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Title: Modalities for multi-agent systems

Over the past 10-15 years modal logic has become an increasingly popular and successful framework for modeling and analyzing multi-agent systems. Various logical systems have been proposed and studied for that purpose. Besides the purely technical and intrinsically logical problems that have arisen in these studies, a multitude of new conceptual questions related to the semantics of these logics have emerged. These questions refer to the fundamental notions of strategies and strategic abilities of agents/players and coalitions of agents to achieve objectives, particularly in the context of incomplete information.

In this tutorial I will introduce one of the currently most popular modal logics for multi-agent systems, known as the Alternating-time Temporal Logic ATL, where one can formally express statements about the strategic ability of an agent or a coalition of agents, to achieve a goal, such as: "The agent (or, coalition) A has a strategy such that, if A follows that strategy, then, no matter what the other agents do, the goal G will be achieved".

Then I will discuss briefly some variations and extensions of ATL and some related technical results. I will also mention some of the conceptual and technical problems it presents, related to the interaction between knowledge and strategic abilities of agents and coalitions. Time permitting I will hint at how ATL can be endowed with model update mechanism, similar to that of the Dynamic Epistemic Logic DEL, to provide a logical framework for capturing the interplay between the dynamics of information and the dynamics of abilities of players.

The tutorial will only assume general background on modal logic.
