

Default Reasoning about Actions

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Dissertation

Abstract

Action Theories are versatile and well-studied knowledge representation formalisms for modelling dynamic domains. However, traditional action theories allow only the specification of definite world knowledge, that is, universal rules for which there are no exceptions. When modelling a complex domain for which no complete knowledge can be obtained, axiomatisers face an unpleasant choice: either they cautiously restrict themselves to the available definite knowledge and live with a limited usefulness of the axiomatisation, or they bravely model some general, defeasible rules as definite knowledge and risk inconsistency in the case of an exception for such a rule.

This thesis presents a framework for default reasoning in action theories that overcomes these problems and offers useful default assumptions while retaining a correct treatment of default violations. The framework allows to extend action theories with defeasible statements that express how the domain usually behaves. Normality of the world is then assumed by default and can be used to conclude what holds in the domain under normal circumstances. In the case of an exception, the default assumption is retracted, whereby consistency of the domain axiomatisation is preserved.