Multi-task Bayesian Optimization via Gaussian Process Upper Confidence Bound

Sihui Dai Jialin Song Yisong Yue

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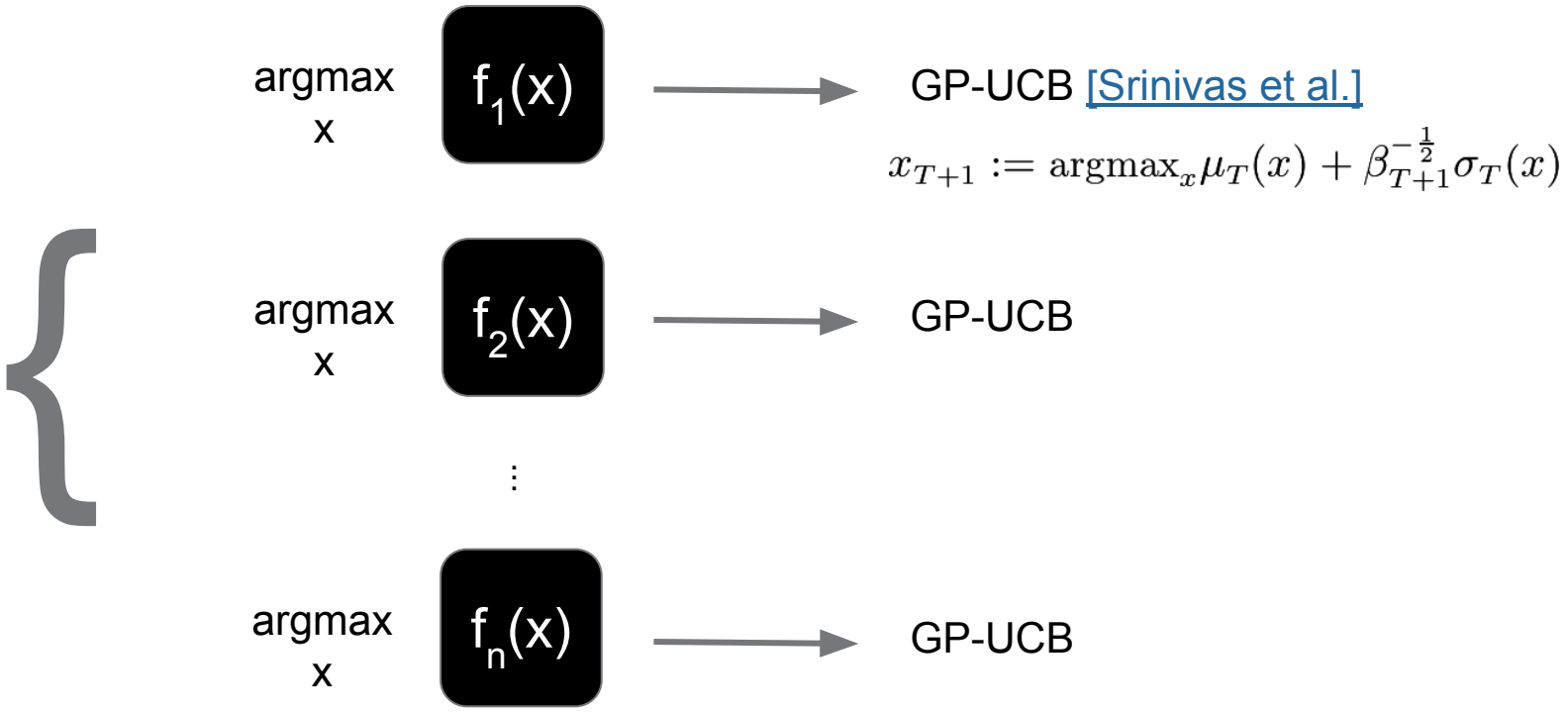
Motivation: Optimal Design of Related Experiments

ie) hyperparameter tuning multiple related models



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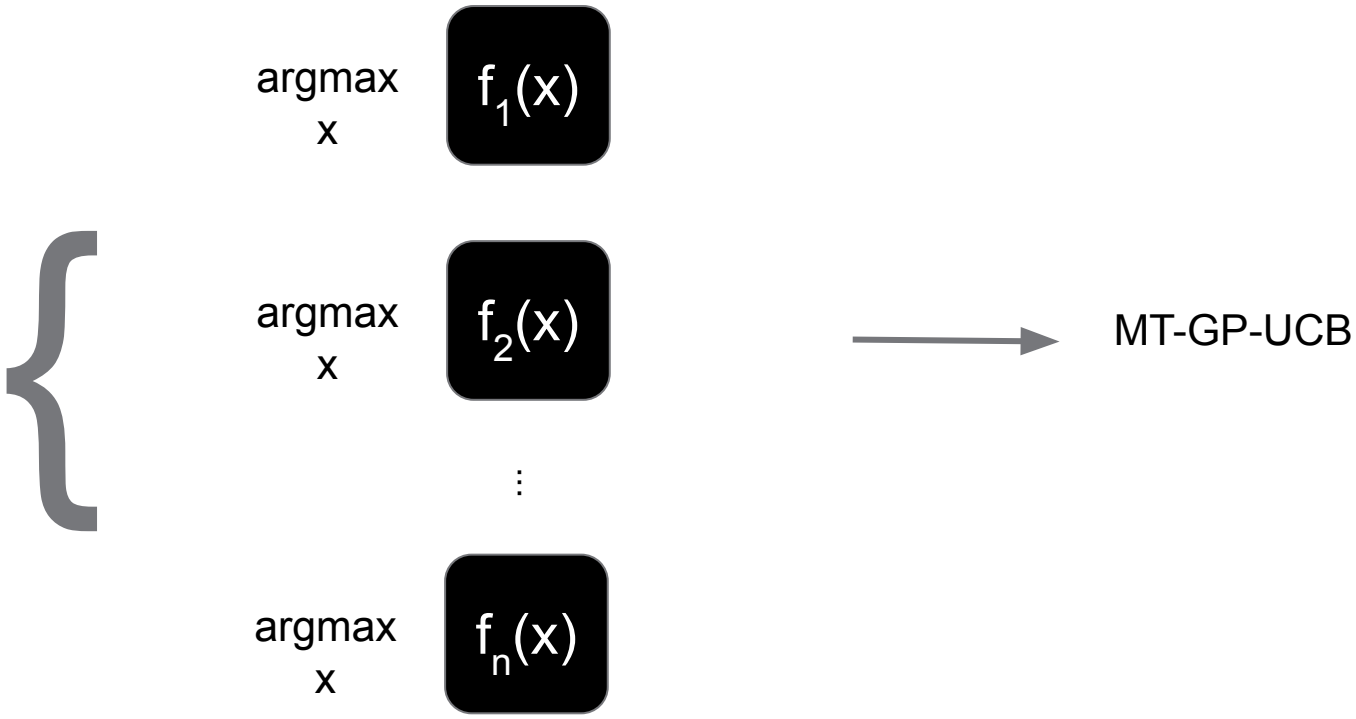

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MT-GP-UCB

- use multi-task GP to model joint distribution among tasks
- $x^i_{T+1} := \text{argmax}_{x^i} \mu^i_T(x^i) + \beta^{-\frac{1}{2}}_{T+1} \sigma^i_T(x^i) \quad \forall i \in [1, n]$
- multitask regret: $r_t := \frac{1}{n} \sum_{i=1}^{n} (f^i(x^{*i}_t) - f^i(x^i_t))$
- MT-GP-UCB is zero regret

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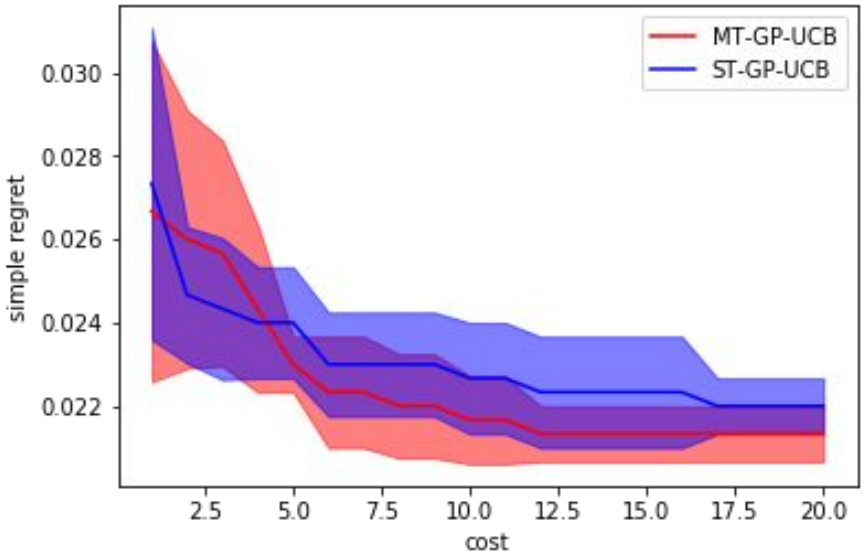
Applications: Hyperparameter Tuning

Optimizing hyperparameters on 4 different models trained on UCI iris dataset

Models and hyperparameters tuned:

- KNN - number of neighbors
- SVC (RBF), SVC (Linear), Logistic regression- regularization parameter



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