Budgeted Optimization with Concurrent Stochastic-Duration Experiments

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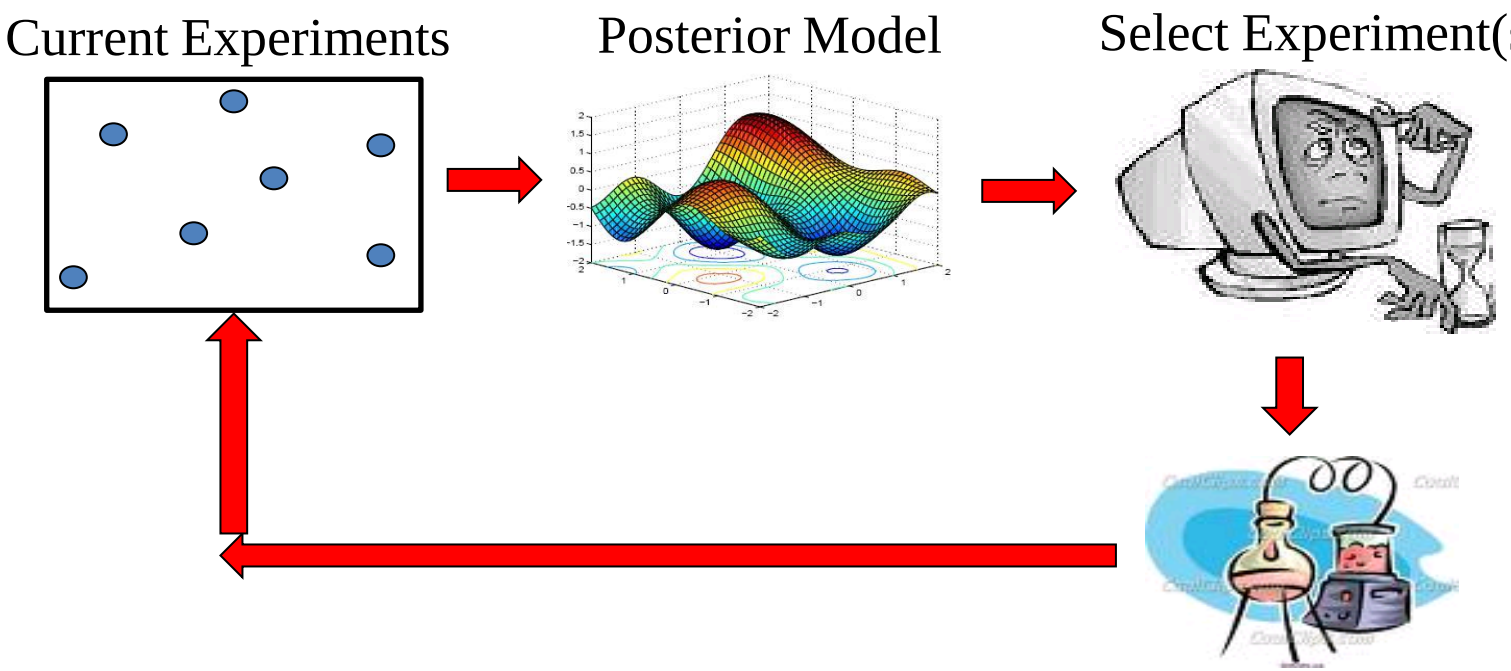
Bayesian Optimization (BO)

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)



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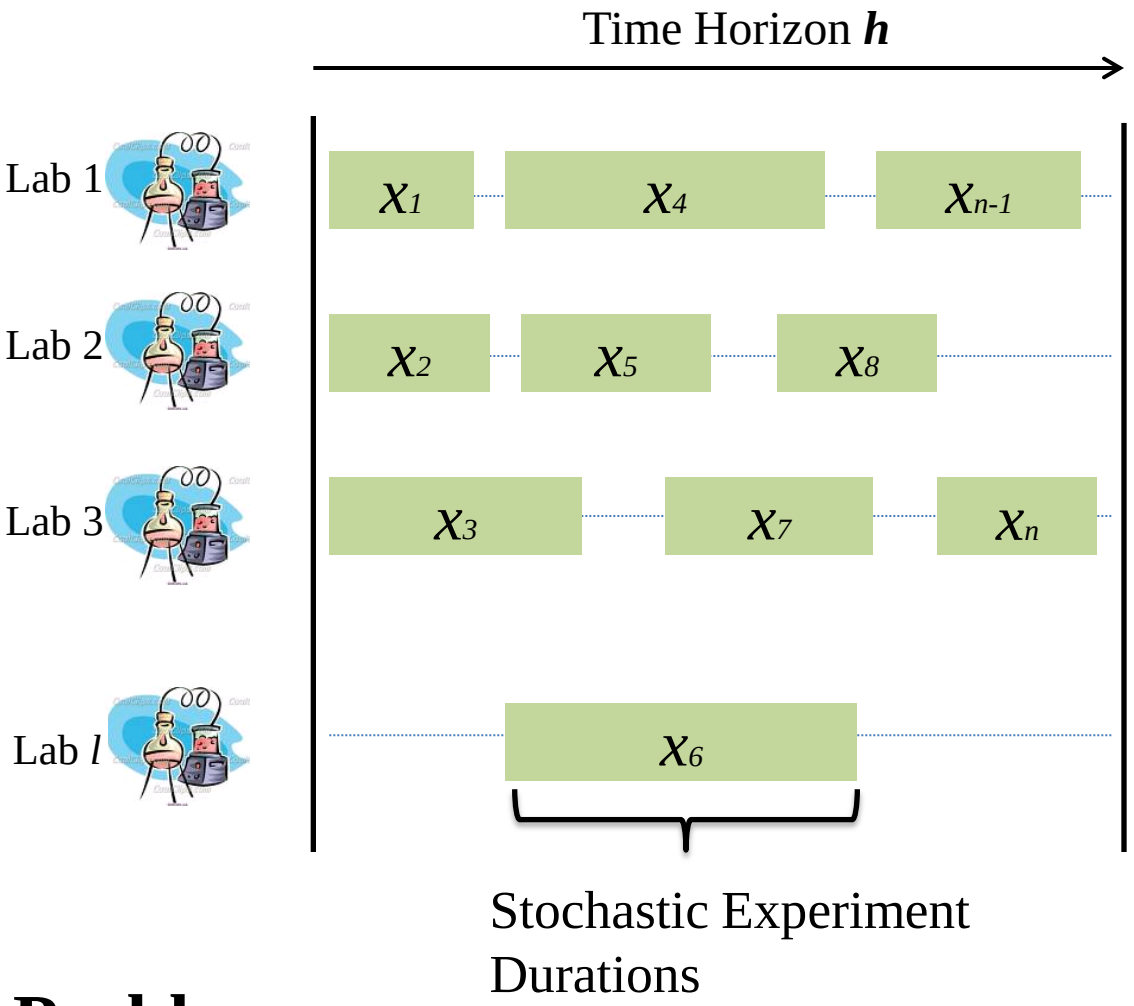
Extended BO Model



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.

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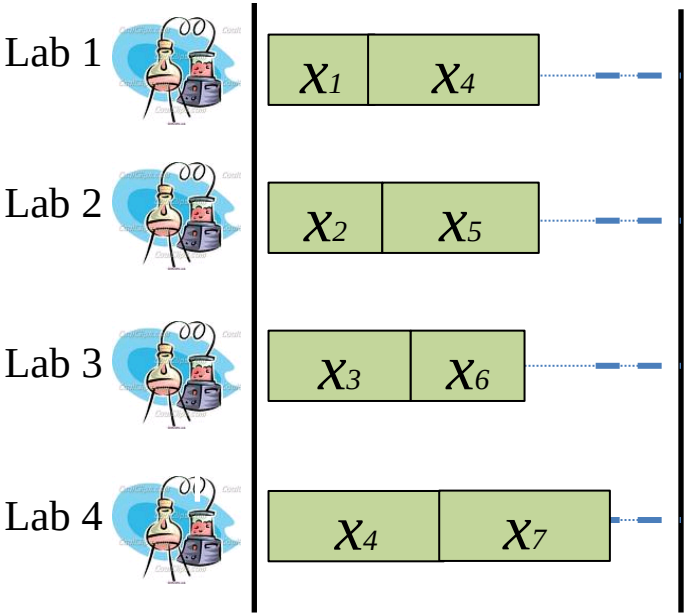
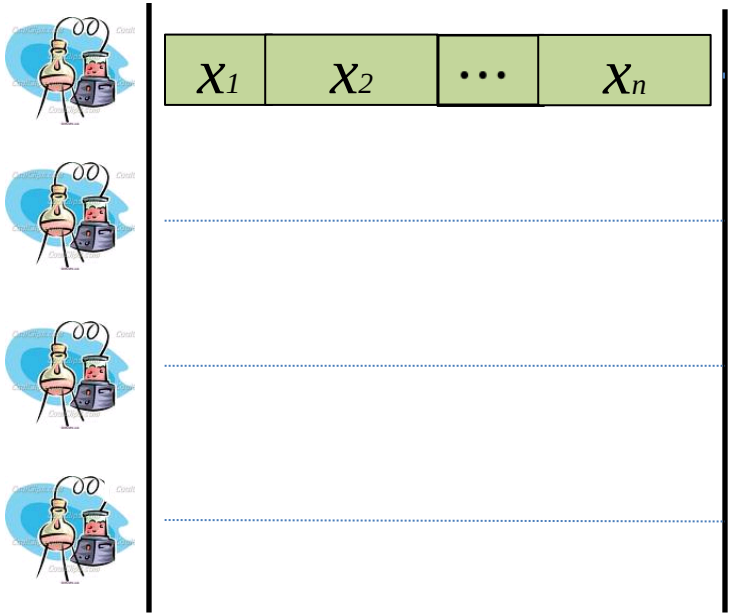
Challenges

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

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