

Budgeted Optimization with Concurrent Stochastic-Duration Experiments

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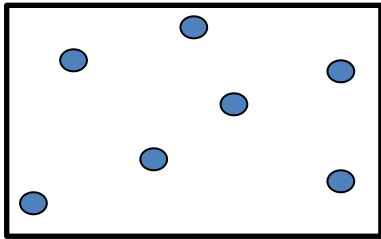
NIPS 2011

Bayesian Optimization (BO)

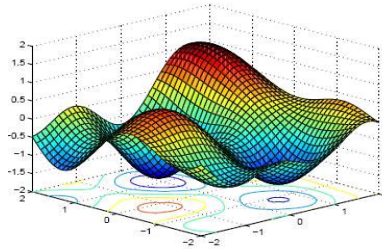
Goals: maximize an unknown function f by requesting a small set of function evaluations

- Assume a prior on f is available (e.g. Gaussian Process)

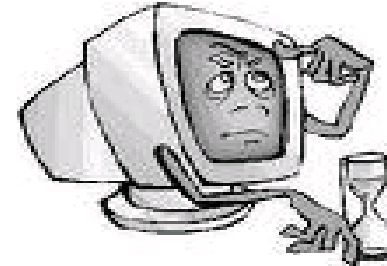
Current Experiments



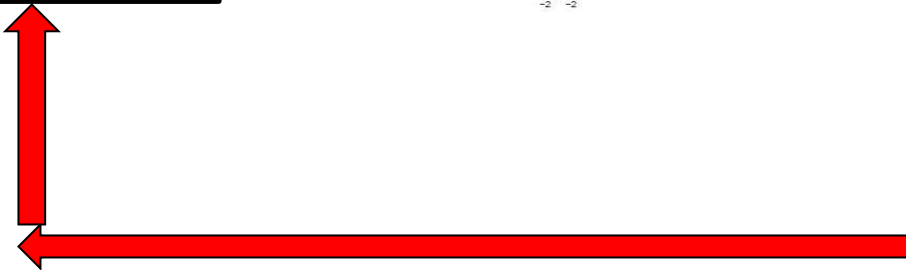
Posterior Model



Select Experiment(s)

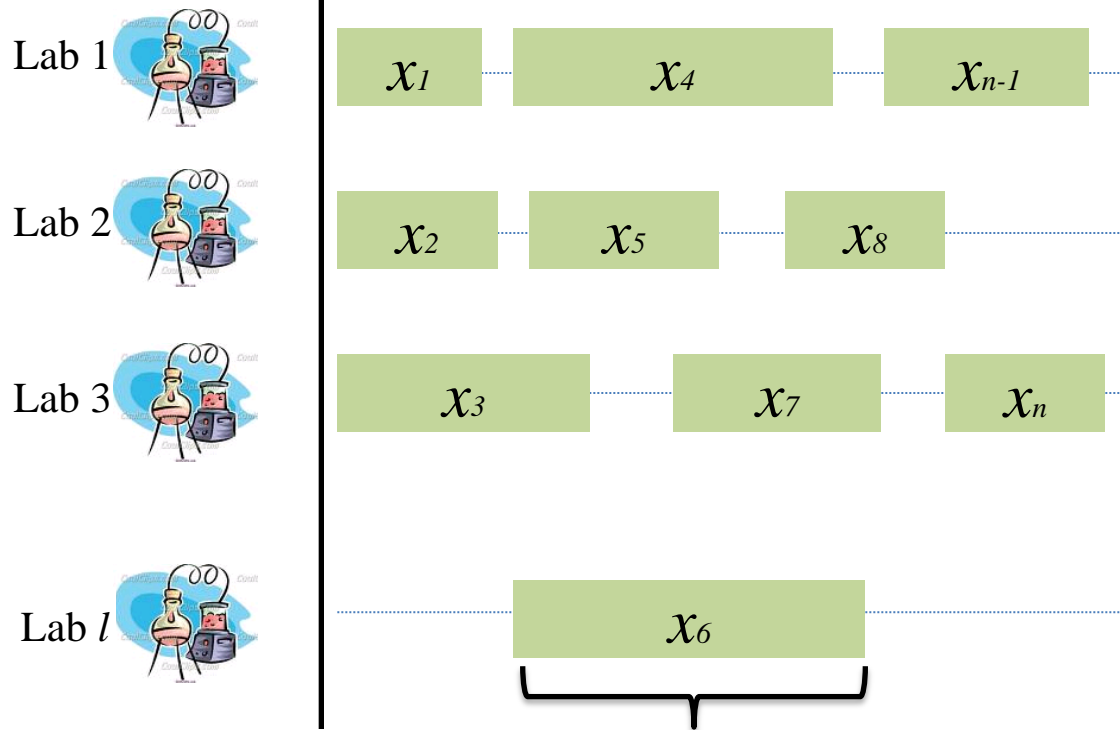


Run Experiment(s)



Extended BO Model

Time Horizon h



We consider the following:

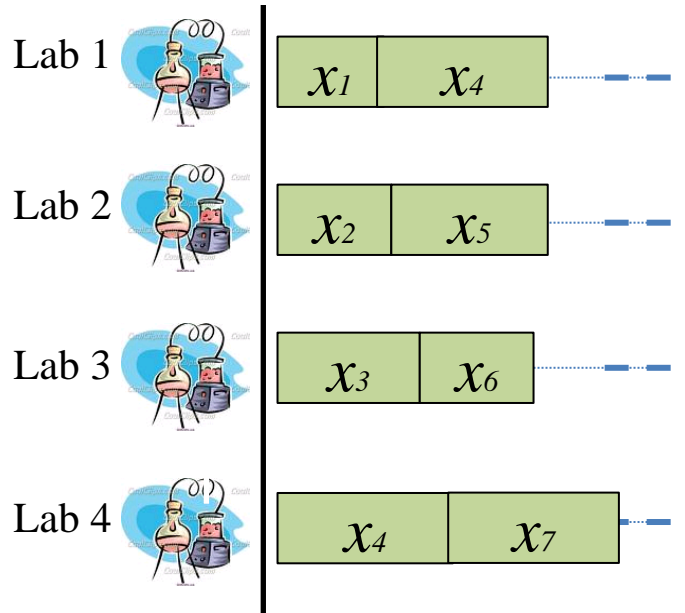
- Concurrent experiments (up to l exp. at any time)
- Stochastic exp. durations (known distribution p)
- Experiment budget (total of n experiments)
- Experimental time horizon h

Problem:

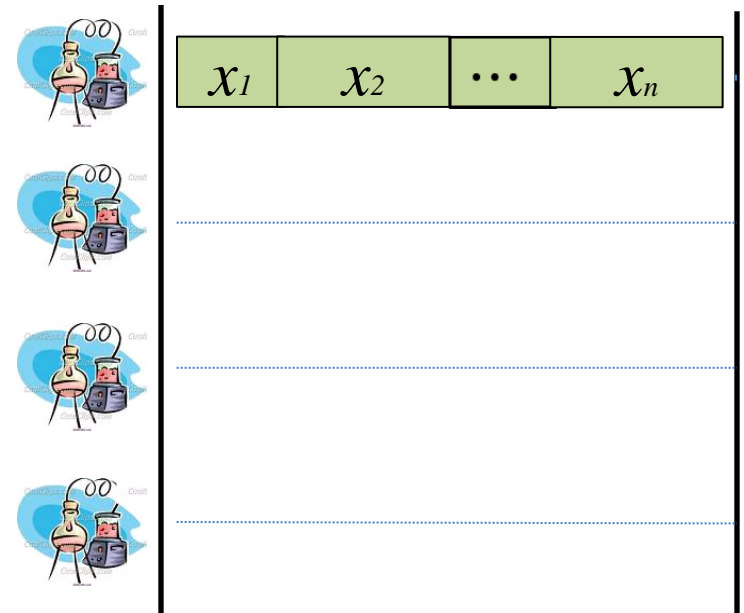
Schedule when to start new experiments and which ones to start.

Challenges

Objective 1: complete all n experiments with high prob. within horizon
(favors *maximizing* concurrency)



Objective 2: maximize info. used in selecting each experiment
(favors *minimizing* concurrency)



We present online and offline approaches that effectively trade off these two conflicting objectives