

NAS-Bench-Suite: NAS Evaluation is (Now) Surprisingly Easy

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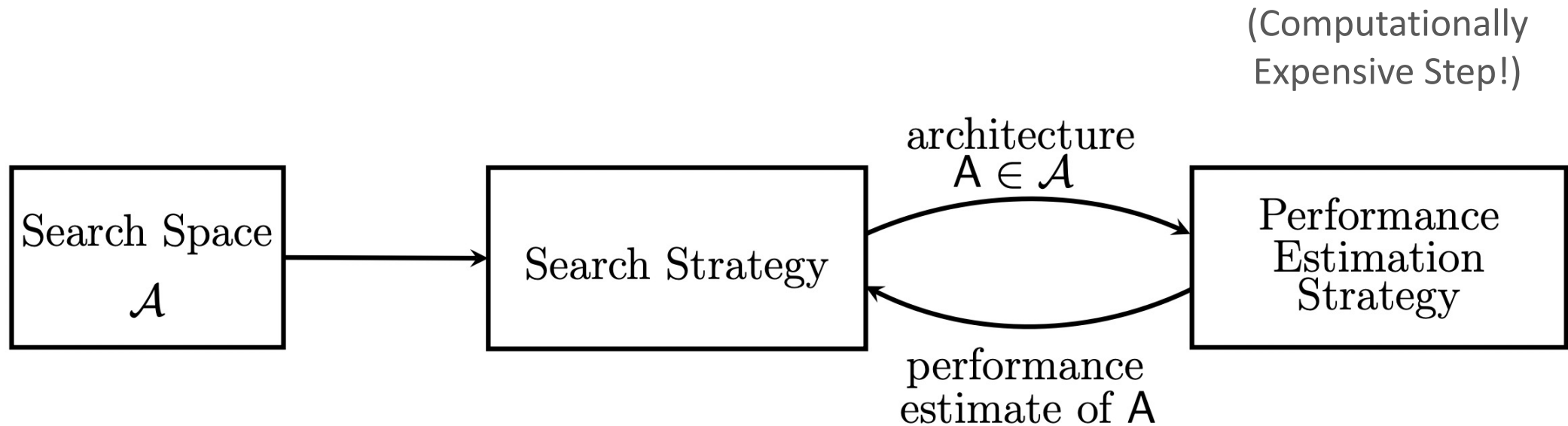


SCAN ME



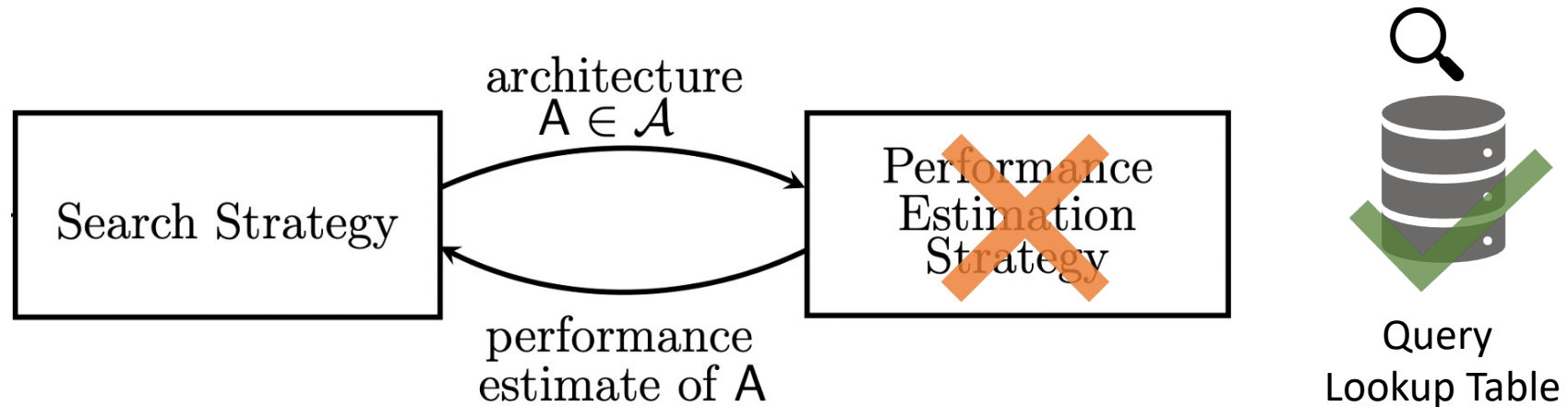
<https://github.com/automl/NASLib>

Neural Architecture Search (NAS)



NAS Benchmarks

- ❖ **Create Benchmark:** Exhaustively evaluate every single architecture in the search space and store the metrics (happens only once!)
- ❖ **Use Benchmark:** Architecture evaluation now involves just a table lookup (running time: minutes!)



Facilitates proper scientific research: fair apples-to-apples evaluations by design, multiple runs, baseline comparisons, etc.

The NAS-Benchmark Landscape

Popular

- NAS-Bench-101 (2019)
- NAS-Bench-201 (2020)

Others

- NAS-Bench-ASR (2021)
- NAS-Bench-301 (2021)
- Trans-NAS-Bench (2021)
- NAS-Bench-MR (2021)
- NAS-Bench-NLP (2020)

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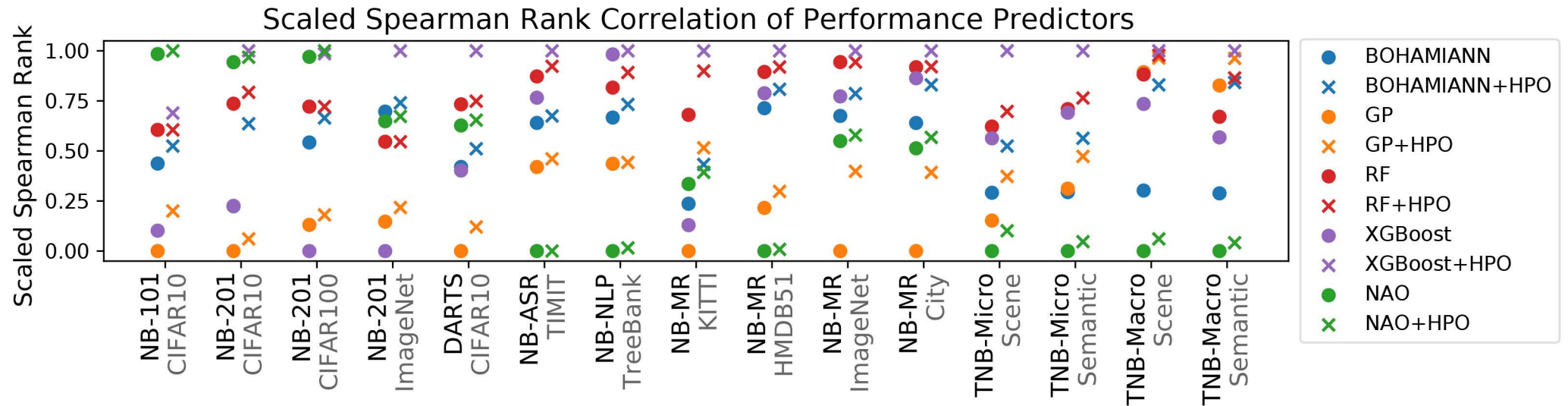
- Benchmarks have very different search spaces and APIs
- NAS algorithms are often hardcoded with a particular search space

⇒ Evaluating NAS algorithms across different benchmarks is difficult!

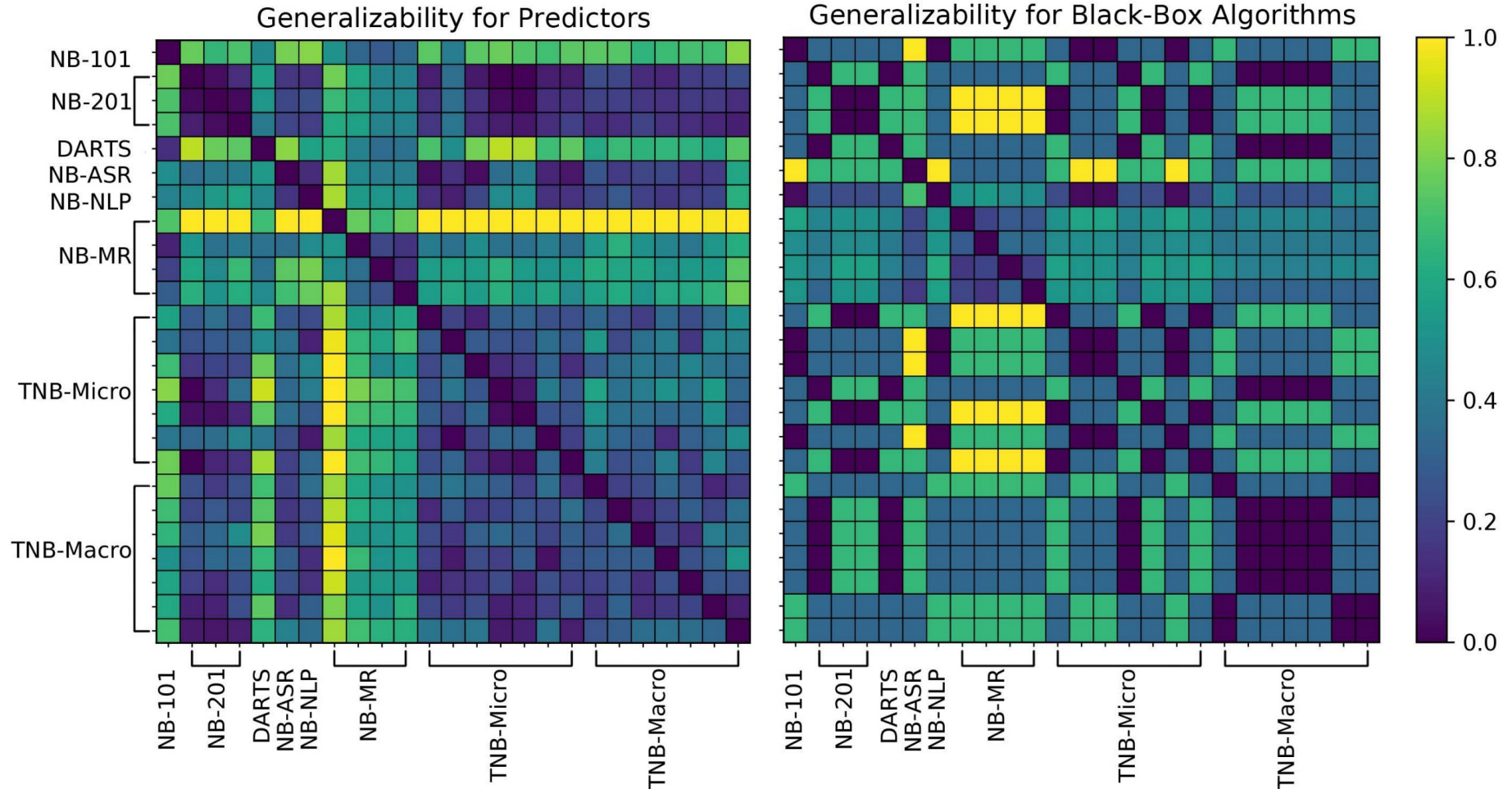
Is There a Need to Evaluate NAS Algorithms on Diverse Benchmarks?

	NAS Algorithms					Performance Predictors				
	RS	RE	BANANAS	LS	NPENAS	GP	BOHAM.	RF	XGB	NAO
Avg.Rank, 101&201	4.50	3.00	3.50	1.50	2.50	4.67	2.83	2.17	4.17	1.17
Avg. Rank, non-101&201	3.06	2.11	2.83	3.13	3.87	4.08	3.06	1.33	2.46	4.08

❖ Conclusions drawn from just the popular NAS-Bench-101 and NAS-Bench-201 can be misleading!



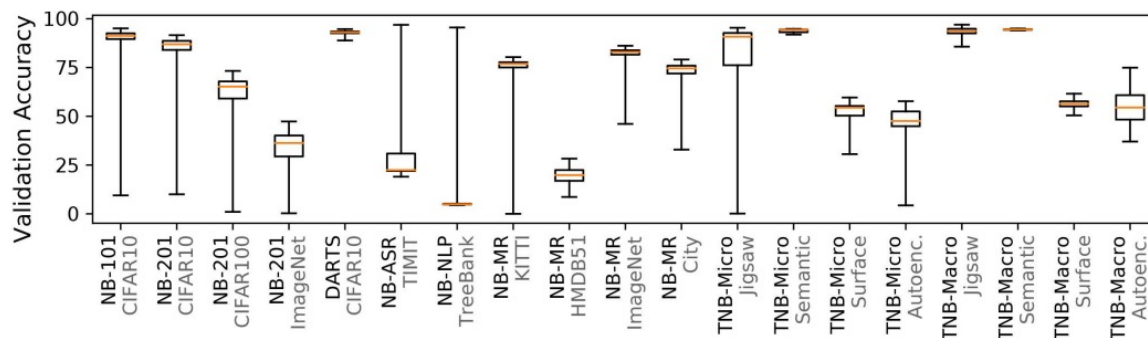
Hyperparameter Optimization of NAS Algorithms Across Benchmarks



NAS-Bench-Suite: A Single Interface to NAS Benchmarks

Benchmark	Size	Queryable			Macro	Type	#Tasks	NAS-Bench-Suite
		Tab.	Surr.	LCs				
NAS-Bench-101	423k	✓				Image class.	1	✓
NAS-Bench-201	6k	✓		✓		Image class.	3	✓
NAS-Bench-NLP	10 ⁵³			✓		NLP	1	✓
NAS-Bench-1Shot1	364k	✓				Image class.	1	✓
NAS-Bench-301	10 ¹⁸		✓			Image class.	1	✓
NAS-Bench-ASR	8k	✓			✓	ASR	1	✓
NAS-Bench-MR	10 ²³		✓		✓	Var. CV	4	✓
TransNAS-Bench	7k	✓		✓	✓	Var. CV	14	✓
NAS-Bench-111	423k		✓	✓		Image class.	1	✓
NAS-Bench-311	10 ¹⁸		✓	✓		Image class.	1	✓
NAS-Bench-NLP11	10 ⁵³		✓	✓		NLP	1	✓

 NAS-Bench-Suite: Directly allows access to **25** different NAS Benchmarks



 Automatically compute various benchmark statistics!

NAS-Bench-Suite: A Modular and Flexible Implementation Through the NASLib Library



SCAN ME



NAS Lib

A Modular and Flexible NAS Library



<https://github.com/automl/NASLib>



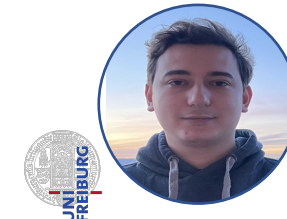
Collaborate with us!



Frank Hutter



Arber Zela



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Arjun Krishnakumar

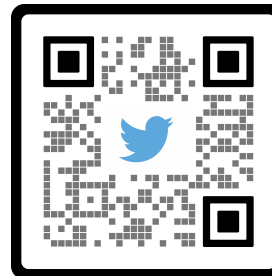


Mahmoud Safari



Shakiba Moradian

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