PLATO 2023
1st International Planning and Ontology Workshop

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PREFACE

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Aim and Scope of the Workshop.

Automated Planning and Ontology are two well-established fields of Artificial Intelligence (AI). The former investigates techniques to formally model and reason about the effects of actions, and decide the combinations of actions that allow an agent to achieve goals. The latter investigates techniques to formally define knowledge (by formally describing domain entities and their interrelations), allowing agents to process information about objects, and events, and incrementally build and verify beliefs.
Both Automated Planning and Ontology generally rely on logic to model knowledge and organize reasoning mechanisms. They support the development of cognitive capabilities that autonomous agents need to effectively act in the real world. In this context, the PLanning And onTology wOrkshop (PLATO) aims at bringing together researchers in these two fields of AI to address new research challenges, share their experiences, and learn from each other.
The workshop aims at investigating the synergetic contributions of technologies and methods from these two fields. There are examples in the literature that have investigated the use of Ontology to generate planning models, find effective plans, and contextualize plans and action execution to domain features.

Topics of Interest.

The workshop is open to both application and theoretical contributions that see the integration of ontology and planning as a mechanism to enhance the efficacy of AI-based solutions. Here is a list of (some) topics:

- Ontological analysis of concepts related to planning/scheduling (e.g., capability, capacity, action, etc)
- Domain ontologies supporting tasks related to planning/scheduling
- Reuse of foundational ontologies (e.g., DOLCE, BFO, UFO) in order to strive the interoperability among multiple ontologies, among other goals
- Semantic Web ontologies and technologies for reasoning, (FAIR) data management, interoperability, etc
- Ontologies supporting the interoperability of heterogeneous planning frameworks
- Ontologies supporting Plan and Schedule Execution
- Plan Recognition, plan management, and goal reasoning
- Partially observable and unobservable domains
- Knowledge acquisition and engineering for planning and scheduling
- Situation assessment for contextualized planning decisions
- Explainability of plans and planning models
- Trustworthy, safety, and ethics in planning
- Benchmarking and evaluation metrics of plans and plan-based controllers
- Out-of-the-box research challenges at the intersection between Automated Planning and Ontology

Paper presentations.

Michael Beetz "Plan-based control of robot agents – reasoning with one's eyes and hands" (keynote)

Talk by Prof. Michael Beetz of the University of Bremen about his recent developments towards enhanced cognition of agents capable of internally simulating perception-action loops to make better decisions and implement more reliable robot behaviors. Specifically, Prof. Beetz investigates the integration of task and motion planning to rely on an internal semantic model of grasping and motion actions capable of emulating thy physics of real-world environments. In his talk, Prof. Beetz clearly shows the need of pushing research towards the design of more realistic and detailed models of the world to allow robots to reason about commonsense and intuitive physics knowledge and realize increasingly reliable and effective behaviors.

Stefano Borgo "Layering Physical and Social Interactions for Planning via Ontology (keynote)

Talk by Dr. Stefano Borgo of CNR - Institute of Cognitive Sciences and Technologies (ISTC-CNR) puts the emphasis on the social dimension of robots acting in the real world. In this regard, in his talk, Dr. Borgo points out the importance of matching the social expectations of humans that interact with robots (or artificial

agents in general) and how such expectations may change according to the (social) context. He highlights how the technical execution of robot skills is intertwined with context-sensitive social rules that determine the way agents (human-human as well as human-robot) actually interact. In this perspective, Dr. Borgo discusses different layers of knowledge introducing notions concerning functional and social disruptions that should be evaluated and eventually anticipated when planning in social environments.

Milene Santos Teixeira and Mauro Dragoni, "Plan and Ontology-based Dialogue Policies for Healthcare" (regular paper)

Integrate ontology and planning to automate the generation of dialogue managers in the domain of healthcare assistance. The ontology is used as an abstraction to hide the complexity of the underlying planning technology and thus supports the specification of planning problems and the management of dialogue interactions. Within the tracking of the dialogue state (represented using Convology), a planning agent is in charge of selecting the next action to execute in order to retrieve the needed information from a user. Action selection and execution are performed until enough information is retrieved to draw conclusions about the health state of the involved user. The authors in particular consider a dialogue scenario addressing medical guidelines concerning the identification of asthma symptoms showing promising results.

Emmanuel Papadakis, Thomas Leo McCluskey, Hassna Louadah and Gareth Tucker, "Ontology-guided Knowledge Graph Construction to Support Scheduling in Train Maintenance Depot" (regular paper)

This work proposes the use of semantic technology to integrate and uniformly represent updated knowledge about train maintenance procedures. The authors propose a data acquisition pipeline aiming at aggregating and semantically organizing textual information extracted from semi-structured manuals. They use extracted data to automatically populate a domain-specific ontology and then show how to access such data to partially automatize maintenance operations on a short-term horizon.

Tobias John and Patrick Koopmann, "Planning with Ontology-Enhanced Status Using Problem-Dependent Rewritings" (regular paper)

This work proposes the integration of ontology into planning specifications. The objective is to represent plan states through a knowledge base and use ontology-related semantics to infer implicit information that can ease planning and/or influence planning decisions. They pursue a separation of concerns by keeping separate the planning and ontological models. Then they develop a PDDL-based rewriting procedure to generate problem descriptions and keep updated and aligned the planning and semantic descriptions according to planning decisions and ontological inference.

Milene Santos Teixeira, Michael Welt, Raphael Chis and Birte Glimm, "Challenges on Deriving Planning Problems from Ontologies" (short paper)

This work investigates core challenges concerning the mapping of domain-specific ontologies into planning problems. The work discusses related works pointing out mapping strategies between ontological knowledge and planning models with the aim of pointing out research issues. It bases the discussion on an interesting domain concerning the synthesis of personalized courses in an E-Learning platform. The authors propose a promising approach linking ontological knowledge to HTN planning problems by pursuing a hierarchical decomposition of course structures.

Bharath Muppasani, Vishal Pallagani, Biplav Srivastava and Raghava Mutharaju "Building and Using a Planning Ontology from Past Data for Performance Efficiency" (short paper)

This work proposes an interesting initiative concerning the definition of an ontological model to uniformly describe planning domains taken from the International Planning Competition. The authors in particular show how the model can be used to analyze planning domains and improve the efficiency of planners by extracting macro operations to rationalize domain specifications.

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