



1. The Risk of Heuristics

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Servers

- Some VM placement heuristics underperform the optimal by 30%
- Heuristic risk analysis tools

Heuristic Heuristic One adversarial input (e.g., VM sequence) Analyzer Optimal

Operators manually debug this input to see why 🤮

4. Adversarial Subspaces





 \oslash

Challenge: Find all adversarial subspaces (~ AllSAT) \mathcal{X} plain: Find all adversarial subspaces + p-values



2. \mathcal{X} plain Proposal



3. \mathcal{X} plain Goal

- An automatic tool to explain heuristic underperformance ٠
- Provide 3 types of explanations to see why heuristics underperform and when ٠

5. Gap Reasons

I can modify the heuristic if I know why the heuristic screws up for the adversarial inputs.



DSL for VM placement. Red arrows show the decisions that heuristic took but optimal didn't and blue is vice versa.

Challenge: Encode optimal and heuristic decisions explicitly \mathcal{X} plain: Encode the problems in a network-flow based DSL \mathcal{X} plain: Heatmap of action differences of optimal and heuristic in each subspace

6. Ongoing Work

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- Generalize from single instance to trends across different instances increasing (\mathcal{P}) : $\forall a, b \mid a, b \in \mathcal{P} \& |a| \ge |b| \rightarrow gap(a) \ge gap(b)$
- Towards analyzing gray-box heuristics; second internship project •

Pantea Karimi (t-pkarimi), Solal Pirelli