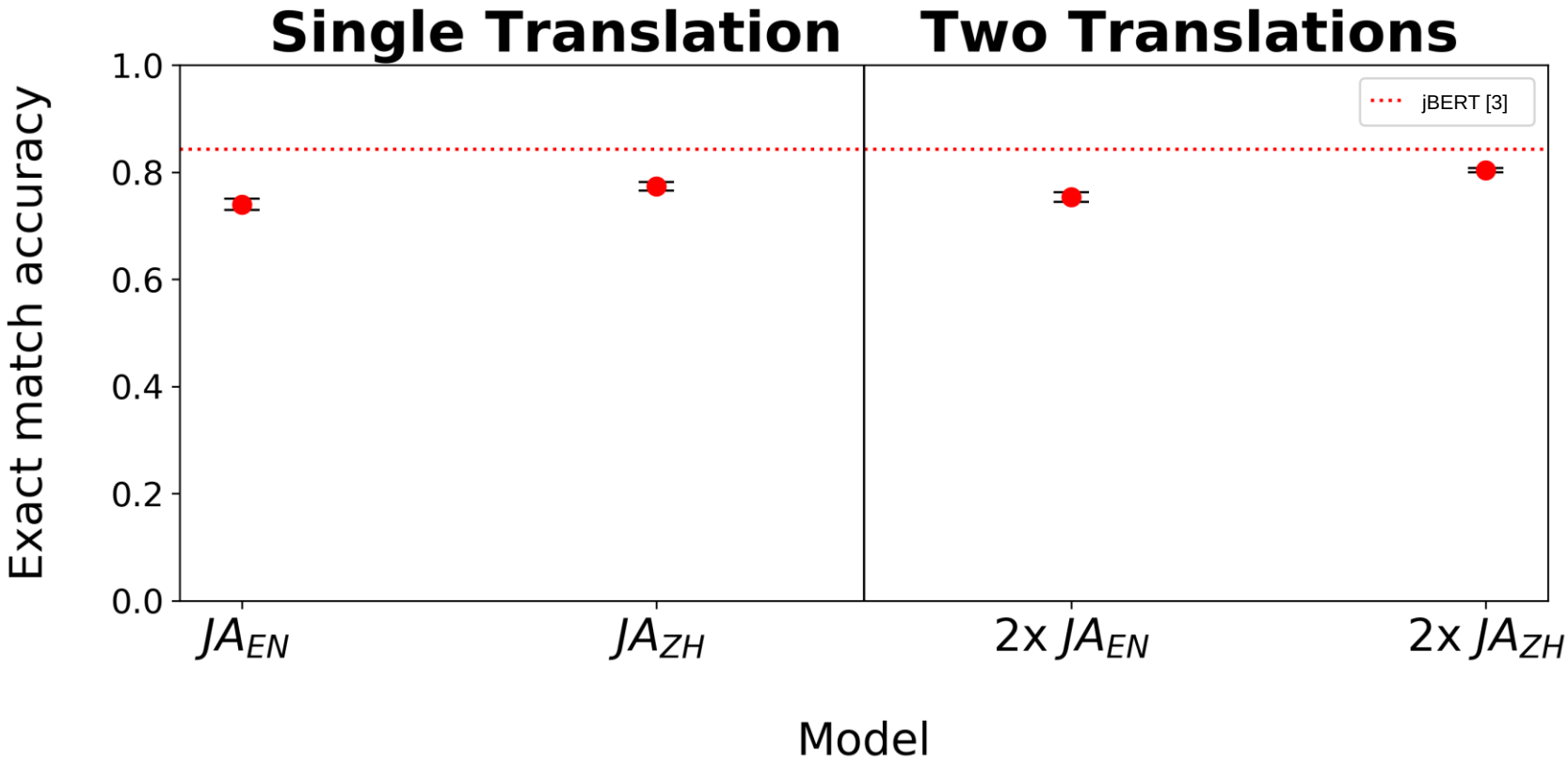
Analysis – Zero-shot language transfer



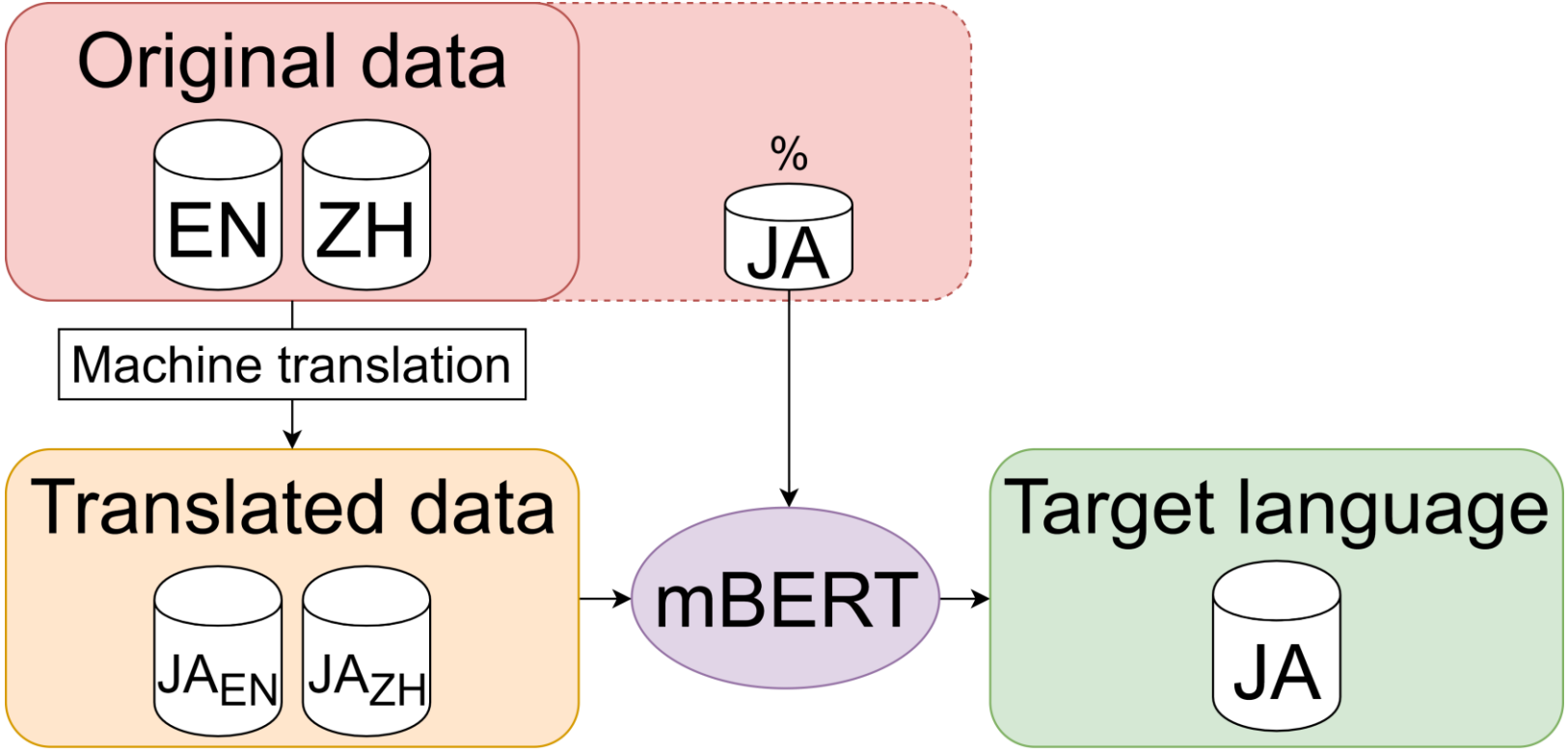
Experiment – Machine translated data



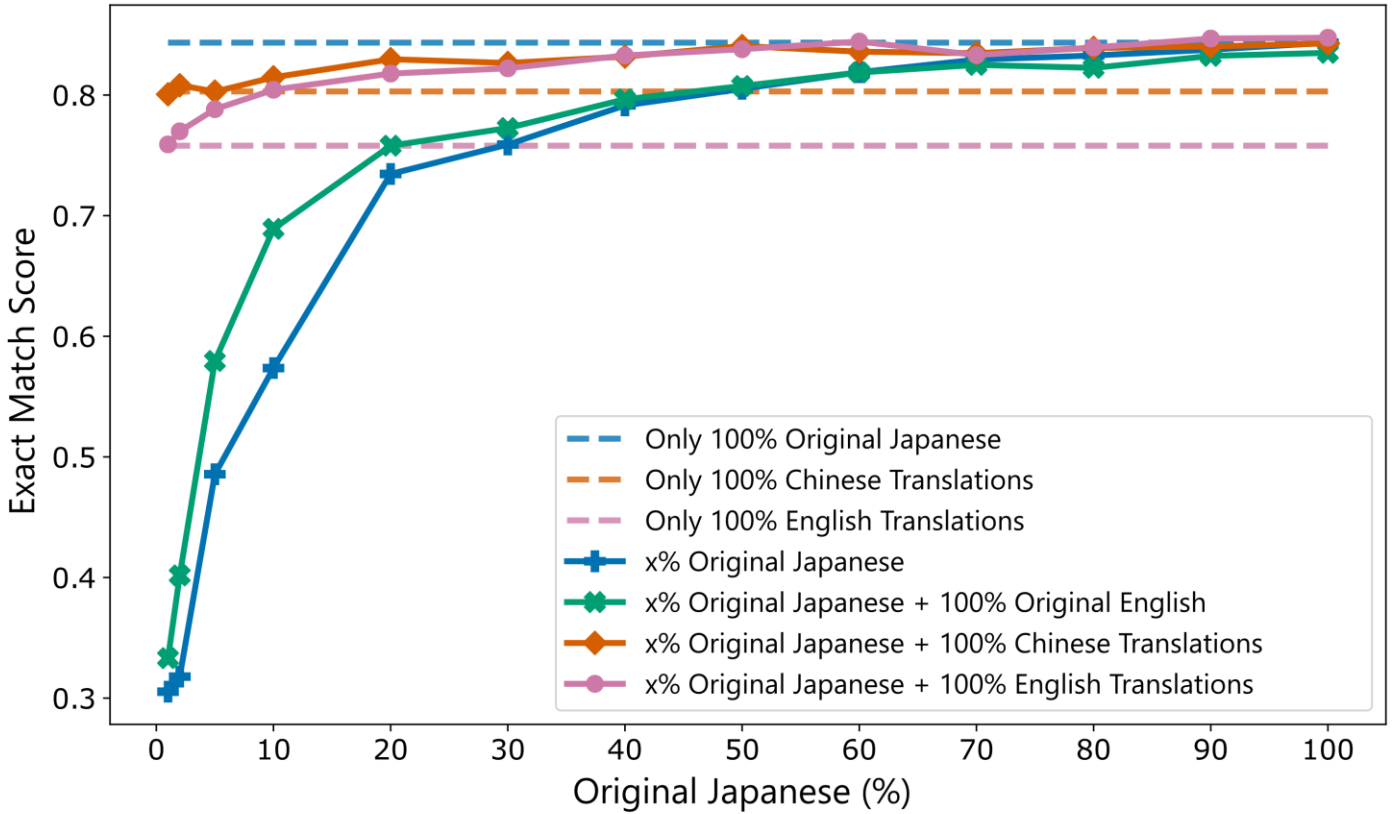
Results – Machine translated data



Experiment – Mixing translated data



Results – Mixing translated data



(Mis)translations

風邪を引くと全身がだるくなる。

The cold makes my whole body weak.

“Cold” has 2 meanings: cold (temperature) and cold (illness).

Both make sense in this context – but one does not match the label!

Conclusions

- Choice of source language impacts the performance, with Chinese-Japanese being a better language pair than English-Japanese

- Training on machine translated data shows promise, especially when used with small amounts of target language data

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References

[1] Aramaki et al., NTCIR-13 MedWeb (Medical Natural Language Processing for Web Document) Task, http://mednlp.jp/medweb/NTCIR-13/

[2] Multilingual BERT (mBERT), https://github.com/google-research/bert/blob/master/multilingual.md

[3] Kikuta et al., BERT pre-trained model trained on Japanese Wikipedia articles.

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