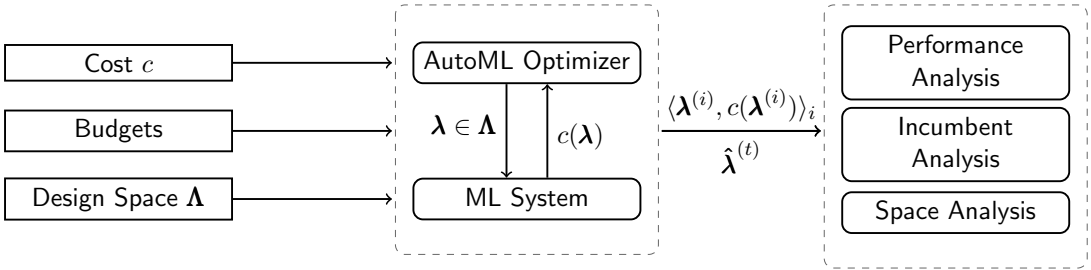
AutoML: Interpretability

Studying the AutoML Optimization Process

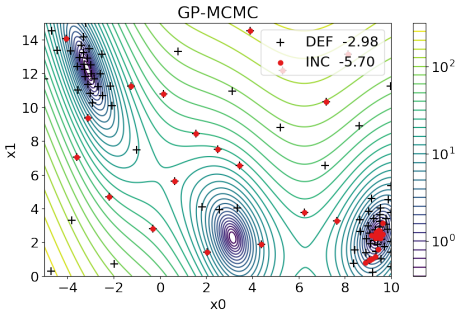
Bernd Bischl Frank Hutter Lars Kotthoff
Marius Lindauer Joaquin Vanschoren

Idea



$\rightsquigarrow$ focus on how the AutoML optimizer samples from the design space $\mathbf{\Lambda}$

Analyzing the Sampling Behavior



Source: [Lindauer et al. 2019]

- Plot of a 1D or 2D function

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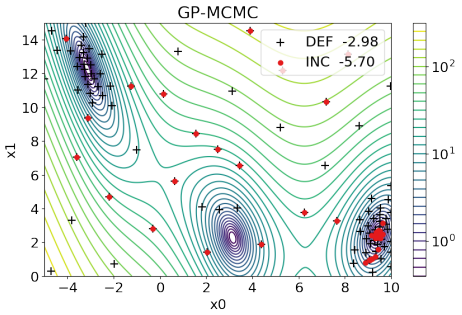

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- Background shows the ground truth (real function values)

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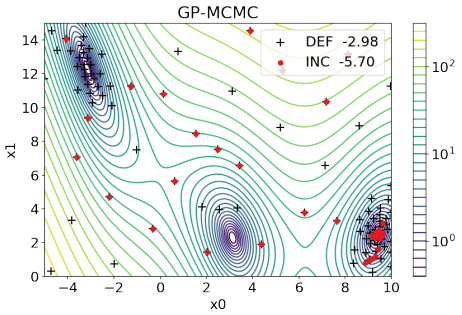

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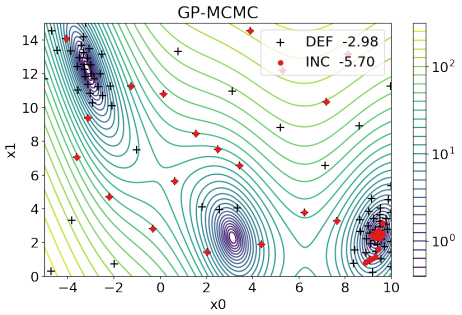

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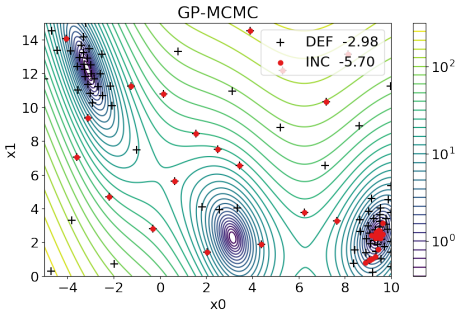

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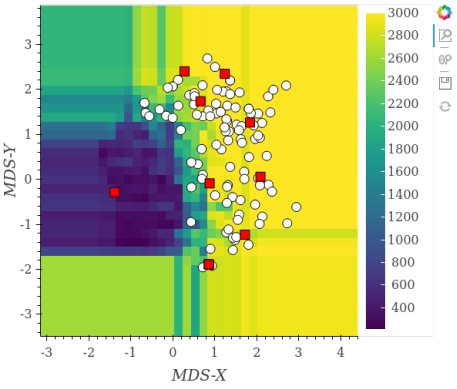
$\rightsquigarrow$ Impossible for higher dimensional problems?

Analyzing the Sampling Behavior in N-D



Source: [Lindauer et al. 2019]

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  but we have to project N-D into 2-D

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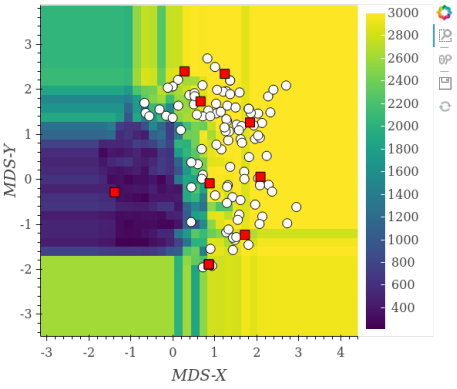

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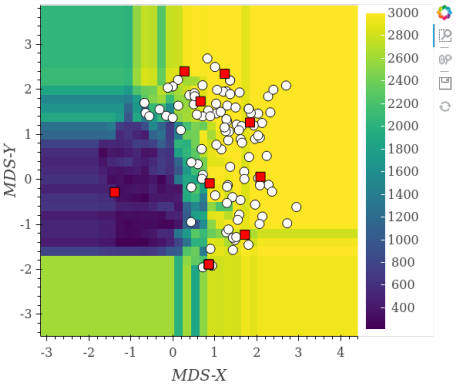

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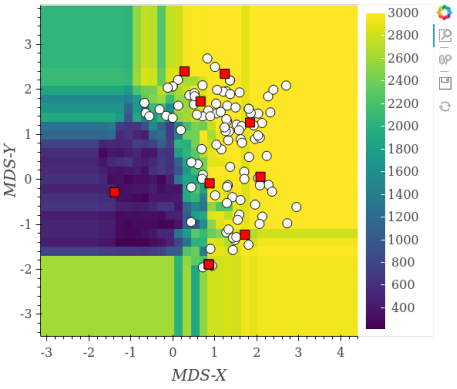

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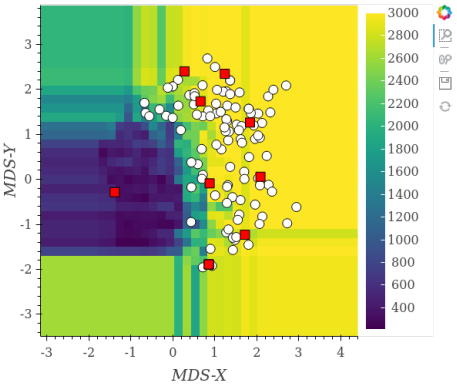

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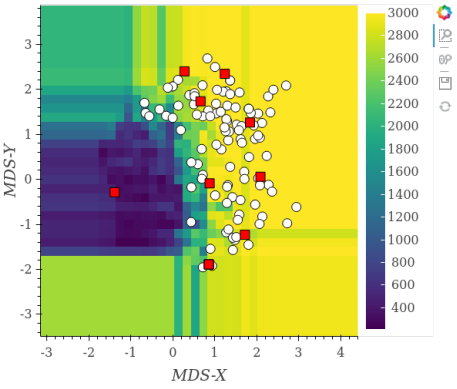

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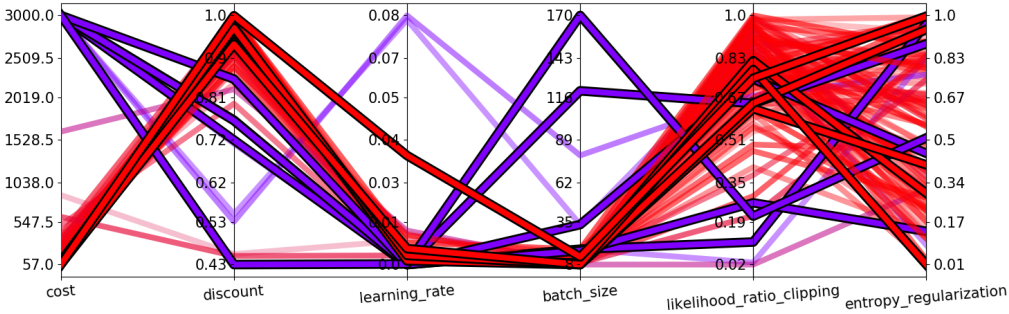
  5. Extension: Animation by showing how points get added over time

Parallel Coordinate Plot [Golovin et al 2017]



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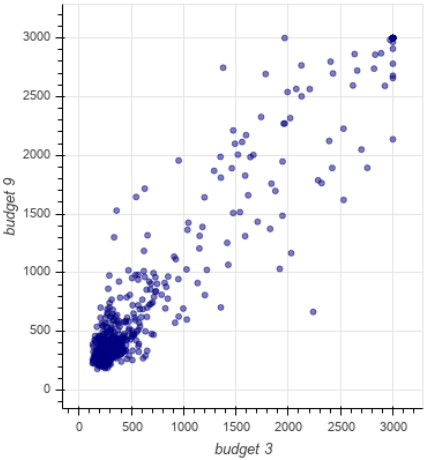
- Each coordinate is one hyperparameter;
- Except the most left one: cost or loss

Multi-Fidelity Checks



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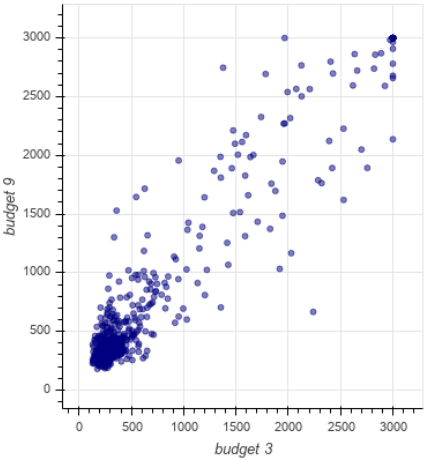

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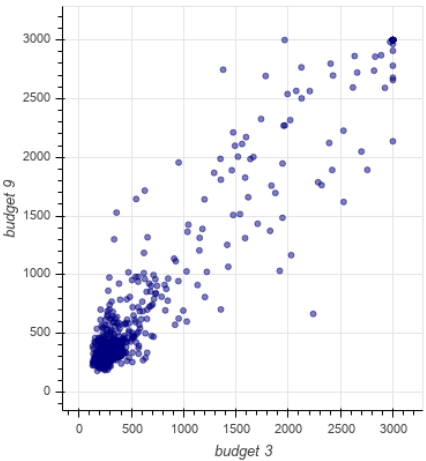

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- Challenge of multi-fidelity approaches:
  - How to choose the fidelities (a.k.a. budgets)
- Important Property:
  - Decisions on small budgets should be reasonable for higher budgets
- Analysis:
  1. Scatter plot of performance on Budget X vs. Budget Y
  2. Each dot is sampled hyperparameter configuration
  3. Compute rank correlation (here: 0.69)