WhiteMech: White-Box Self-Programming Mechanisms

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Abstract

Dynamic systems that operate autonomously in nondeterministic (uncertain) environments are becoming a reality. These include intelligent robots, self-driving cars, but also manufacturing systems (Industry 4.0), smart objects and spaces (IoT), advanced business process management systems (BPM), and many others. These systems are currently being revolutionized by advancements in sensing (vision, language understanding) and actuation components (autonomous mobile manipulators, automated storage and retrieval systems). However, despite of these advances, their core logic is still mainly based on hard-wired rules either designed or possibly obtained through a learning process.

On the other hand, we can envision systems that are able to deliberate by themselves about their course of action when un-anticipated circumstances arise, new goals are submitted, new safety conditions are required, and new regulations and conventions are imposed. Crucially, empowering dynamic systems with deliberating capabilities carries significant risks and therefore we must be able to balance such power with trust. For this reason, it is of interest to make these systems queryable, analyzable and explainable in human terms, so as to be guarded by human oversight. Recent scientific discoveries in Knowledge Representation and Planning combined with insights from Verification and Synthesis in Formal Methods, Data-Aware Processes in Databases, as well as other areas of AI, chart a novel path for realizing what we may call White-Box Self-Programming Mechanisms, that is, systems with a multifaceted model of the world that can be exploited to deliberate on their course of action and answer queries about their behavior.

About the Keynote Speaker

Giuseppe De Giacomo is full professor in Computer Science and Engineering at Univ. Roma “La Sapienza". His research activity has concerned theoretical, methodological and practical aspects in different areas of AI and CS, most prominently Knowledge Representation, Reasoning about Actions, Generalized Planning, Autonomous Agents, Service Composition, Business Process Modeling, Data Management and Integration. He is AAAI Fellow, ACM Fellow, and EurAI Fellow. He is Program Chair of ECAI 2020. He has got an ERC Advanced Grant for the project WhiteMech: White-box Self-Programming Mechanisms (2019-2024).