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Control theoretic methods for experimental design in Partially Observed Markov Decision Processes

How do we most effectively use controls within the framework of Partially Observed Markov Decision Processes (POMDP) so as to provide data that is most informative about parameters of interest? This talk attempts to give a partial answer to this question. Methods from Markov decision process, especially dynamic programming, will be introduced and then used in an algorithm to maximize a relevant Fisher Information. The algorithm will then be applied to a POMDP example. The methods developed can also be applied to stochastic dynamic systems, by suitable discretization, and we consequently show what control policies look like in the Morris-Lecar Neuron model, and some simulation results will be presented. We show how parameter dependence within these methods can be dealt with by the use of priors, and by updating policies online.