Step-DAD: Semi-Amortized Policy-Based Bayesian Experimental Design

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21st March 2024, 9.00am UK time

Abstract

We develop a semi-amortized, policy-based, approach to Bayesian experimental design (BED) called Step-wise Deep Adaptive Design (Step-DAD). Like existing, fully amortized, policy-based BED approaches, Step-DAD trains a design policy upfront before the experiment. However, rather than keeping this policy fixed, Step-DAD periodically updates it as data is gathered, refining it to the particular experimental instance. This allows it to improve both the adaptability and the robustness of the design strategy compared with existing approaches.