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Learning the goal-structure of actions in a connectionist network without inverse planning

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Abstract

Bayesian inverse planning models have had considerable success in accounting for how humans understand others' goal-directed behavior. To date, however, this approach has relied on a pre-specified distribution of possible goals, and it is not clear where knowledge of this goal space comes from. We present an alternative, connectionist model for which possible goals are not specified a priori; instead, action predictions is derived from statistical regularities across past visual experiences. The model was evaluated by comparing its prediction performance to mouse-tracking data from human subjects in a novel trajectory prediction task. Like humans, the model showed an initial bias for efficient motion, but rapidly adjusted its predictions based on observed trajectories. This pattern of adjustment indicated sensitivity to continuously varying "sub-goals" that were not explicitly provided to the model and could not be attributed to participants a priori.