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Modeling Intuitive Teaching as Sequential Decision Making Under Uncertainty

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Abstract

Informal teaching is a ubiquitous social behavior with a rich evolutionary history. We model teaching as the decision making problem of planning a sequence of actions to convey information to a naive learner. We compare humans intuitive teaching actions in a simple collaborative game to the optimal solution of a Partially Observable Markov Decision Process (POMDP). In a teaching POMDP, the current state is the latent, unobservable knowledge of the student and pedagogical actions may yield changes in that knowledge or provide partial information about the students state. In our experiment, human teachers balance assessment and instruction while incorporating prior information about student knowledge. Viewing teaching as a POMDP suggests specific predictions for when different teaching actions (e.g., testing versus instruction) should be preferred under different conditions. Improving our understanding of the decision making strategies that underlie intuitive teaching has a range of implications from education to clinical rehabilitation.