Authoring Knowledge via Natural Language

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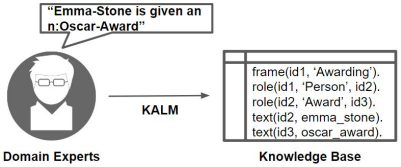
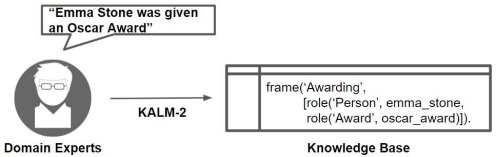
INTRODUCTION

The Knowledge Authoring Logic Machine[1] (KALM) enables domain experts who do not have knowledge representation skills to **write their domain knowledge into knowledge base** via Controlled Natural Language (CNL). In this way, domain experts are able to store their knowledge and reason with it.



However, by relying on CNL, KALM only takes **restricted syntactic forms** and **present tense** as input, which are too burdensome for users.

KALM-2 is proposed to solve these problems using a natural language parsing toolkit, **Stanza**[2].

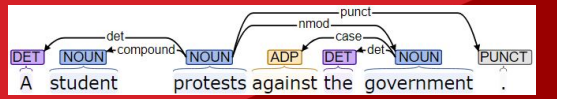


It is demonstrated that KALM-2 performs as well as the original KALM (**95.6%** accuracy).

PROBLEMS AND SOLUTIONS

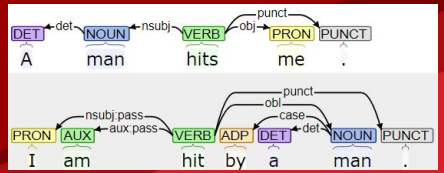
There are a bunch a problems emerging when migrating from CNL to NL using Stanza. The problems are-two fold: 1) **Stanza Model Issues** and, 2) **Stanza Semantic Mismatch**.

> **Stanza Model Issues** refers to the accuracy problems existing in the pipeline.



"Protests" is wrongly identified as a noun, which causes wrong dependencies. KALM-2 detects such errors and modifies them to be correct.

> **Stanza Semantic Mismatch** refers to the problems that equivalent sentences are represented differently.



Two sentences represent the same meaning but with different dependencies. Using **Para-parsing**, KALM-2 can merge them into the same representation.

EVALUATION

Metrics	Description	Results
FrSynC	All frames and roles are correct, and all role-fillers are disambiguated	239 (95.6%)
FrC	All frames and roles are correct	248 (99.2%)
PFrC	Some frames/ roles are correct	0
Wrong	Some frames/roles are wrong	2 (0.008%)
Total	All frames	250

REFERENCES

[1] Gao, Tiantian, Paul Fodor, and Michael Kifer. "Knowledge authoring for rule-based reasoning." OTM Confederated International Conferences" On the Move to Meaningful Internet Systems". Springer, Cham, 2018.
[2] Qi, Peng, et al. "Stanza: A Python natural language processing toolkit for many human languages." arXiv preprint arXiv:2003.07082 (2020).