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Knowledge Representation for General Problem-Solving Systems and Robots

Abstract: A general problem-solving robot is able to understand the representation of a new task and successfully tackle it without human intervention. This requires architectures for cognitive robotics that integrate symbolic and sub-symbolic representations. I will present a formal framework for the design of control hierarchies along with an instantiation for a real Baxter robot that combines high-level reasoning and planning with a physics simulator and low-level control nodes for motors and sensor processing. As an example of a general problem representation technique, I will present and discuss a formal language for describing so-called epistemic games to a general problem-solving system. These are characterised by rules that depend on what players can and cannot deduce from the information they get during gameplay.