

Modal Fixed Point Logics

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These four lectures are centered around multi-modal logics extended by the possibility to introduce least and largest fixed points. We begin with discussing a range of traditional results and turn towards a more explicit and operational approach in the fourth lecture. Our focus will be on foundational questions rather than practical applications, which will be – I assume – treated in other lectures.

Session 1: The general framework

Labeled transition systems, least and greatest fixed points, the modal μ -calculus, its syntax and semantics.

Session 2: Basic results

The fundamental semantic theorem of the modal μ -calculus, expressive power, decidability of satisfiability, the hierarchy result.

Session 3: Time, belief, knowledge and common knowledge

Logics for linear time, computational tree logic, epistemic logics, modeling belief and knowledge in the modal framework.

Session 4: Proofs and justifications

Logic of proofs, structured proof terms, explicit justifications, internalizations and forgetful interpretations, true cut-free systems.

References

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