Reflective essay

As part of the Master's in Artificial Intelligence, since April 2025 I have been studying the module "Knowledge Representation and Reasoning". During this 12-week journey, I had the opportunity to gain new knowledge by reading books and articles, attending seminars, working independently on various assignments as well as exchanging ideas with colleagues through collaborative discussion forums.

More specifically, during the first units of the module, I learnt about the basic concepts of knowledge representation and reasoning, the underlying principles of reasoning, namely set theory, logic, and truth tables, as well as first order logic (FOL). Through the collaborative discussion 1, I had the opportunity to discuss the assertion that "Knowledge Representation is a recent phenomenon – it only became a topic of discussion with the development of computing technology and the need to represent knowledge in computer systems". Through this exchange of ideas with my colleagues I dived deeper into the concepts of reasoning and knowledge representation and I gained additional knowledge (evidence can be seen in my own portfolio).

In addition, during the first half of the module, I learned more about programming languages based on FOL and set theory and I had the opportunity to create and evaluate simple statements in Prolog. I had also the opportunity to explore the meaning of knowledge modelling and engineering, its principles and examine the practical application of ontological approaches for the development of a knowledge-based system. During this part of the module, via the formative activities, the wiki activities, and the preparation activities for each seminar, I practiced the theoretical knowledge gained.

At the beginning of the second half of the module, I explored the concepts of and principles that underpin knowledge acquisition, one of the steps followed in the development of accurate and efficient knowledge-based systems. Though the analysis of the paper 'A curated ontology-

based large-scale knowledge graph of artificial intelligence tasks and benchmarks' by Kathrin Blagec (Blagec, K. et al. (2022), I was able to go to critically review and evaluate the development and structure of ITO, explore and present the strengths and weaknesses of using an ontology-based knowledge graph for AI task benchmarking, as well recommend potential real-world applications for the ITO framework. Such analysis challenged myself and led me to think about how ontology-based knowledge may change the future of our life.

On top of that, during this second half of the module I was gradually introduced to a systematic approach to exploring, understanding and extracting knowledge from data sources for modelling knowledge-based systems. In addition, I learnt how to develop a knowledge-based system using the Protege software tool, explored knowledge-based technologies and potential future applications, and learnt how to evaluate a knowledge-based system. Through formative activities I was able to practice the theoretical knowledge I gained through the material provided as well as seminars and develop ontologies. Evidence of formative activities can be found in my own portfolio.

Furthermore, during the second half of the module I engaged in the second collaborative discussion forum where with my peers we exchanged thoughts and ideas around the definition of an ontology and the language that is the most useful to express ontologies that can be utilised by software agents on the WWW. Through this discussion forum, I enhanced my knowledge not only about OWL2, but other languages such as KIF, RDF and OWL-lite (evidence can be seen in my own portfolio).

Additionally, as I got closer to the end of the module I was requested to construct, using Protégé tool, a prototype ontology as the backbone for an AI-driven job-matching service. Through this assignment I was able to apply knowledge representation and reasoning principles to a real-world problem. Such application enhanced my hands-on skills as well as my critical evaluation skills as I had to continuously monitor, assess and fix issues as they arise. I found this practical assignment a real challenge for myself but having developed the

prototype I felt that through the knowledge gained throughout the module I can really contribute to the solution of rea-world problems (evidence can be seen in my own portfolio).

To sum up, through articles, material provided by the instructor, and books I enhanced my theoretical knowledge of the concepts and through activities and assignments I practiced on knowledge representation and reasoning. As a result, this module enhanced my communication, collaboration, organization, and technical skills and helped me understand better the concept of ontologies and their application on real-world problems. Now, I can apply such knowledge in my profession such systems start gaining ground.

References

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