The O-star: An ontology and LLM-based system for astronomical knowledge retrieval

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1 Introduction and Movivation

- *Briefly describe your chosen domain (e.g., healthcare, education, smart cities).*
- *Why is this domain interesting or useful for ontology [1]/KG/ASP modeling?*
- *Clearly define the scope of your project (what you cover, what you do not).*

Note:

- In this template, all italic text should be removed and replaced with your own text (which should not be italic); the italic text is just a placeholder letting you know what to write there.
- If you use Figures or Tables, please make sure to give each one a caption and a figure/table number and refer to them from the main text!
- References should be provided where applicable.

2 Methodology

Content depends on your chosen track, but structure is similar

Ontology + KG parts (Tracks 1 + 3)

- *Describe ontology design: main classes, object/data properties, restrictions.*
- *Include a diagram or screenshot of your class hierarchy.*
- *Explain how you populated the KG (data source, manual vs. automated, number of individuals/triples).*

ASP part (Tracks 2 + 3)

- *Describe the ASP encoding: main predicates, rules, constraints.*
- *Explain how the ASP part interacts with the ontology/KG (if applicable).*
- *Explain why ASP is suited for this reasoning.*

Hybrid part (Track 1)

- *Include a simple architecture diagram (e.g., query → KG → fallback to LLM).*
- *Explain how the ontology/KG is used to enhance LLM responses.*

2.1 Evaluation

Describe how you evaluated your system (according to the evaluation suggestions given in the project description), and present the evaluation results.

2.2 Discussion and Conclusion

- *Discuss the strengths and limitations of your approach.*
- *What did you learn about combining symbolic and data-driven AI?*

References

[1] Guarino, Nicola, Daniel Oberle, and Steffen Staab. "What is an ontology?." *Handbook on ontologies* (2009): 1-17.