The SPECTRANS System Description for the WMT22 Biomedical Task

Nicolas Ballier[1], Jean-Baptiste Yunès[2], Guillaume Wisniewski[3], Lichao Zhu[1], Maria Zimina-Poirot[1]

[1]CLILLAC-ARP, [2]IRIF, [3]LLF, Université Paris Cité, F-75013 Paris, France
{nicolas.ballier, guillaume.wisniewski, jean-baptiste.yunes, lichao.zhu, maria.zimina-poirot}@u-paris.fr

1. Our approaches to the task

- to use open source NMT toolkit JoeyNMT and Systran Pure Neural Server® to train and fine-tune biomedical NMT models (en↔fr) based on specialized biomedical corpora (UFAL, WMT, Khresmoi);

- to compare and analyze translations predicted by the models;

- to interpret and understand performances of the models.

2. Data and training for baseline model and fine-tuning

Technique	Run	Corpus	BLEU		sacreBLEU		Toolkit
			fr→en	en→fr	fr→en	en→fr	
Baseline model (in-domain)	run 1	UFAL	0.258	0.207	61.01	59.23	JoeyNMT
SYSTRAN Pure Neural Server	run 2	SYSTRAN in-house corpora	0.401	0.316	/	/	SYSTRAN
ModelStudio Light	run 3	in-house data	0.259	0.073	/	/	SYSTRAN
Baseline model (out-of-domain) + fine-tuning (in-domain)	run 4	Europarl 7 + UFAL	0.097	0.203	18.60	21.13	JoeyNMT
		Europarl 7 + WMT and Khresmoi	/	/	54.8	38.4	JoeyNMT

3. Analysis and metrics of the translations

Comparison of occurrences of "must" and "should" in SYSTRAN and JoeyNMT translations with *iTrameur*

Cooc	FqCooc total	FqCooc contexte	IndSP
must	7	14	27
surgery	2	4	7
sleep	5	4	6
be	30	8	5

Cooc	FqCooc total	FqCooc contexte	IndSP
should	28	12	13
surgery	5	4	7
dreams	6	4	6
vascular	10	4	5

N°	Systran Translation	JoeyNMT Translation
1	It is these human traits that a rational organization of research **must** try to promote and exploit.	this is therefore those of human interest that a rational research organization **should** attempt to encourage and operate.
2	Other parasomias, presenting Dreams or fragments of dysphoric dreams, **must be** distinguished from nightmares, and their management is different: These are mainly night terror, **sleep**-related hallucinations and behavioral disorder In REM **sleep**.	other parasomnias, presenting **dreams** or fragments of dysphoric **dreams**, are indistinguishable from nightmare, and are mainly nocturnal ground, hallucinations related to sleep and rem behavioral disorder.
3	Manufacturers of medical devices **must** demonstrate, often through clinical trials, the safety, performance and clinical benefit of their products.	manufacturers of medical devices **should** show, often using clinical trials, safety, performance and clinical benefit of their products.
4	The treatment of pvih **must be** comprehensive, it requires taking into account all these aspects, medical, psychic, social, and involving patients.	consideration **should** be given to managing the conditions of all such aspects, medical, psyche, social, and patient management.
5	Parkinson's syndrome is then associated with other symptoms called "red flags", which **must be** sought during interrogation and physical examination.	parkinson syndrome is then associated with other symptoms called " red flags ", which **should** be considered for interpreting and physical examination.
6	Titration remains necessary and maximum tolerated doses **must be** reached.	titration remains necessary and maximum tolerated doses **should** be reached.
7	A multidisciplinary approach **must** involve expertise in orthopedic **surgery**, musculoskeletal imaging and nuclear medicine, infectious diseases, as well as plastic or vascular **surgery** for cases with soft tissue loss or vascularization defect.	a multidisciplinary approach **should** include specialists for orthopedic **surgery**, musculoskeletal and nuclear medicine imaging, infectious diseases, and in plastic or **vascular surgery** for cases with loss of soft tissue or **vascular** defects.
8	The treatment of pvih **must be** comprehensive, it requires taking into account all these aspects, medical, psychic, social, and involving patients.	consideration **should** be given to managing the conditions of all such aspects, medical, psyche, social, and patient management.
9	Other parasomias, presenting Dreams or fragments of dysphoric dreams, **must be** distinguished from nightmares, and their management is different: These are mainly night terror, **sleep**-related hallucinations and behavioral disorder In REM **sleep**.	other parasomnias, presenting **dreams** or fragments of dysphoric **dreams**, are indistinguishable from nightmare, and are mainly nocturnal ground, hallucinations related to sleep and rem behavioral disorder.
10	Titration remains necessary and maximum tolerated doses **must be** reached.	titration remains necessary and maximum tolerated doses **should** be reached.

❓ **overuses** of "must" in the SYSTRAN translation (IndSP = +5) and "should" in JoeyNMT
👉 **large frequency differences** of both words in training data : 18,462 ("should") *vs.* 4,061 ("must"); occurrence preponderances seemingly **unbalanced** the translation predictions
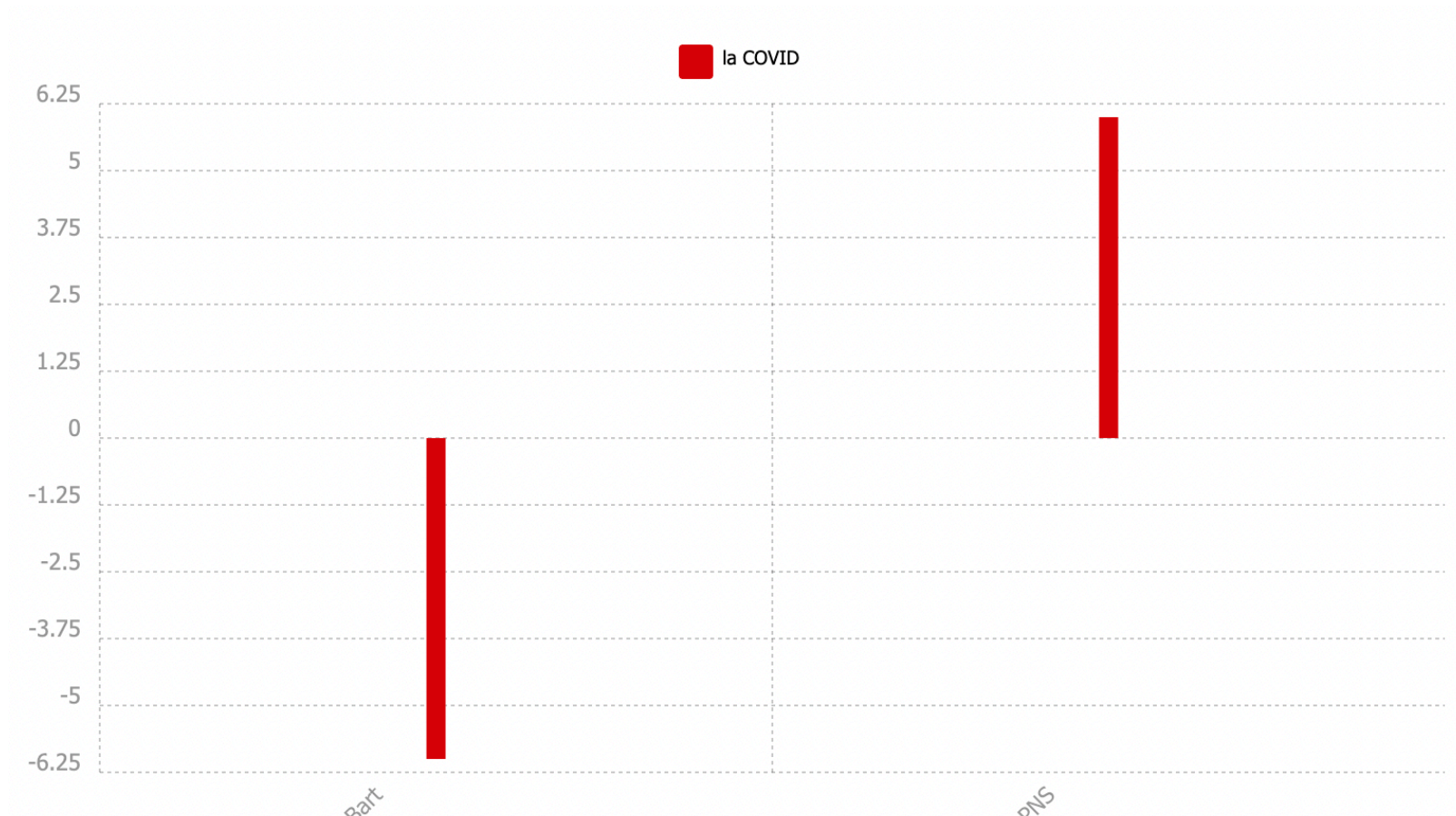
4. Vocabulary comparisons

Comparison of Vocabulary Growth Curves in SYSTRAN PNS and mBART translations
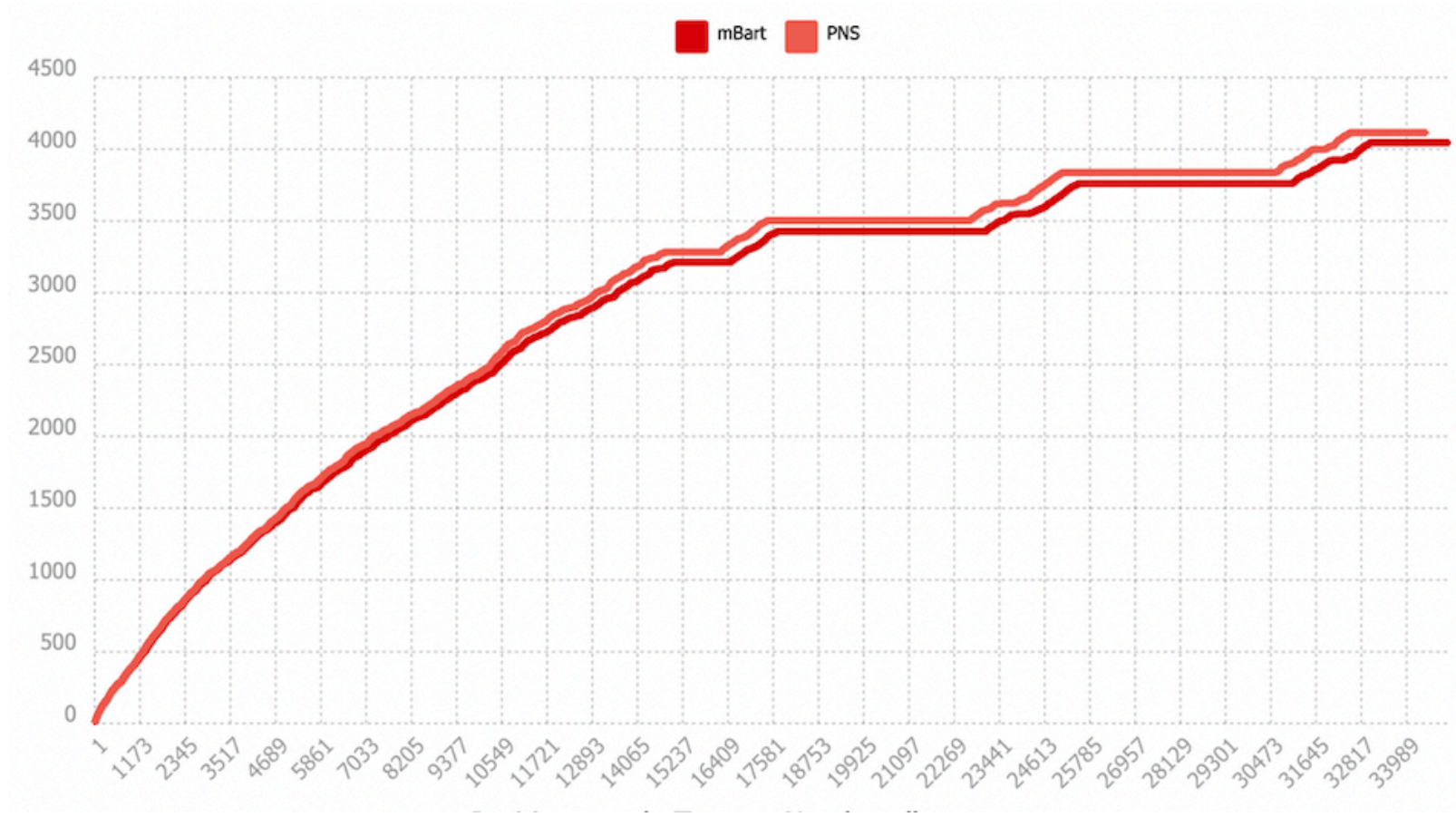
👉 SYSTRAN did slightly better than mBART, with less word variations.

Comparison of Specificity Vocabulary Growth Curves in Systran PNS and mBART translations

👉 The French feminine determiner "la" before "COVID" is more correctly predicted by PNS than mBART.

5. Conclusion

We used a variety of strategies, toolkit comparison and fine-tuning to compare outcomes of different NMT systems in biomedical translation. Our contribution lies in the textometric analysis of the output. This allowed us to raise the issue of the role of the variability observed for the gender of COVID in French or for technical terms like "keloids".

6. Acknowledgements