

Non-Classical Temporal Logic in Topological Dynamics

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Dynamic topological systems consist of the action of a continuous function on a topological space. One is typically interested in the behaviour of such systems after the function is iterated indefinitely, after which the system may exhibit phenomena such as recurrence or convergence to a fixed point. By combining the topological interpretation of intuitionistic logic with tenses from linear temporal logic, such phenomena may be naturally reasoned about in a propositional setting, giving rise to intuitionistic (linear) temporal logic (ITL). The aim of the course is to provide an overview of recent results and techniques in the field, with an emphasis on their applicability to non-classical dynamic logics in general.

In the first session we define ITL and establish some basic properties regarding its syntactic and semantic behaviour. We then study its expressive power and identify key expressions separating various classes of topological spaces.

In the second session, we show that ITL based on arbitrary dynamical systems is decidable. In order to do so, we introduce non-deterministic quasimodels and simulations, two crucial tools both for this and the following session.

Finally, in the third session, we prove that ITL enjoys a natural axiomatisation. The proof builds on the decidability proof combined with Jankov-de Jongh formulas. We conclude by discussing related problems, including some open problems, and comments on how they could be approached.