tide mamba

Lucy Score = Throughput x Availability x Acc / 10,000. LPD condenses live-fit vs Acc-champ RAM.
[T]=Tween [S]=Split [FP]=FastProxy [L]=Linear [HP]=HeadProxy
idle - epoch 1/1 (1 left, 86% overall) - lr unset - 2026-08-23 13:32:57 -
This epoch 2024 / 2346 cells. Recorded 2024 results. Learning rate unset.
Score 0 usually means the cell finished before a Lucy pulse (Acc never sampled). Score is live-fit: Throughput x Availability x Acc.
SGD that blocks serve dies on Availability. SoftAcc is serve-confidence only.
pi_collection - mamba - offline report

Lucy champions (this tide)

Axis	Cell	Score	Soft	Acc	Thru	Avail
hard acc	binary|none|[T][S][L]|single|simd	2.84	25.2	43.8	99.7	11.3
throughput	ternary|none|sgd|single|simd	17.18	18.0	18.6	533.7	17.9
availability	int3|none|[T][S]Sparse|bicameral|simd	0.80	25.0	12.5	8.2	38.9
lucy score	float32|none|[T][S]|single|simd	28.65	25.0	25.0	524.9	21.9
mobile score (trap)	binary|none|[T][S]|single|simd	18.48	24.9	16.7	368.9	20.1
t->50%	uint6|none|[T]Alt|bicameral|simd	0.13	25.0	50.0	8.2	6.6
acc/sec	binary|none|tween_chain|single|simd	14.89	25.0	21.3	409.6	14.5

Lucy axis champions (this tide)

Axis	Mode	DType	Arch	Value
hard_acc	Step[T]Alt	int32	tricameralx3	75.00
throughput	sgd	ternary	singlex1	533.68
availability	[T][S]Sparse	int3	bicameralx2	38.89
score	[T][S]	float32	singlex1	28.65
soft_acc	[T][S][L]	binary	singlex1	25.25
acc_thru	[T][S]	float32	singlex1	131.22
realtime	sgd	bfloat16	singlex1	121.21
adapt	[T][S][HP]	uint4	singlex1	25.09
keep_learn	tween_chain	nf4	bicameralx2	16.41
acc_per_sec	tween_chain	binary	singlex1	12.42
time_to_50	[T]Alt	uint6	bicameralx2	0.09
consistency	tween	bfloat16	singlex1	100.00
stability	tween	fp4	singlex1	100.00
mobile_score	[T][S]	binary	singlex1	242175.39
lpd	[T][S]	uint2	bicameralx2	16.92
mspeed	[T][S][HP]Async	float64	bicameralx2	1.00
mavail	[T][S][HP]Async	uint5	bicameralx2	1.00
mix	[T][S][HP]Async	float64	bicameralx2	0.93
gold_std	[T][S][HP]Async	uint5	bicameralx2	7.91

Best settings per train mode

Mode	DType	Format	Score	Soft	Acc	Avail	n
[T][S]	float32	none	28.7	25.0	25.0	21.9	102
sgd	bfloat16	none	27.7	22.9	22.4	24.5	102
tween	float32	none	20.2	23.5	25.3	17.9	102
tween_chain	float32	none	19.7	25.0	24.6	21.8	102
Mesh[T]Chain	int8	none	18.4	25.0	25.3	25.2	102
step_tween_chain	float32	none	17.8	25.0	27.9	20.1	102
MeshBP	float32	none	15.8	25.0	22.4	15.0	102
Step[T][S]	float64	none	15.7	25.0	28.1	23.5	102
step_sgd	float32	none	15.3	18.2	16.4	19.1	102

[T][S][HP]	int4	none	12.5	25.0	27.5	21.9	102
Mesh[T]	binary	none	11.9	25.1	36.0	18.1	102
[T][S]Sparse	float32	none	11.6	25.0	23.2	23.3	102
[T][S][HP]Async	int8	none	10.9	25.0	15.0	21.9	102
step_tween	int8	none	8.9	25.0	24.8	12.7	102
[T][S][FP]	binary	none	8.7	25.0	37.5	19.6	102
[T]Alt	float64	none	5.5	25.0	21.9	15.3	102
[T][S][L]Cache	binary	none	5.5	24.9	30.0	19.2	102
Mesh[T][S]	uint8	none	5.3	25.0	25.0	23.8	86
[T][S][L]	fp8e4m3	none	5.1	25.0	20.0	24.7	102
Step[T]Alt	uint8	none	3.8	25.0	6.2	12.9	102

Best dtype per mode

Mode	Winner dtype	Score	Soft	Acc
[T][S]	float32	28.7	25.0	25.0
sgd	bfloat16	27.7	22.9	22.4
tween	float32	20.2	23.5	25.3
tween_chain	float32	19.7	25.0	24.6
Mesh[T]Chain	int8	18.4	25.0	25.3
step_tween_chain	float32	17.8	25.0	27.9
MeshBP	float32	15.8	25.0	22.4
Step[T][S]	float64	15.7	25.0	28.1
step_sgd	float32	15.3	18.2	16.4
[T][S][HP]	int4	12.5	25.0	27.5
Mesh[T]	binary	11.9	25.1	36.0
[T][S]Sparse	float32	11.6	25.0	23.2
[T][S][HP]Async	int8	10.9	25.0	15.0
step_tween	int8	8.9	25.0	24.8
[T][S][FP]	binary	8.7	25.0	37.5
[T]Alt	float64	5.5	25.0	21.9
[T][S][L]Cache	binary	5.5	24.9	30.0
Mesh[T][S]	uint8	5.3	25.0	25.0
[T][S][L]	fp8e4m3	5.1	25.0	20.0
Step[T]Alt	uint8	3.8	25.0	6.2

Best mode per dtype

DType	Winner mode	Score	Soft	Acc
float32	[T][S]	28.7	25.0	25.0
bfloat16	sgd	27.7	22.9	22.4
binary	[T][S]	18.5	24.9	16.7
int8	Mesh[T]Chain	18.4	25.0	25.3
int2	[T][S]	17.2	25.0	20.8
ternary	sgd	17.2	18.0	18.6
uint64	sgd	15.9	21.1	19.5
float64	Step[T][S]	15.7	25.0	28.1
int64	sgd	14.7	19.2	17.2
fp4	step_sgd	13.9	20.8	20.7
int4	[T][S]	13.6	25.0	20.8
int32	sgd	13.3	19.7	21.2
uint8	MeshBP	12.7	25.0	20.0
uint32	Step[T][S]	12.3	25.0	37.5
uint	Mesh[T]Chain	11.8	25.0	25.0

int16	[T][S]	11.2	25.0	25.0
uint16	[T][S]	11.1	25.0	31.2
uint4	tween	9.8	23.2	21.2
fp8e4m3	[T][S]	9.3	25.0	37.5
uint2	Mesh[T]Chain	8.7	25.1	29.2
fp8e5m2	MeshBP	8.6	25.0	29.0
complex64	[T][S]	8.4	25.0	28.1
uintptr	[T][S]	7.9	25.0	25.0
complex128	[T][S]	7.6	25.0	31.2
int3	tween_chain	7.5	25.0	27.4
uint6	[T][S]	6.8	24.9	12.5
float16	sgd	6.6	14.4	14.3
uint3	[T][S]	6.5	25.0	12.5
nf4	[T][S]	6.4	25.0	25.0
int5	sgd	5.1	16.4	18.5
int	Mesh[T]	4.8	25.0	28.3
fp6	sgd	4.7	16.0	20.8
uint5	MeshBP	3.8	25.0	19.6
int6	[T][S]	3.6	25.0	12.5

Leaderboard (Lucy Score)

#	Cell	Score	Soft	Acc	Thru	Avail
1	float32|none|[T][S]|single|simd	28.7	25.0	25.0	524.9	21.9
2	bfloat16|none|sgd|single|simd	27.7	22.9	22.4	493.9	24.5
3	float32|none|tween|single|simd	20.2	23.5	25.3	479.5	17.9
4	float32|none|tween_chain|single|simd	19.7	25.0	24.6	360.2	21.8
5	binary|none|[T][S]|single|simd	18.5	24.9	16.7	368.9	20.1
6	int8|none|Mesh[T]Chain|single|simd	18.4	25.0	25.3	291.9	25.2
7	float32|none|step_tween_chain|single|simd	17.8	25.0	27.9	353.5	20.1
8	binary|none|step_tween_chain|single|simd	17.4	25.1	32.9	305.3	22.7
9	int2|none|[T][S]|single|simd	17.2	25.0	20.8	464.1	14.8
10	ternary|none|sgd|single|simd	17.2	18.0	18.6	533.7	17.9
11	int8|none|tween_chain|single|simd	16.8	25.0	23.1	348.9	19.2
12	bfloat16|none|[T][S]|single|simd	16.5	25.0	21.4	283.8	23.2
13	uint64|none|sgd|single|simd	15.9	21.1	19.5	275.7	27.4
14	float32|none|MeshBP|single|simd	15.8	25.0	22.4	420.1	15.0
15	float64|none|Step[T][S]|single|simd	15.7	25.0	28.1	268.2	23.5
16	float32|none|step_sgd|single|simd	15.3	18.2	16.4	441.1	19.1
17	binary|none|tween_chain|single|simd	14.9	25.0	21.3	409.6	14.5
18	int64|none|sgd|single|simd	14.7	19.2	17.2	332.4	23.0
19	fp4|none|step_sgd|single|simd	13.9	20.8	20.7	354.5	18.8
20	int4|none|[T][S]|single|simd	13.6	25.0	20.8	348.1	15.6

Leaderboard (SoftAcc)

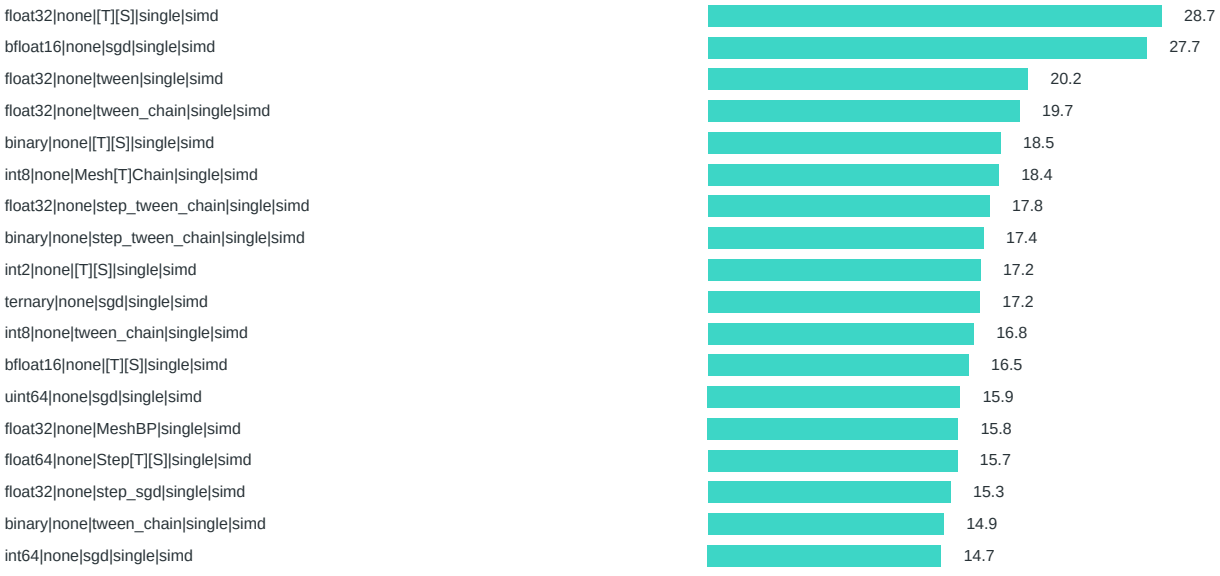
#	Cell	Score	Soft	Acc	Thru	Avail
1	binary|none|Mesh[T]|single|simd	11.9	25.1	36.0	263.0	18.1
2	binary|none|step_tween_chain|single|simd	17.4	25.1	32.9	305.3	22.7
3	uint32|none|Step[T][S]|single|simd	12.3	25.0	37.5	174.9	28.2
4	float64|none|Step[T][S]|single|simd	15.7	25.0	28.1	268.2	23.5
5	int4|none|[T][S][HP]|single|simd	12.5	25.0	27.5	228.2	21.9
6	float32|none|[T][S]Sparse|single|simd	11.6	25.0	23.2	200.2	23.3
7	int4|none|[T][S]|single|simd	13.6	25.0	20.8	348.1	15.6

8	int8|none|[T][S][HP]|single|simd	11.9	25.0	20.0	217.6	21.9
9	float32|none|step_tween_chain|single|simd	17.8	25.0	27.9	353.5	20.1
10	float32|none|tween_chain|single|simd	19.7	25.0	24.6	360.2	21.8
11	int16|none|[T][S]|single|simd	11.2	25.0	25.0	235.8	19.0
12	int4|none|MeshBP|single|simd	12.2	25.0	24.1	255.3	19.2
13	int8|none|Mesh[T]Chain|single|simd	18.4	25.0	25.3	291.9	25.2
14	fp4|none|tween|single|simd	11.3	25.0	26.7	272.0	16.5
15	fp4|none|Mesh[T]|single|simd	11.1	25.0	31.8	259.6	17.1
16	uint8|none|MeshBP|single|simd	12.7	25.0	20.0	273.1	18.6
17	int8|none|tween_chain|single|simd	16.8	25.0	23.1	348.9	19.2
18	float32|none|MeshBP|single|simd	15.8	25.0	22.4	420.1	15.0
19	bfloat16|none|[T][S]|single|simd	16.5	25.0	21.4	283.8	23.2
20	float32|none|Mesh[T]Chain|single|simd	11.2	25.0	24.6	266.8	16.8

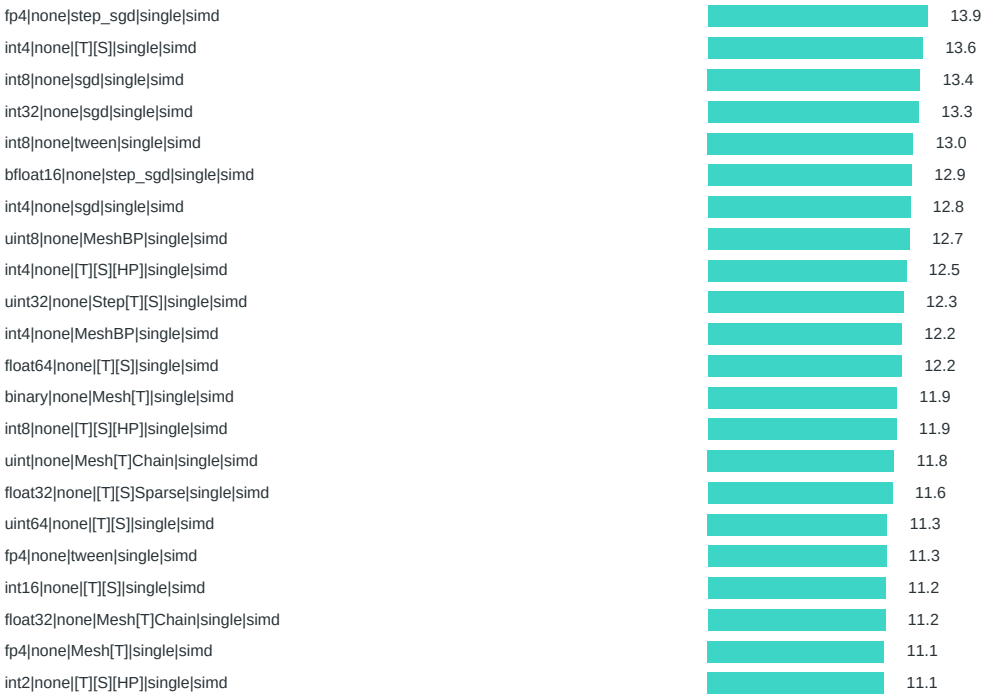
Leaderboard (hard Acc)

#	Cell	Score	Soft	Acc	Thru	Avail
1	uint32|none|Step[T][S]|single|simd	12.3	25.0	37.5	174.9	28.2
2	binary|none|Mesh[T]|single|simd	11.9	25.1	36.0	263.0	18.1
3	binary|none|step_tween_chain|single|simd	17.4	25.1	32.9	305.3	22.7
4	fp4|none|Mesh[T]|single|simd	11.1	25.0	31.8	259.6	17.1
5	float64|none|Step[T][S]|single|simd	15.7	25.0	28.1	268.2	23.5
6	uint64|none|[T][S]|single|simd	11.3	25.0	28.1	244.8	18.5
7	float32|none|step_tween_chain|single|simd	17.8	25.0	27.9	353.5	20.1
8	int4|none|[T][S][HP]|single|simd	12.5	25.0	27.5	228.2	21.9
9	int8|none|sgd|single|simd	13.4	21.2	26.8	215.3	29.4
10	fp4|none|tween|single|simd	11.3	25.0	26.7	272.0	16.5
11	int8|none|Mesh[T]Chain|single|simd	18.4	25.0	25.3	291.9	25.2
12	float32|none|tween|single|simd	20.2	23.5	25.3	479.5	17.9
13	int8|none|tween|single|simd	13.0	21.7	25.0	387.5	15.4
14	float32|none|[T][S]|single|simd	28.7	25.0	25.0	524.9	21.9
15	uint|none|Mesh[T]Chain|single|simd	11.8	25.0	25.0	200.7	23.4
16	int16|none|[T][S]|single|simd	11.2	25.0	25.0	235.8	19.0
17	float32|none|tween_chain|single|simd	19.7	25.0	24.6	360.2	21.8
18	float32|none|Mesh[T]Chain|single|simd	11.2	25.0	24.6	266.8	16.8
19	int4|none|MeshBP|single|simd	12.2	25.0	24.1	255.3	19.2
20	float32|none|[T][S]Sparse|single|simd	11.6	25.0	23.2	200.2	23.3

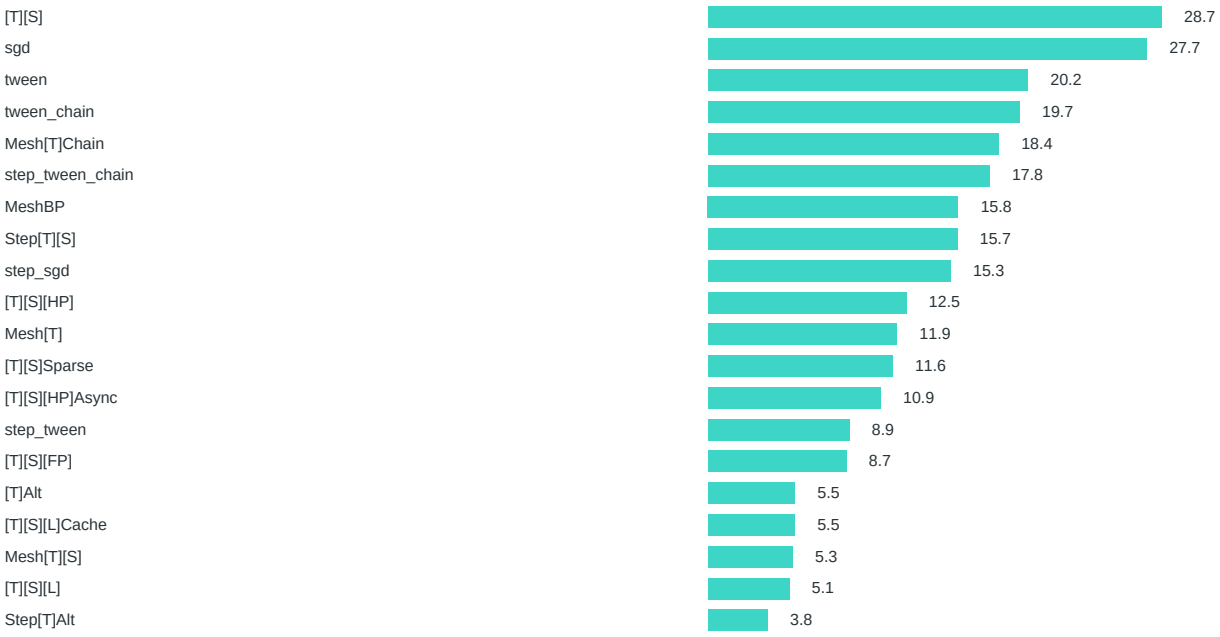
Top scores



Top scores



Best settings per mode



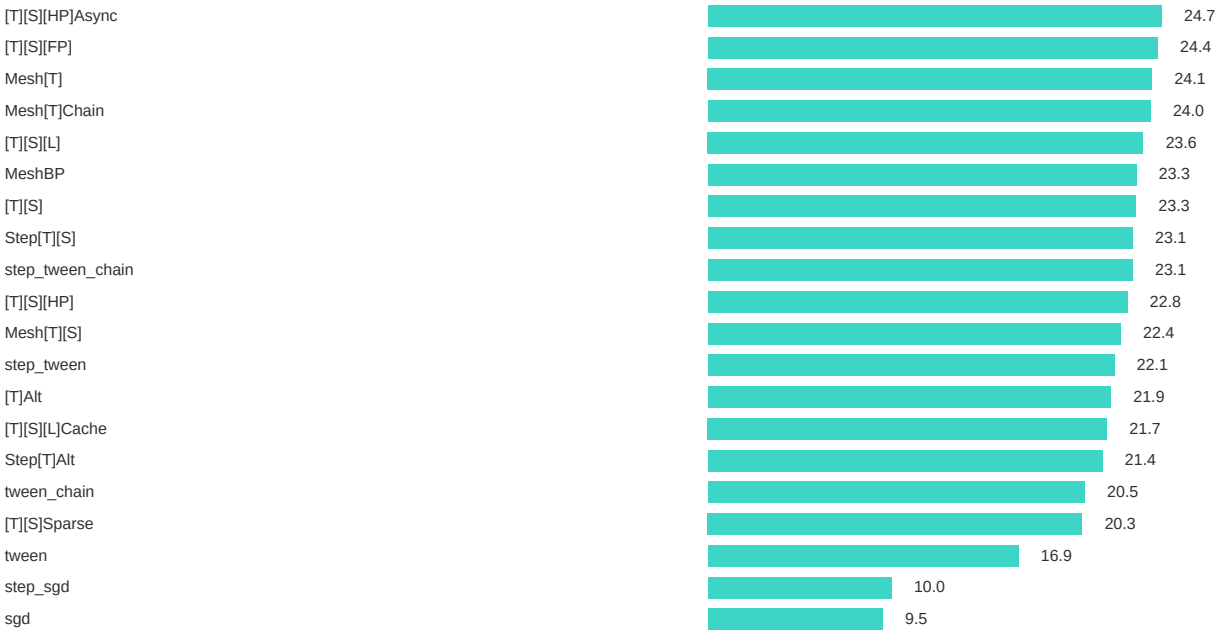
Mean Score by train mode



Mean Score by train mode



Mean hard Acc by train mode



Mean SoftAcc by train mode



Mean Availability by train mode



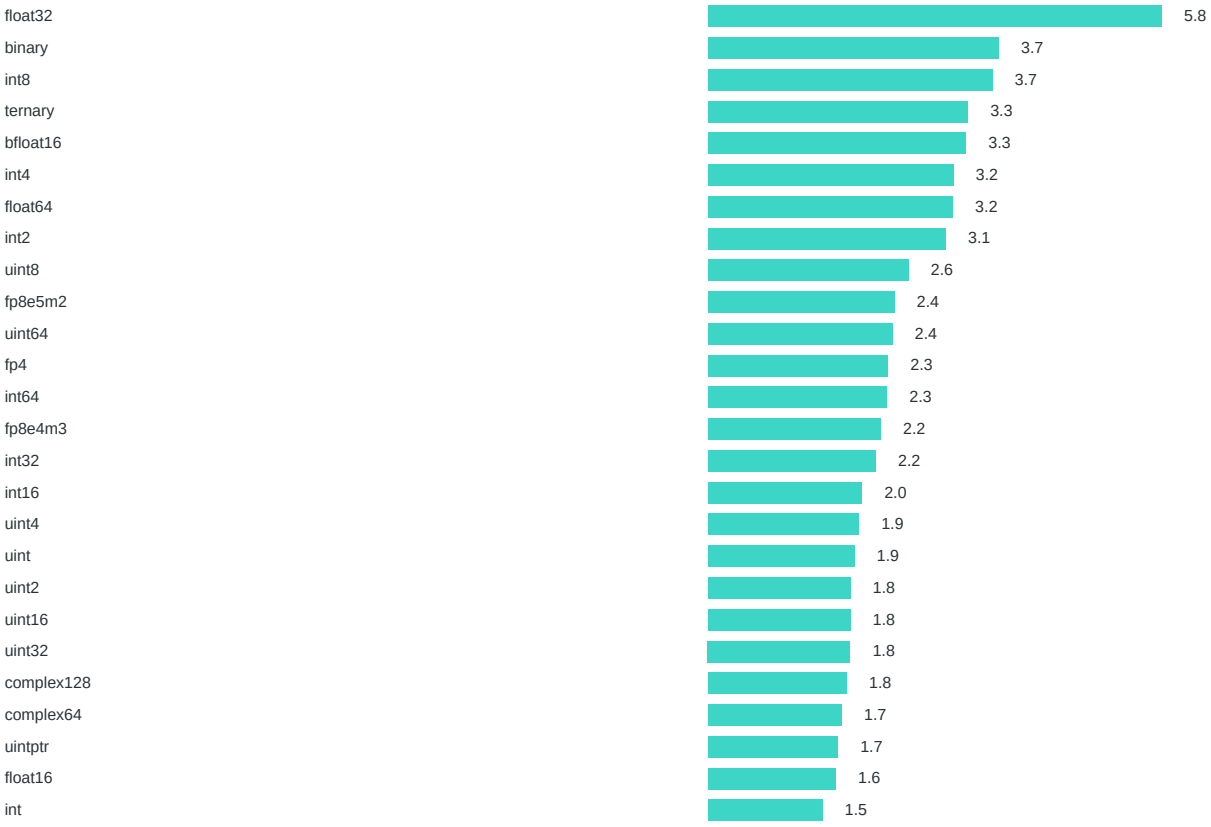
Mean Availability by train mode



Mean Throughput by train mode



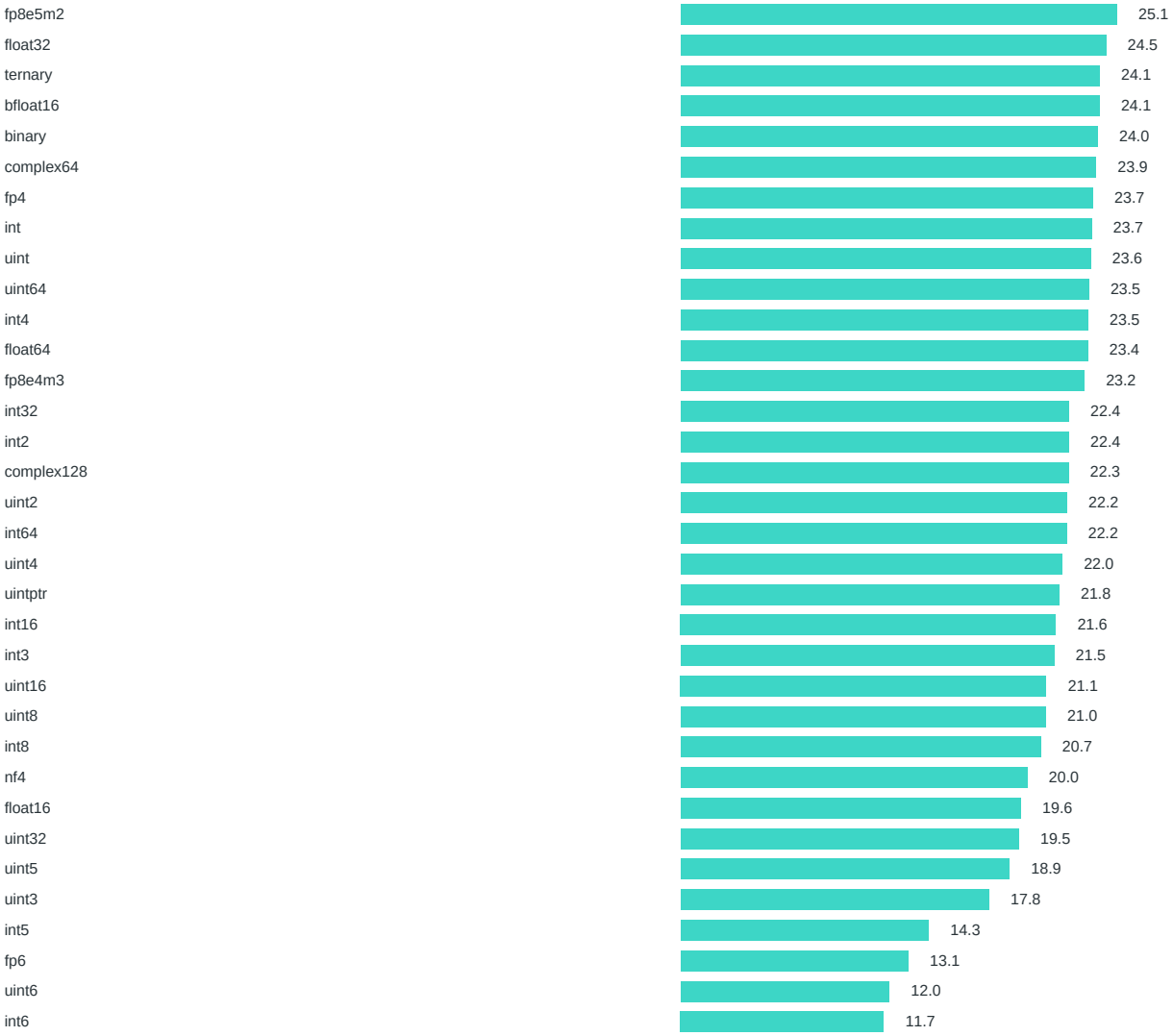
Mean Score by dtype



Mean Score by dtype



Mean hard Acc by dtype



Mean Score by arch



Honesty - mean Score, every mode x dtype (cols 1-12)

Honesty - mean Score, every mode x dtype (cols 1-12)

	bfloat16	binary	complex128	complex64	float16	float32	float64	fp4	fp6	fp8e4m3	fp8e5m2	int
MeshBP	5	2	1	2	1	6	3	3	1	1	5	2
Mesh[T]	4	8	1	1	2	6	3	6	0	2	3	2
Mesh[T]Chain	2	4	3	1	4	8	2	3	0	3	4	1
Mesh[T][S]	3	2	1	1	1	2	2	1	0	1	1	2
Step[T]Alt	1	1	0	0	0	1	0	0	0	1	1	0
Step[T][S]	2	6	2	3	2	6	8	1	0	2	4	4
[T]Alt	1	1	1	1	1	2	2	1	1	1	1	1
[T][S]	7	6	5	4	3	16	4	3	1	7	4	5
[T][S][FP]	4	6	3	3	1	4	2	2	1	2	1	1
[T][S][HP]	4	4	1	2	3	5	3	3	2	3	2	2
[T][S][HP]Async	3	2	2	2	3	5	6	1	2	4	5	1
[T][S][L]	1	2	2	1	1	2	3	2	1	2	1	0
[T][S][L]Cache	2	3	2	3	2	2	2	1	1	3	2	1
[T][S]Sparse	4	4	2	1	2	8	5	2	0	2	3	1
sgd	10	2	2	0	2	5	3	2	2	1	1	1
step_sgd	5	1	2	0	1	6	2	5	0	2	0	1
step_tween	1	3	2	1	1	3	4	1	1	2	1	1
step_tween_chain	2	8	1	1	2	9	2	2	1	3	3	2
tween	5	3	1	3	0	11	4	5	1	2	2	1
tween_chain	2	5	3	2	3	9	3	2	2	2	3	1

Honesty - mean Score, every mode x dtype (cols 13-24)

Honesty - mean Score, every mode x dtype (cols 13-24)

	int16	int2	int3	int32	int4	int5	int6	int64	int8	nf4	ternary	uint
MeshBP	4	2	2	1	5	2	1	3	3	2	5	2
Mesh[T]	1	2	2	1	4	1	1	2	1	1	3	2
Mesh[T]Chain	1	4	1	3	3	1	1	4	8	1	4	5
Mesh[T][S]	0	3	0	1	1	1	0	1	2	1	3	2
Step[T]Alt	1	1	0	1	1	0	0	0	1	0	1	0
Step[T][S]	2	3	2	4	4	1	1	2	4	1	5	1
[T]Alt	1	1	0	0	1	1	0	1	1	1	2	1
[T][S]	8	8	2	4	6	0	1	5	5	3	6	4
[T][S][FP]	2	1	1	3	2	1	1	3	4	2	3	2
[T][S][HP]	2	4	1	2	6	1	1	4	4	2	2	2
[T][S][HP]Async	3	3	2	2	2	1	1	3	4	1	2	2
[T][S][L]	1	1	1	1	1	0	0	1	1	2	1	1
[T][S][L]Cache	1	2	3	3	2	0	1	1	1	1	2	2
[T][S]Sparse	3	4	1	2	4	0	0	2	3	1	3	1
sgd	2	3	0	6	5	2	0	4	6	2	8	1
step_sgd	1	4	1	2	4	0	0	1	2	2	4	3
step_tween	2	3	1	1	2	0	1	1	5	1	2	1
step_tween_chain	2	2	1	2	3	1	1	3	4	2	4	1
tween	1	6	1	2	5	1	1	3	6	0	4	2
tween_chain	2	3	3	2	4	1	1	1	8	1	3	3

Honesty - mean Score, every mode x dtype (cols 25-34)

Honesty - mean Score, every mode x dtype (cols 25-34)

	uint16	uint2	uint3	uint32	uint4	uint5	uint6	uint64	uint8	uintptr
MeshBP	5	2	1	3	3	1	1	3	4	1
Mesh[T]	1	2	1	1	1	1	1	2	3	2
Mesh[T]Chain	1	5	1	3	3	1	0	2	3	3
Mesh[T][S]	1	2	1	1	1	1	1	2	2	2
Step[T]Alt	1	0	0	1	1	1	0	1	1	1
Step[T][S]	2	2	2	8	2	1	1	1	4	2
[T]Alt	1	0	1	0	0	1	1	1	1	1
[T][S]	6	5	3	3	5	2	2	8	5	5
[T][S][FP]	1	2	1	1	1	1	1	1	2	1
[T][S][HP]	2	2	1	1	1	1	1	2	3	2
[T][S][HP]Async	2	3	1	3	2	2	1	4	3	2
[T][S][L]	2	1	1	1	0	1		1	1	1
[T][S][L]Cache	2	1	1	2	1	2	0	1	2	1
[T][S]Sparse	1	3	1	1	2	0	0	3	2	1
sgd	1	2	1	2	1	1	1	5	1	2
step_sgd	0	0	0	1	0	0	0	1	2	1
step_tween	1	1	1	1	2	1	0	2	3	1
step_tween_chain	1	1	1	1	4	0	1	2	2	2
tween	4	0	2	3	4	1	0	1	2	2
tween_chain	3	3	1	1	2	1	0	4	3	2

Honesty - mean hard Acc, every mode x dtype (cols 1-12)

Honesty - mean hard Acc, every mode x dtype (cols 1-12)

	bfloat16	binary	complex128	complex64	float16	float32	float64	fp4	fp6	fp8e4m3	fp8e5m2	int
MeshBP	29	36	17	20	23	25	24	22	20	19	22	27
Mesh[T]	33	32	27	25	17	26	20	27	15	24	29	25
Mesh[T]Chain	25	20	26	19	33	29	30	36	7	31	38	19
Mesh[T][S]	20	24	25	19	15	23	31	28	9	21	28	28
Step[T]Alt	25	22	23	19	21	27	15	21	6	27	29	25
Step[T][S]	23	35	24	38	35	19	36	19	4	27	31	39
[T]Alt	23	20	31	23	25	24	18	19	8	31	19	25
[T][S]	18	15	29	16	24	27	19	26	8	31	30	33
[T][S][FP]	31	31	27	35	20	27	26	26	17	31	25	38
[T][S][HP]	28	29	10	26	21	31	21	39	17	22	27	31
[T][S][HP]Async	25	23	30	32	18	20	36	22	38	30	44	33
[T][S][L]	31	37	27	35	17	25	25	28	15	17	32	21
[T][S][L]Cache	25	18	27	31	19	29	26	23	12	35	27	15
[T][S]Sparse	24	24	28	18	16	30	26	28	8	18	24	21
sgd	15	10	10	6	9	13	13	8	8	6	10	7
step_sgd	14	14	10	9	6	20	14	13	3	12	6	10
step_tween	22	23	21	32	19	23	21	24	19	21	21	18
step_tween_chain	26	27	20	25	21	25	27	26	17	24	23	23
tween	22	15	14	24	13	24	22	16	10	17	19	14
tween_chain	22	25	21	26	21	24	17	24	18	20	19	22

Honesty - mean hard Acc, every mode x dtype (cols 13-24)

Honesty - mean hard Acc, every mode x dtype (cols 13-24)

	int16	int2	int3	int32	int4	int5	int6	int64	int8	nf4	ternary	uint
MeshBP	22	25	22	22	28	31	18	27	19	23	24	35
Mesh[T]	24	22	18	25	25	24	13	24	19	26	26	20
Mesh[T]Chain	23	22	27	17	15	26	11	29	25	21	21	36
Mesh[T][S]	6	23	25	21	28	22	12	24	29	28	26	31
Step[T]Alt	33	27	12	44	23	4	10	21	12	19	35	12
Step[T][S]	23	18	29	26	23	15	10	31	25	19	22	23
[T]Alt	27	27	19	14	28	17	10	27	19	19	24	27
[T][S]	27	30	17	27	19	12	4	21	21	15	34	28
[T][S][FP]	27	25	17	33	32	12	8	27	26	24	33	31
[T][S][HP]	21	22	19	19	32	15	11	26	21	25	19	19
[T][S][HP]Async	24	24	31	20	26	17	15	23	23	17	20	32
[T][S][L]	19	23	40	17	27	8	10	20	16	42	26	12
[T][S][L]Cache	21	15	40	29	15	8	19	26	15	15	28	27
[T][S]Sparse	28	23	17	24	31	8	4	23	14	15	23	26
sgd	10	12	5	13	13	8	6	7	15	10	19	10
step_sgd	9	10	9	12	14	6	6	9	13	10	14	10
step_tween	29	27	22	25	23	15	19	16	27	25	25	28
step_tween_chain	22	24	31	20	27	19	15	26	27	23	23	24
tween	17	24	13	17	18	12	11	19	20	13	18	16
tween_chain	21	24	19	22	22	10	19	19	28	16	23	26

Honesty - mean hard Acc, every mode x dtype (cols 25-34)

Honesty - mean hard Acc, every mode x dtype (cols 25-34)

	uint16	uint2	uint3	uint32	uint4	uint5	uint6	uint64	uint8	uintptr
MeshBP	26	24	15	29	22	18	11	28	22	19
Mesh[T]	24	23	26	24	23	29	27	21	21	37
Mesh[T]Chain	16	26	21	24	24	29	7	26	23	33
Mesh[T][S]	11	42	22	21	25	12	12	22	21	30
Step[T]Alt	27	25	10	26	27	29	6	21	19	25
Step[T][S]	19	25	17	33	21	8	6	22	25	15
[T]Alt	21	4	21	10	29	10	33	19	28	46
[T][S]	27	33	17	24	24	23	17	39	20	35
[T][S][FP]	16	22	21	26	17	31	12	15	17	23
[T][S][HP]	27	30	15	10	42	10	8	34	26	22
[T][S][HP]Async	15	25	17	16	22	31	10	41	18	24
[T][S][L]	35	27	29	10	19	36		33	31	12
[T][S][L]Cache	24	10	19	29	17	26	10	23	18	17
[T][S]Sparse	27	35	21	9	30	6	8	21	22	10
sgd	9	8	5	8	7	6	7	10	9	9
step_sgd	6	9	5	8	6	6	8	13	14	9
step_tween	24	25	18	27	21	18	11	24	26	13
step_tween_chain	26	18	21	21	27	14	22	28	23	20
tween	20	13	20	17	23	10	14	11	20	16
tween_chain	22	24	17	16	16	20	9	21	18	23

Honesty - mean SoftAcc, every mode x dtype (cols 1-12)

Honesty - mean SoftAcc, every mode x dtype (cols 1-12)

	bfloat16	binary	complex128	complex64	float16	float32	float64	fp4	fp6	fp8e4m3	fp8e5m2	int
MeshBP	25	25	25	25	25	25	25	25	17	25	25	25
Mesh[T]	25	25	25	25	25	25	25	25	21	25	25	25
Mesh[T]Chain	25	25	25	25	25	25	25	25	25	25	25	25
Mesh[T][S]	25	25	25	25	25	25	25	25	25	25	25	25
Step[T]Alt	25	25	25	25	25	25	25	25	25	25	25	25
Step[T][S]	25	25	25	25	25	25	25	25	25	25	25	25
[T]Alt	25	25	25	25	25	25	25	25	25	25	25	25
[T][S]	25	25	25	25	25	25	25	25	25	25	25	25
[T][S][FP]	25	25	25	25	25	25	25	25	25	25	25	25
[T][S][HP]	25	25	25	25	25	25	25	25	25	25	25	25
[T][S][HP]Async	25	25	25	25	25	25	25	25	25	25	25	25
[T][S][L]	25	25	25	25	25	25	25	25	25	25	25	25
[T][S][L]Cache	25	25	25	25	25	25	25	25	25	25	25	25
[T][S]Sparse	25	25	25	25	25	25	25	25	25	25	25	25
sgd	15	11	11	5	8	15	14	9	7	7	9	7
step_sgd	14	12	12	8	9	18	13	13	4	11	5	10
step_tween	25	22	23	25	21	25	18	22	19	21	25	22
step_tween_chain	25	25	25	25	25	25	25	25	15	25	25	22
tween	22	21	18	21	15	24	23	17	11	19	19	13
tween_chain	22	25	20	25	20	23	19	21	19	23	19	24

Honesty - mean SoftAcc, every mode x dtype (cols 13-24)

Honesty - mean SoftAcc, every mode x dtype (cols 13-24)

	int16	int2	int3	int32	int4	int5	int6	int64	int8	nf4	ternary	uint
MeshBP	25	25	25	25	25	25	19	25	25	25	25	25
Mesh[T]	25	25	21	25	25	21	17	25	25	25	25	21
Mesh[T]Chain	25	25	25	25	25	21	21	25	25	25	25	25
Mesh[T][S]	25	25	25	25	25	25	25	25	25	25	25	25
Step[T]Alt	25	25	25	25	25	25	25	25	25	25	25	25
Step[T][S]	25	25	25	25	25	25	25	25	25	25	25	25
[T]Alt	25	25	25	25	25	25	25	25	25	25	25	25
[T][S]	25	25	25	25	25	25	25	25	25	25	25	25
[T][S][FP]	25	25	25	25	25	25	25	25	25	25	25	25
[T][S][HP]	25	25	25	25	25	25	25	25	25	25	25	25
[T][S][HP]Async	25	25	25	25	25	25	25	25	25	25	25	25
[T][S][L]	25	25	25	25	25	25	25	25	25	25	25	25
[T][S][L]Cache	25	25	25	25	25	25	25	25	25	25	25	25
[T][S]Sparse	25	25	25	25	25	25	25	25	25	25	25	25
sgd	9	12	5	13	14	7	6	8	12	10	17	10
step_sgd	9	9	9	11	14	6	6	9	15	10	14	11
step_tween	25	25	22	22	22	17	17	22	25	25	25	25
step_tween_chain	25	25	25	25	25	19	17	25	25	25	25	25
tween	18	20	14	17	19	14	13	19	19	15	20	18
tween_chain	21	23	21	18	22	15	17	21	25	19	25	23

Honesty - mean SoftAcc, every mode x dtype (cols 25-34)

Honesty - mean SoftAcc, every mode x dtype (cols 25-34)

	uint16	uint2	uint3	uint32	uint4	uint5	uint6	uint64	uint8	uintptr
MeshBP	25	25	21	25	25	17	22	25	25	21
Mesh[T]	25	25	25	25	25	25	21	25	25	25
Mesh[T]Chain	25	25	25	25	25	21	25	25	25	25
Mesh[T][S]	25	25	25	25	25	25	25	25	25	25
Step[T]Alt	25	25	25	25	25	25	25	25	25	25
Step[T][S]	25	25	25	25	25	25	25	25	25	25
[T]Alt	25	25	25	25	25	25	25	25	25	25
[T][S]	25	25	25	25	25	25	25	25	25	25
[T][S][FP]	25	25	25	25	25	25	25	25	25	25
[T][S][HP]	25	25	25	25	25	25	25	25	25	25
[T][S][HP]Async	25	25	25	25	25	25	25	25	25	25
[T][S][L]	25	25	25	25	25	25	25	25	25	25
[T][S][L]Cache	25	25	25	25	25	25	25	25	25	25
[T][S]Sparse	25	25	25	25	25	25	25	25	25	25
sgd	8	8	6	9	8	6	7	11	9	9
step_sgd	7	9	5	9	7	7	7	11	14	10
step_tween	22	21	21	25	22	23	10	22	25	18
step_tween_chain	25	22	22	21	25	21	22	25	25	25
tween	19	14	19	19	20	11	12	12	18	19
tween_chain	22	24	17	18	21	20	11	17	25	24

Honesty - mean Avail, every mode x dtype (cols 1-12)

Honesty - mean Avail, every mode x dtype (cols 1-12)

	bfloat16	binary	complex128	complex64	float16	float32	float64	fp4	fp6	fp8e4m3	fp8e5m2	int
MeshBP	14	10	16	14	8	11	19	13	16	10	16	13
Mesh[T]	13	14	14	12	11	11	15	14	12	12	12	14
Mesh[T]Chain	10	11	17	12	15	17	13	12	16	13	19	12
Mesh[T][S]	20	14	21	17	17	16	17	14	24	17	18	23
Step[T]Alt	6	5	8	10	8	9	7	9	12	7	8	8
Step[T][S]	12	12	14	15	10	17	16	12	19	13	14	16
[T]Alt	9	5	10	9	8	7	10	8	15	11	9	9
[T][S]	23	16	19	22	18	18	17	14	20	20	17	22
[T][S][FP]	21	16	22	21	18	15	15	15	27	18	17	17
[T][S][HP]	21	13	18	21	22	19	17	16	25	18	17	18
[T][S][HP]Async	21	14	21	19	23	14	19	16	28	22	21	21
[T][S][L]	13	8	16	13	14	10	17	14	20	15	13	10
[T][S][L]Cache	17	15	20	24	15	13	17	14	25	16	20	21
[T][S]Sparse	23	19	22	20	20	22	24	21	23	21	21	21
sgd	18	11	19	12	12	16	17	13	13	13	15	14
step_sgd	13	7	10	10	12	12	11	15	12	10	6	11
step_tween	8	7	9	12	5	10	9	8	18	11	14	9
step_tween_chain	9	13	9	9	11	14	8	7	19	13	13	12
tween	15	8	14	17	7	15	15	10	15	14	13	10
tween_chain	11	13	12	14	10	16	10	9	20	13	14	13

Honesty - mean Avail, every mode x dtype (cols 13-24)

Honesty - mean Avail, every mode x dtype (cols 13-24)

	int16	int2	int3	int32	int4	int5	int6	int64	int8	nf4	ternary	uint
MeshBP	19	8	16	12	13	16	18	14	14	12	13	12
Mesh[T]	10	8	19	10	9	14	15	12	7	11	9	16
Mesh[T]Chain	12	12	18	14	14	15	20	17	15	14	10	17
Mesh[T][S]	20	17	16	17	13	19	23	17	16	20	15	18
Step[T]Alt	8	6	9	10	5	9	9	8	9	9	5	9
Step[T][S]	19	8	16	17	13	17	16	12	9	12	13	15
[T]Alt	11	6	11	9	5	13	12	12	8	10	7	11
[T][S]	23	11	21	16	14	18	21	22	14	17	12	22
[T][S][FP]	19	11	22	19	11	21	27	22	13	22	12	21
[T][S][HP]	20	17	19	19	15	21	20	20	15	19	12	22
[T][S][HP]Async	24	15	23	22	11	26	20	25	15	16	13	19
[T][S][L]	16	8	15	17	8	20	22	13	9	17	8	18
[T][S][L]Cache	19	11	25	22	14	22	26	19	12	19	10	19
[T][S]Sparse	20	22	27	24	18	27	24	26	22	23	18	21
sgd	18	13	13	20	11	15	16	12	16	17	14	16
step_sgd	11	9	13	14	10	9	18	12	10	12	8	15
step_tween	11	8	13	7	9	12	13	11	12	10	8	10
step_tween_chain	13	9	12	13	7	16	12	14	12	12	11	10
tween	10	10	15	10	11	16	14	13	9	10	9	12
tween_chain	14	8	16	10	12	16	16	12	12	13	9	14

Honesty - mean Avail, every mode x dtype (cols 25-34)

Honesty - mean Avail, every mode x dtype (cols 25-34)

	uint16	uint2	uint3	uint32	uint4	uint5	uint6	uint64	uint8	uintptr
MeshBP	19	18	16	12	17	14	18	13	13	13
Mesh[T]	12	14	13	11	12	14	17	12	12	13
Mesh[T]Chain	11	20	13	16	17	17	17	13	12	18
Mesh[T][S]	16	19	25	20	21	19	21	26	19	23
Step[T]Alt	8	8	13	12	6	12	11	12	9	10
Step[T][S]	15	16	21	20	13	19	16	13	12	16
[T]Alt	9	14	14	12	7	12	10	9	9	13
[T][S]	20	19	25	22	18	22	24	19	15	18
[T][S][FP]	16	22	22	16	18	17	25	18	18	17
[T][S][HP]	17	19	26	15	15	22	22	15	13	17
[T][S][HP]Async	21	26	23	20	18	24	27	22	17	22
[T][S][L]	15	12	16	15	11	20	18	14	9	16
[T][S][L]Cache	23	20	21	17	19	27	25	16	19	19
[T][S]Sparse	14	25	28	22	22	22	25	25	21	23
sgd	12	13	18	16	15	17	16	18	12	15
step_sgd	7	11	9	9	8	10	17	10	11	14
step_tween	8	10	11	10	17	14	9	14	12	9
step_tween_chain	12	9	16	8	15	10	13	14	9	11
tween	12	9	21	13	16	13	14	12	13	16
tween_chain	15	16	14	12	11	18	14	8	13	15

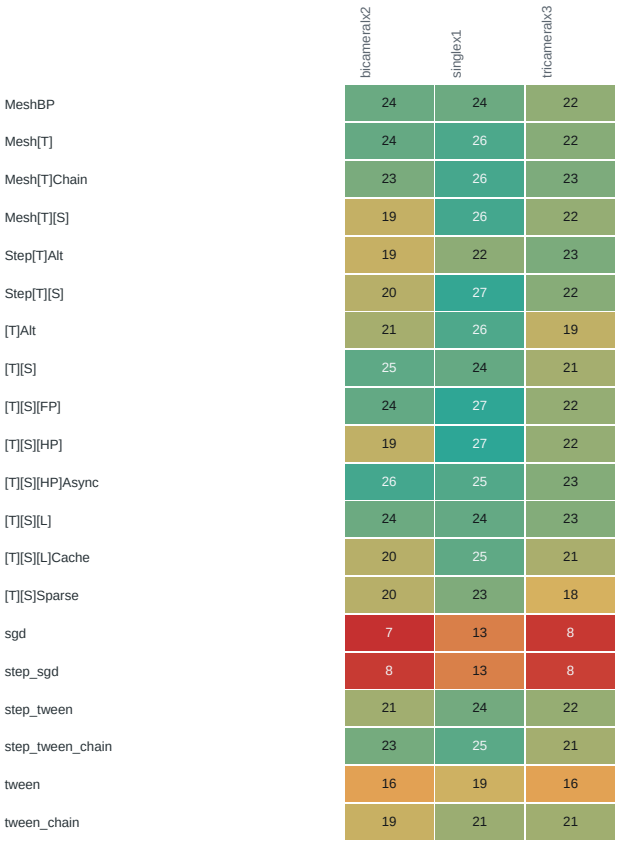
Mean Score, every mode x arch

Mean Score, every mode x arch



Mean hard Acc, every mode x arch

Mean hard Acc, every mode x arch



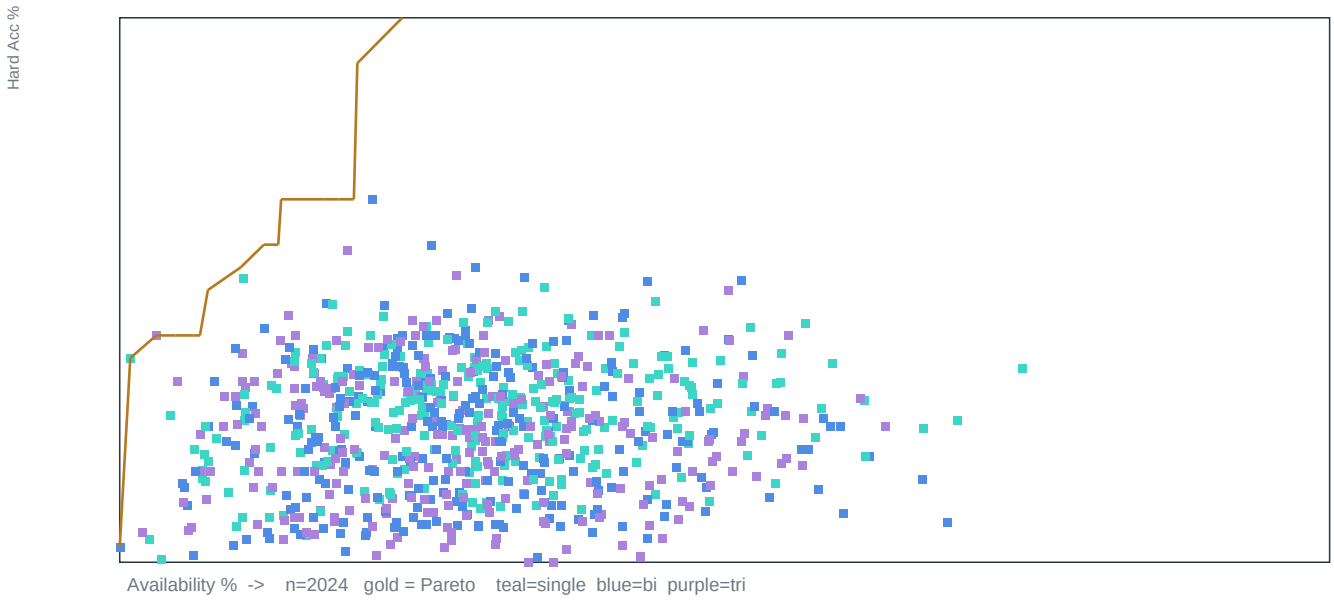
	bicamerax2	single×1	tricamerax3
MeshBP	24	24	22
Mesh[T]	24	26	22
Mesh[T]Chain	23	26	23
Mesh[T][S]	19	26	22
Step[T]Alt	19	22	23
Step[T][S]	20	27	22
[T]Alt	21	26	19
[T][S]	25	24	21
[T][S][FP]	24	27	22
[T][S][HP]	19	27	22
[T][S][HP]Async	26	25	23
[T][S][L]	24	24	23
[T][S][L]Cache	20	25	21
[T][S]Sparse	20	23	18
sgd	7	13	8
step_sgd	8	13	8
step_tween	21	24	22
step_tween_chain	23	25	21
tween	16	19	16
tween_chain	19	21	21

Mean Avail, every mode x arch

Mean Avail, every mode x arch

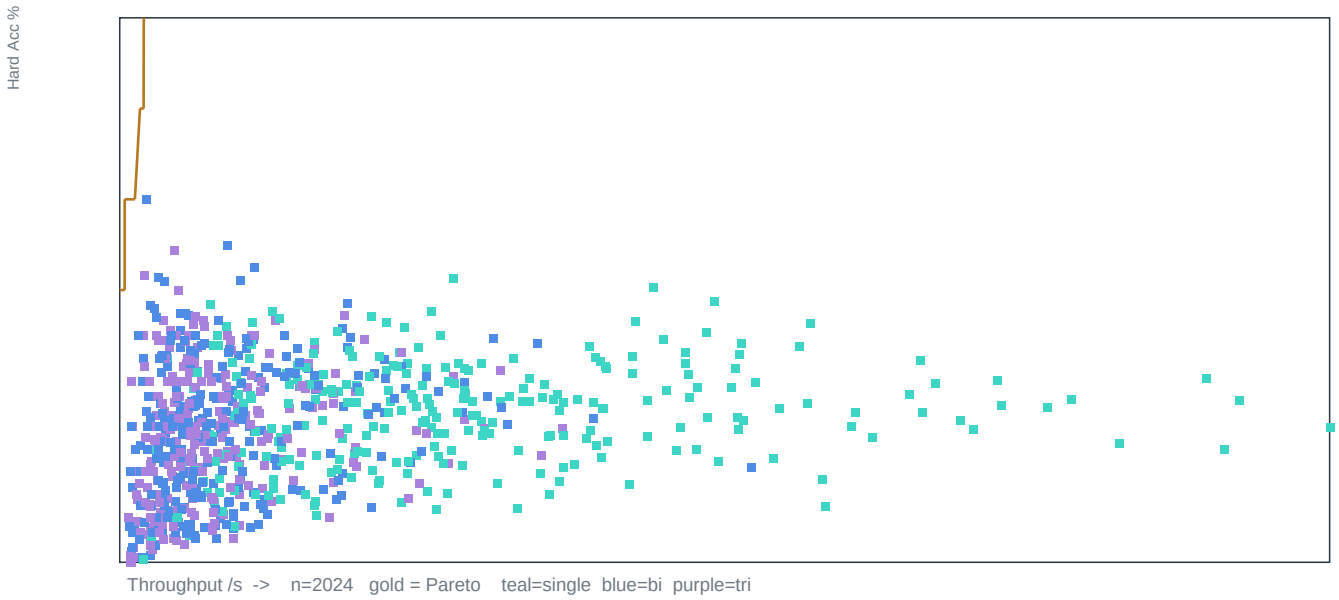
	bicameralx2	singlex1	tricameralx3
MeshBP	14	14	14
Mesh[T]	12	13	13
Mesh[T]Chain	15	15	14
Mesh[T][S]	20	17	19
Step[T]Alt	9	8	9
Step[T][S]	15	14	15
[T]Alt	10	9	10
[T][S]	21	17	19
[T][S][FP]	19	16	20
[T][S][HP]	19	16	19
[T][S][HP]Async	21	20	20
[T][S][L]	14	13	16
[T][S][L]Cache	20	16	21
[T][S]Sparse	24	17	25
sgd	13	17	14
step_sgd	11	12	11
step_tween	12	10	10
step_tween_chain	12	12	11
tween	12	12	13
tween_chain	13	13	13

Pillars - Availability vs hard Acc

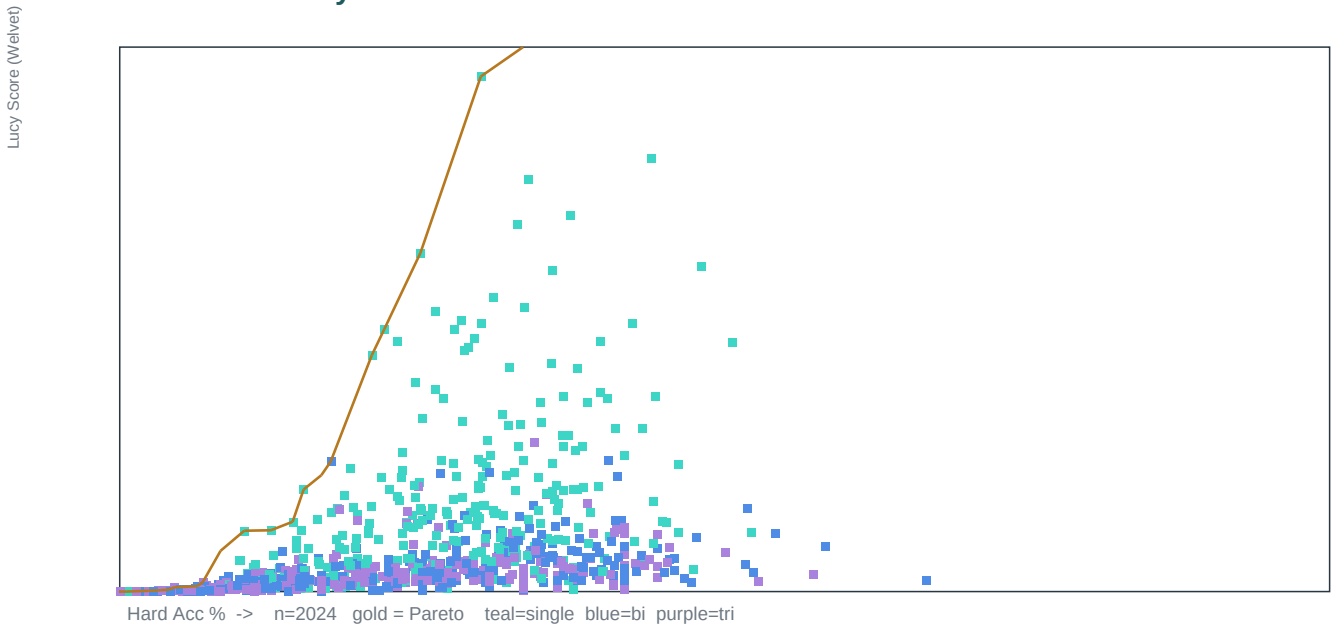


Pillars - Throughput vs hard Acc

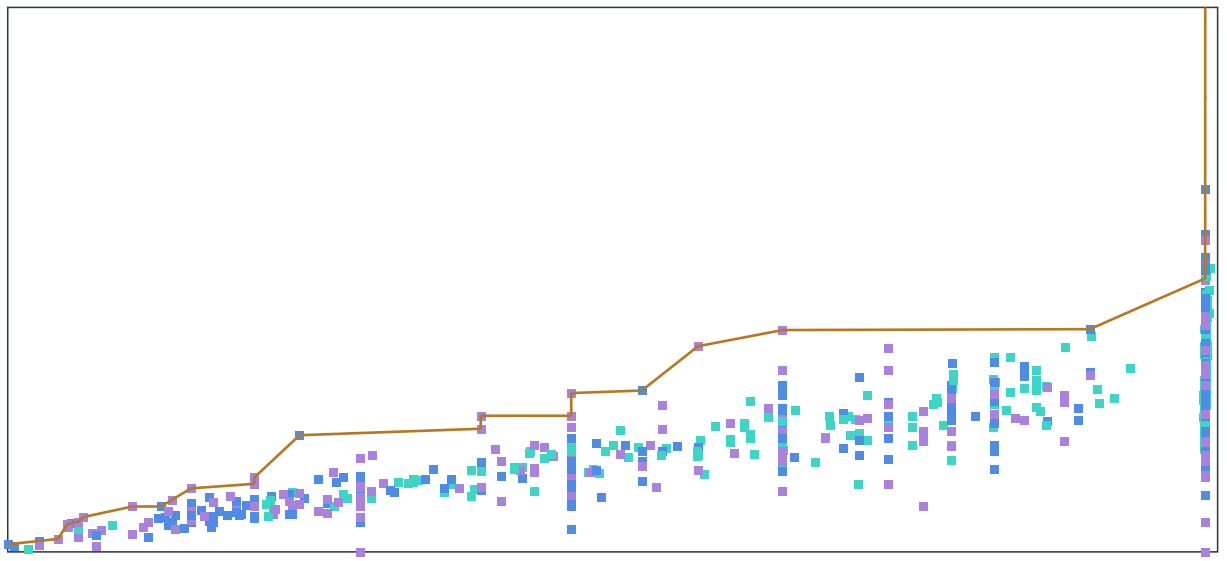
Pillars - Throughput vs hard Acc



Pareto - hard Acc vs Lucy Score

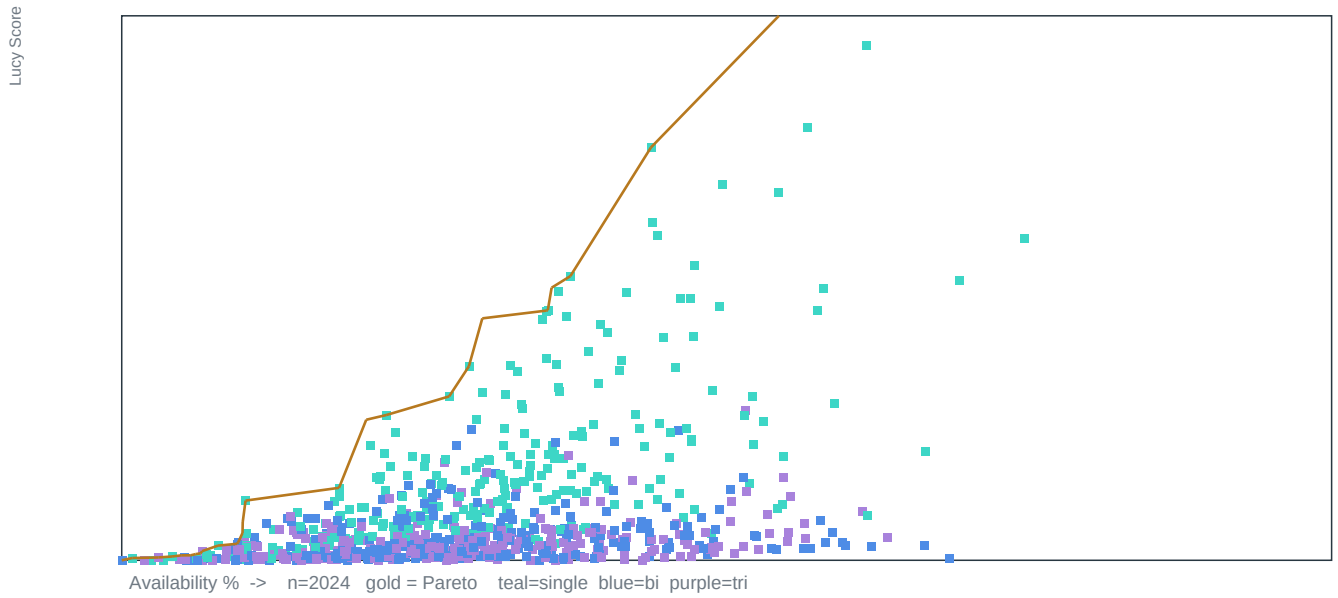


SoftAcc (serve-confidence) vs hard Acc

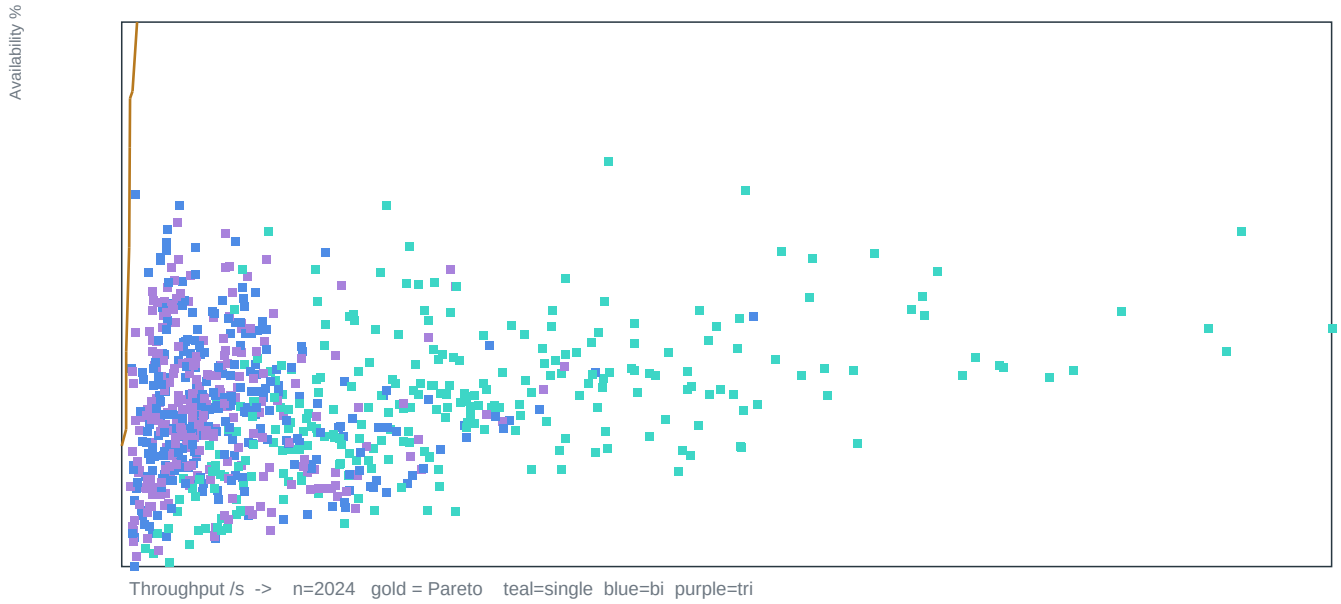



SoftAcc % -> n=2024 gold = Pareto teal=single blue=bi purple=tri
Hard Acc %

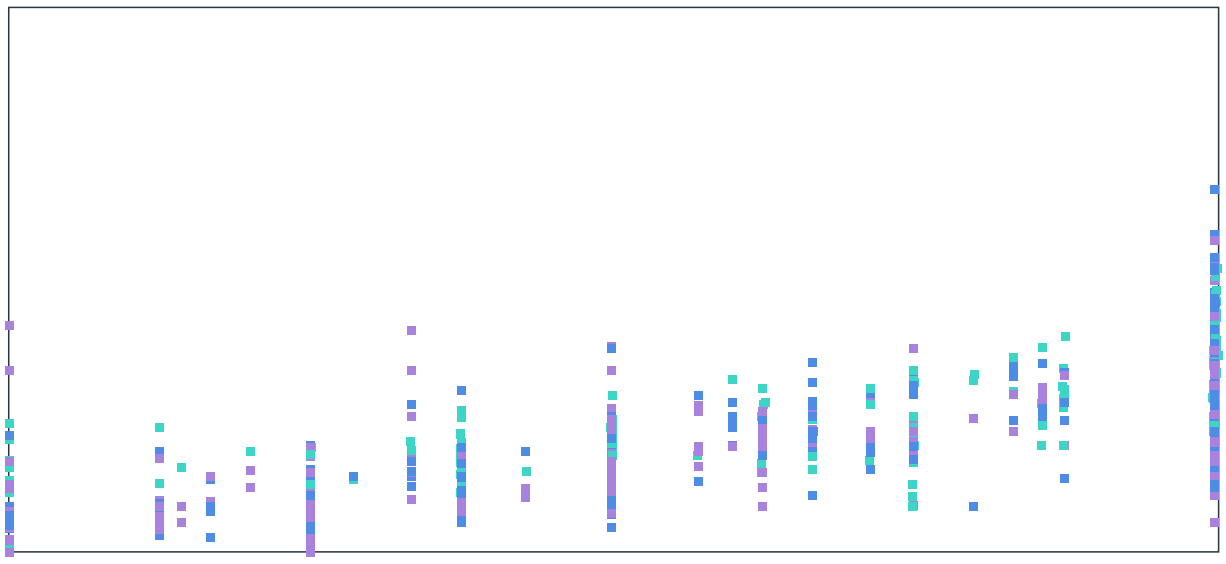
Avail vs Lucy Score (duty clock)



Pillars - Throughput vs Availability



AdaptPct vs hard Acc



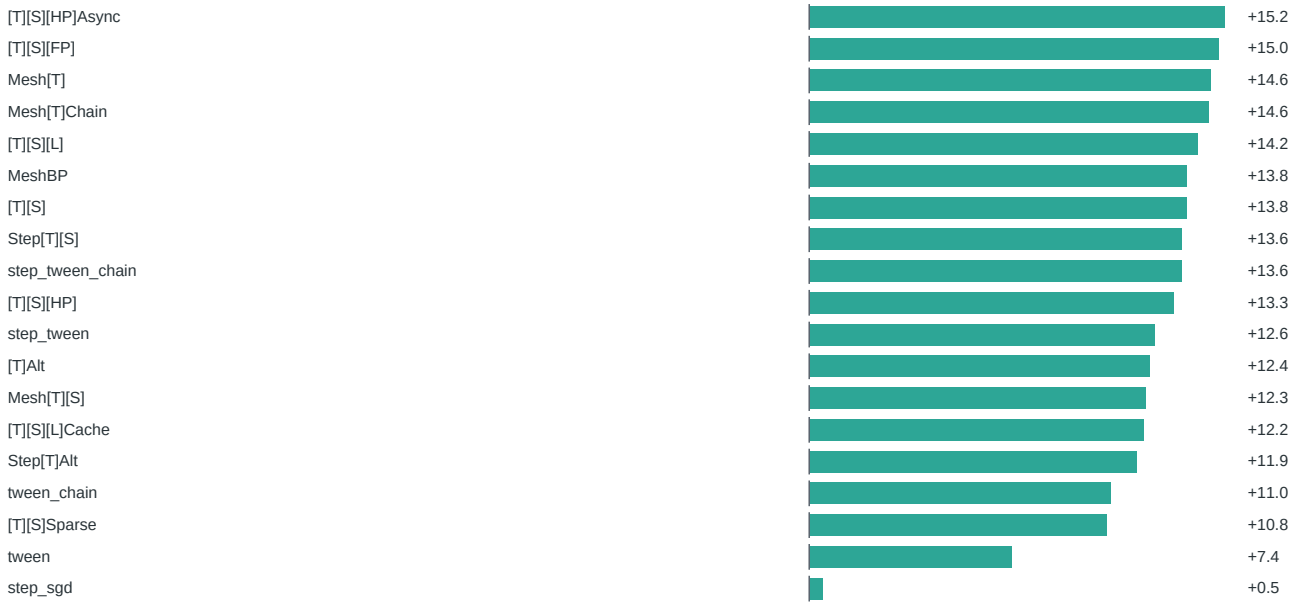

AdaptPct % -> n=2024 gold = Pareto teal=single blue=bi purple=tri
Hard Acc %

vs sgd - matched dtype x format x arch

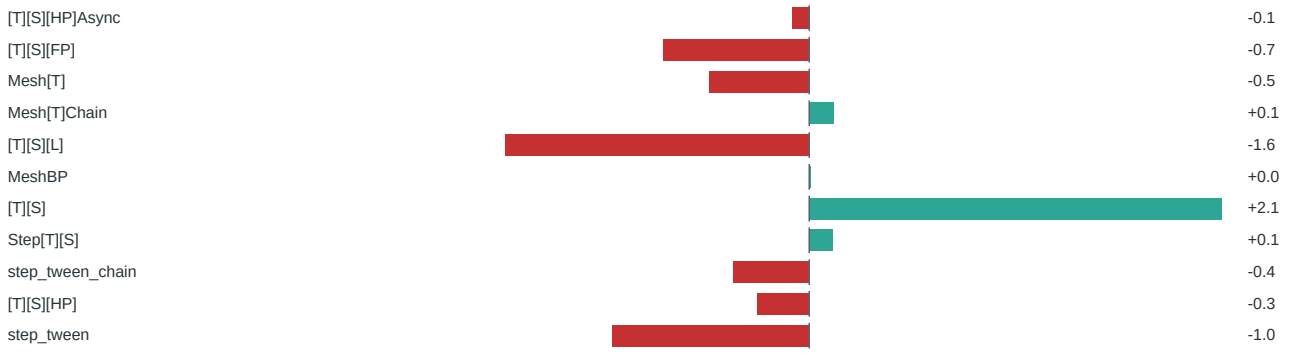
AccDelta is the honest column. ScoreDelta is usually Availability (duty clock), not a better chain rule. Acc win = AccDelta > 0.5. Score win = ScoreDelta > 1. Baseline is discovered from the board, not a frozen StepBP list.

mode	n	AccD	Acc win%	SoftD	AvailD	ThruD	ScoreD	Score win%
[T][S][HP]Async	102	+15.2	82	+15.5	+5.3	-61	-0.1	35
[T][S][FP]	102	+15.0	87	+15.5	+3.7	-70	-0.7	28
Mesh[T]	102	+14.6	96	+14.7	-2.4	-47	-0.5	24
Mesh[T]Chain	102	+14.6	82	+15.2	-0.2	-38	+0.1	34
[T][S][L]	102	+14.2	76	+15.5	-0.7	-77	-1.6	9
MeshBP	102	+13.8	93	+14.5	-0.8	-32	+0.0	35
[T][S]	102	+13.8	80	+15.5	+3.9	+1	+2.1	58
Step[T][S]	102	+13.6	80	+15.5	-0.2	-37	+0.1	33
step_tween_chain	102	+13.6	96	+14.3	-3.3	-41	-0.4	18
[T][S][HP]	102	+13.3	84	+15.5	+3.5	-54	-0.3	32
step_tween	102	+12.6	92	+12.6	-4.5	-47	-1.0	18
[T]Alt	102	+12.4	76	+15.5	-5.0	-72	-1.8	5
Mesh[T][S]	86	+12.3	84	+14.9	+3.6	-94	-1.7	6
[T][S][L]Cache	102	+12.2	75	+15.5	+4.1	-73	-1.1	21
Step[T]Alt	102	+11.9	75	+15.5	-6.3	-83	-2.1	0
tween_chain	102	+11.0	91	+11.3	-1.8	-29	+0.0	30
[T][S]Sparse	102	+10.8	78	+15.5	+7.3	-68	-0.6	24
tween	102	+7.4	86	+7.9	-2.2	-23	-0.2	27
step_sgd	102	+0.5	49	+0.4	-3.7	-33	-1.0	9

mean AccD vs sgd



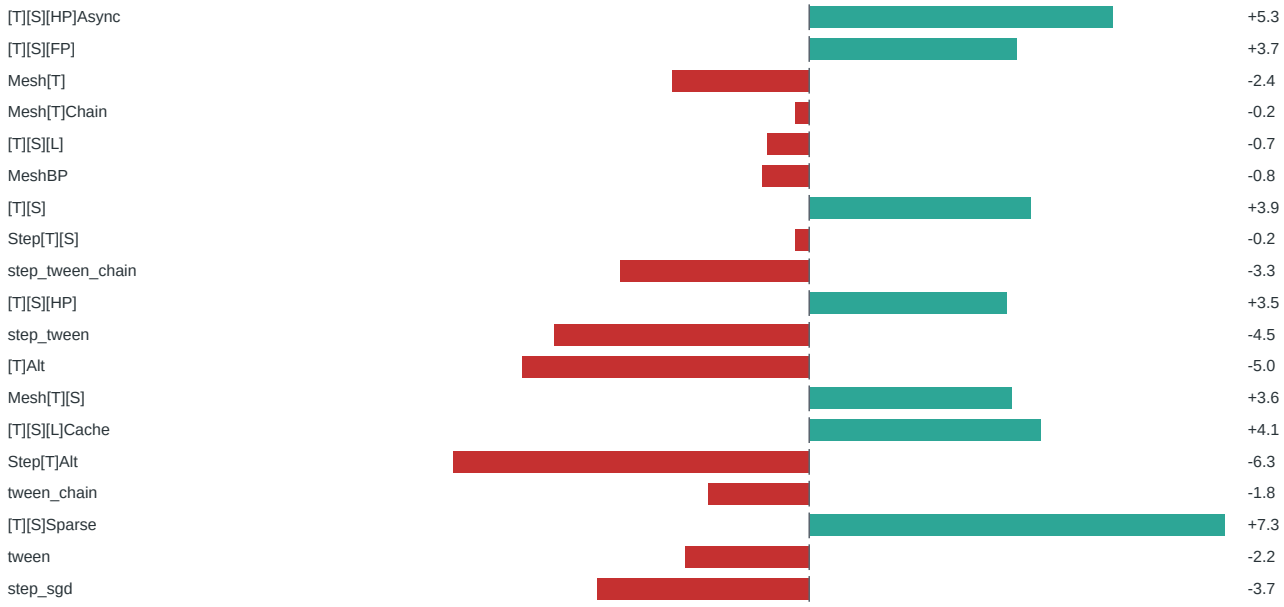
mean ScoreD vs sgd (duty clock)



[T]Alt



mean AvailD vs sgd



AccD vs sgd, every mode x dtype (cols 1-12)

AccD vs sgd, every mode x dtype (cols 1-12)

	bfloat16	binary	complex128	complex64	float16	float32	float64	fp4	fp6	fp8e4m3	fp8e5m2	int
MeshBP	+14	+25	+7	+14	+14	+11	+11	+14	+12	+13	+12	+20
Mesh[T]	+18	+22	+17	+19	+8	+13	+7	+19	+7	+17	+19	+17
Mesh[T]Chain	+10	+10	+16	+13	+24	+15	+17	+28	-1	+25	+28	+12
Mesh[T][S]	+5	+13	+15	+12	+6	+10	+18	+20	-2	+15	+18	+20
Step[T]Alt	+10	+11	+13	+13	+12	+14	+1	+13	-2	+21	+19	+18
Step[T][S]	+8	+25	+14	+31	+27	+6	+23	+12	-4	+21	+21	+32
[T]Alt	+8	+9	+22	+17	+16	+11	+4	+11	+1	+25	+9	+18
[T][S]	+2	+4	+19	+9	+15	+14	+5	+18	+1	+25	+20	+26
[T][S][FP]	+16	+20	+17	+29	+11	+14	+13	+18	+9	+25	+15	+31
[T][S][HP]	+13	+18	+1	+19	+12	+18	+7	+31	+9	+16	+17	+24
[T][S][HP]Async	+10	+12	+21	+26	+9	+7	+23	+14	+30	+24	+34	+26
[T][S][L]	+16	+26	+17	+29	+8	+12	+12	+20	+7	+11	+22	+14
[T][S][L]Cache	+10	+8	+17	+25	+10	+16	+13	+15	+5	+29	+17	+7
[T][S]Sparse	+9	+14	+18	+12	+7	+17	+12	+20	+1	+11	+14	+14
step_sgd	-1	+4	+0	+3	-3	+6	+0	+5	-4	+6	-4	+3
step_tween	+7	+13	+11	+26	+10	+10	+7	+16	+11	+15	+11	+10
step_tween_chain	+11	+16	+10	+18	+12	+12	+14	+18	+10	+18	+13	+16
tween	+6	+5	+4	+18	+4	+11	+9	+9	+3	+11	+9	+7
tween_chain	+7	+14	+11	+20	+12	+11	+4	+16	+10	+14	+9	+15

AccD vs sgd, every mode x dtype (cols 13-24)

AccD vs sgd, every mode x dtype (cols 13-24)

	int16	int2	int3	int32	int4	int5	int6	int64	int8	nf4	ternary	uint
MeshBP	+12	+13	+17	+8	+14	+22	+13	+20	+4	+13	+4	+24
Mesh[T]	+14	+10	+13	+12	+12	+16	+8	+17	+4	+16	+7	+10
Mesh[T]Chain	+13	+10	+22	+4	+1	+18	+6	+22	+10	+12	+2	+25
Mesh[T][S]	-4	+12	+20	+8	+14	+11	+6	+17	+14	+16	+7	+23
Step[T]Alt	+23	+16	+8	+31	+9	-4	+5	+14	-3	+9	+16	+2
Step[T][S]	+13	+6	+24	+13	+9	+6	+5	+24	+9	+9	+3	+12
[T]Alt	+17	+15	+14	+0	+15	+8	+5	+20	+4	+9	+5	+17
[T][S]	+17	+18	+12	+14	+6	+4	-1	+14	+6	+5	+15	+18
[T][S][FP]	+17	+14	+12	+20	+18	+4	+3	+20	+11	+14	+13	+21
[T][S][HP]	+11	+10	+15	+6	+19	+6	+6	+19	+6	+15	-0	+8
[T][S][HP]Async	+14	+12	+26	+7	+13	+8	+9	+16	+7	+7	+1	+22
[T][S][L]	+9	+11	+36	+4	+14	+0	+5	+13	+1	+32	+7	+2
[T][S][L]Cache	+11	+3	+35	+16	+1	+0	+13	+19	-1	+5	+9	+17
[T][S]Sparse	+18	+12	+12	+11	+17	+0	-1	+16	-1	+5	+4	+16
step_sgd	-1	-2	+4	-2	+1	-2	+1	+3	-2	+0	-5	-0
step_tween	+19	+15	+17	+12	+10	+6	+13	+9	+12	+15	+5	+17
step_tween_chain	+12	+12	+26	+7	+14	+11	+10	+19	+12	+13	+4	+13
tween	+7	+12	+8	+4	+5	+4	+6	+12	+5	+3	-1	+6
tween_chain	+11	+12	+14	+9	+8	+2	+13	+12	+12	+7	+4	+16

AccD vs sgd, every mode x dtype (cols 25-34)

AccD vs sgd, every mode x dtype (cols 25-34)

	uint16	uint2	uint3	uint32	uint4	uint5	uint6	uint64	uint8	uintptr
MeshBP	+17	+16	+10	+21	+15	+12	+5	+17	+13	+11
Mesh[T]	+14	+15	+20	+16	+16	+22	+20	+11	+12	+28
Mesh[T]Chain	+7	+18	+16	+16	+17	+23	+0	+16	+15	+24
Mesh[T][S]	+2	+32	+14	+13	+18	+4	+4	+12	+12	+20
Step[T]Alt	+18	+17	+5	+18	+20	+23	-0	+11	+10	+16
Step[T][S]	+10	+17	+11	+26	+14	+2	-0	+11	+16	+6
[T]Alt	+12	-4	+15	+3	+22	+4	+27	+9	+19	+37
[T][S]	+18	+25	+11	+16	+17	+16	+10	+28	+11	+27
[T][S][FP]	+6	+14	+15	+18	+10	+25	+6	+5	+9	+14
[T][S][HP]	+18	+22	+10	+3	+35	+4	+2	+24	+17	+13
[T][S][HP]Async	+5	+17	+11	+8	+15	+25	+4	+31	+9	+15
[T][S][L]	+25	+19	+24	+3	+12	+30	-7	+23	+23	+4
[T][S][L]Cache	+14	+2	+13	+21	+10	+20	+4	+13	+10	+8
[T][S]Sparse	+18	+27	+15	+2	+23	-0	+2	+11	+14	+2
step_sgd	-3	+1	-0	+0	-1	-0	+1	+3	+5	+1
step_tween	+15	+17	+13	+19	+14	+12	+4	+14	+17	+4
step_tween_chain	+17	+9	+15	+13	+20	+8	+15	+18	+14	+11
tween	+11	+5	+15	+10	+16	+3	+7	+1	+11	+7
tween_chain	+13	+16	+11	+9	+9	+14	+3	+11	+10	+15

ScoreD vs sgd, every mode x dtype (cols 1-12)

ScoreD vs sgd, every mode x dtype (cols 1-12)

	bfloat16	binary	complex128	complex64	float16	float32	float64	fp4	fp6	fp8e4m3	fp8e5m2	int
MeshBP	-5	+0	-0	+2	-2	+1	-0	+2	-1	+1	+3	+2
Mesh[T]	-6	+6	-1	+1	-1	+0	-0	+4	-2	+1	+1	+2
Mesh[T]Chain	-8	+1	+2	+1	+2	+3	-1	+2	-2	+2	+3	+0
Mesh[T][S]	-7	-1	-1	+0	-1	-3	-2	-0	-3	+0	-0	+1
Step[T]Alt	-9	-2	-1	+0	-2	-4	-3	-1	-2	-0	-1	-0
Step[T][S]	-8	+4	+0	+3	-0	+1	+5	-0	-2	+1	+3	+4
[T]Alt	-9	-2	-0	+1	-2	-4	-2	-1	-1	+1	-1	-0
[T][S]	-3	+3	+4	+4	+1	+11	+1	+2	-1	+7	+3	+5
[T][S][FP]	-6	+4	+1	+2	-1	-1	-2	+0	-1	+2	+0	+1
[T][S][HP]	-6	+1	-0	+2	+1	-0	-0	+2	-1	+2	+1	+1
[T][S][HP]Async	-7	+0	+1	+2	+0	+0	+2	-0	+0	+3	+4	+1
[T][S][L]	-9	-0	+0	+1	-2	-3	-1	+0	-2	+1	+0	-0
[T][S][L]Cache	-8	+1	+0	+2	-1	-3	-1	-1	-1	+2	+1	+0
[T][S]Sparse	-6	+2	-0	+0	-1	+2	+1	+1	-2	+1	+1	+0
step_sgd	-5	-1	-0	-0	-2	+1	-1	+3	-2	+1	-1	+0
step_tween	-9	+0	+0	+1	-2	-2	+0	-1	-1	+1	+0	+0
step_tween_chain	-8	+6	-1	+0	-0	+4	-2	-0	-1	+2	+2	+1
tween	-5	+1	-0	+3	-2	+6	+0	+3	-1	+1	+1	+0
tween_chain	-8	+3	+1	+2	+1	+4	-0	-0	-0	+1	+2	+1

ScoreD vs sgd, every mode x dtype (cols 13-24)

ScoreD vs sgd, every mode x dtype (cols 13-24)

	int16	int2	int3	int32	int4	int5	int6	int64	int8	nf4	ternary	uint
MeshBP	+2	-2	+1	-4	+0	+0	+1	-2	-3	-0	-3	+1
Mesh[T]	-0	-1	+2	-4	-1	-1	+1	-3	-5	-1	-6	+0
Mesh[T]Chain	-1	+1	+1	-3	-2	-1	+0	-1	+2	-1	-4	+3
Mesh[T][S]	-1	-1	-0	-5	-4	-2	-0	-3	-4	-2	-8	+0
Step[T]Alt	-1	-2	-0	-5	-4	-2	-0	-4	-5	-2	-8	-1
Step[T][S]	+1	-1	+1	-1	-1	-1	+0	-2	-2	-1	-4	+0
[T]Alt	-1	-2	-0	-5	-4	-1	+0	-3	-5	-2	-7	-1
[T][S]	+6	+5	+2	-2	+1	-2	+0	+1	-1	+0	-2	+3
[T][S][FP]	-0	-2	+1	-3	-3	-1	+0	-2	-3	-1	-5	+1
[T][S][HP]	-0	+1	+1	-4	+1	-1	+0	+0	-2	-0	-6	+1
[T][S][HP]Async	+1	+0	+1	-4	-3	-1	+1	-1	-3	-1	-6	+0
[T][S][L]	-0	-3	+1	-4	-4	-2	-0	-4	-5	+0	-7	-1
[T][S][L]Cache	-1	-2	+2	-3	-3	-2	+1	-3	-5	-2	-7	+0
[T][S]Sparse	+1	+1	+0	-3	-1	-2	-0	-2	-3	-2	-5	-0
step_sgd	-1	+1	+0	-4	-1	-2	+0	-4	-4	-1	-4	+1
step_tween	+0	+0	+1	-4	-3	-1	+0	-4	-1	-2	-6	-0
step_tween_chain	+1	-1	+1	-4	-2	-1	+0	-1	-2	-1	-4	-1
tween	-1	+2	+1	-4	-0	-1	+1	-2	-0	-2	-5	+0
tween_chain	+1	-1	+3	-3	-1	-1	+1	-3	+1	-2	-5	+1

ScoreD vs sgd, every mode x dtype (cols 25-34)

ScoreD vs sgd, every mode x dtype (cols 25-34)

	uint16	uint2	uint3	uint32	uint4	uint5	uint6	uint64	uint8	uintptr
MeshBP	+4	-0	-0	+1	+2	+0	-0	-2	+3	-0
Mesh[T]	-0	+0	-1	-1	-0	-0	-0	-4	+2	-0
Mesh[T]Chain	-0	+3	-0	+1	+2	+1	-1	-3	+2	+2
Mesh[T][S]	-1	-0	-1	-1	-0	-1	-1	-3	+1	-1
Step[T]Alt	-1	-1	-1	-1	-1	-0	-1	-4	-1	-1
Step[T][S]	+0	+0	+1	+6	+1	-0	-0	-4	+3	-0
[T]Alt	-1	-1	-1	-1	-1	-0	-1	-5	-0	-0
[T][S]	+5	+3	+1	+2	+4	+1	+1	+2	+4	+3
[T][S][FP]	-0	+0	-0	-0	-1	+0	+0	-4	+1	-1
[T][S][HP]	+1	+0	-0	-1	+0	-0	-0	-3	+2	+0
[T][S][HP]Async	+0	+1	-0	+1	+1	+1	-0	-1	+2	+0
[T][S][L]	+0	-1	-0	-1	-1	+0	-1	-4	-0	-1
[T][S][L]Cache	+0	-1	-1	+0	-1	+1	-1	-4	+1	-1
[T][S]Sparse	-0	+1	-0	-1	+0	-1	-1	-3	+1	-1
step_sgd	-1	-1	-1	-1	-1	-1	-1	-4	+1	-1
step_tween	+0	-1	-0	-0	+1	-0	-1	-3	+2	-1
step_tween_chain	-0	-1	-0	-0	+2	-1	-1	-3	+1	+0
tween	+2	-1	+1	+1	+2	-0	-1	-5	+1	+0
tween_chain	+1	+1	-0	-0	+1	+0	-1	-1	+2	+1

AvailD vs sgd, every mode x dtype (cols 1-12)

AvailD vs sgd, every mode x dtype (cols 1-12)

	bfloat16	binary	complex128	complex64	float16	float32	float64	fp4	fp6	fp8e4m3	fp8e5m2	int
MeshBP	-4	-2	-3	+1	-4	-5	+2	-1	+3	-3	+1	-1
Mesh[T]	-5	+3	-5	-0	-1	-5	-2	+0	-1	-1	-3	+0
Mesh[T]Chain	-7	-0	-2	-0	+3	+1	-4	-2	+3	+0	+4	-2
Mesh[T][S]	+2	+1	+1	+4	+5	+0	-0	+1	+9	+4	+3	+11
Step[T]Alt	-12	-6	-10	-3	-5	-7	-10	-5	-1	-6	-6	-6
Step[T][S]	-6	+1	-5	+3	-2	+1	-1	-2	+6	-0	-1	+2
[T]Alt	-8	-6	-8	-3	-4	-9	-7	-5	+2	-1	-6	-5
[T][S]	+5	+4	+0	+9	+6	+2	-0	+0	+7	+7	+3	+8
[T][S][FP]	+4	+5	+3	+8	+5	-1	-2	+1	+14	+5	+3	+3
[T][S][HP]	+3	+2	-1	+8	+9	+3	-0	+3	+12	+6	+2	+4
[T][S][HP]Async	+3	+3	+2	+7	+11	-1	+1	+2	+15	+9	+6	+7
[T][S][L]	-4	-3	-2	+1	+2	-6	-0	+0	+7	+2	-1	-4
[T][S][L]Cache	-0	+4	+2	+11	+3	-2	-0	+1	+12	+3	+5	+7
[T][S]Sparse	+5	+8	+3	+7	+7	+7	+7	+7	+10	+8	+7	+7
step_sgd	-5	-4	-9	-3	-0	-4	-7	+1	-1	-2	-9	-3
step_tween	-9	-4	-10	-0	-8	-6	-8	-6	+5	-2	-1	-5
step_tween_chain	-8	+2	-9	-4	-1	-2	-9	-7	+6	+0	-2	-2
tween	-3	-3	-5	+5	-5	-1	-3	-3	+2	+1	-2	-4
tween_chain	-6	+1	-6	+2	-2	+0	-7	-4	+7	-0	-0	-1

AvailD vs sgd, every mode x dtype (cols 13-24)

AvailD vs sgd, every mode x dtype (cols 13-24)

	int16	int2	int3	int32	int4	int5	int6	int64	int8	nf4	ternary	uint
MeshBP	+1	-5	+3	-7	+2	+1	+2	+1	-3	-5	-1	-4
Mesh[T]	-8	-5	+7	-10	-2	-1	-1	-1	-10	-6	-5	-0
Mesh[T]Chain	-6	-1	+5	-5	+3	+0	+4	+5	-2	-3	-4	+0
Mesh[T][S]	+2	+4	-0	-3	+2	+3	+8	+5	-1	+2	+0	+5
Step[T]Alt	-10	-7	-4	-10	-6	-6	-8	-4	-8	-8	-9	-8
Step[T][S]	+1	-5	+3	-2	+2	+2	+0	-0	-7	-5	-1	-2
[T]Alt	-7	-8	-2	-10	-6	-2	-4	-1	-8	-7	-6	-6
[T][S]	+4	-2	+8	-4	+3	+3	+5	+10	-2	+0	-1	+5
[T][S][FP]	+1	-2	+9	-1	+0	+5	+11	+10	-4	+5	-1	+4
[T][S][HP]	+2	+3	+6	-0	+4	+6	+4	+8	-2	+2	-2	+6
[T][S][HP]Async	+5	+2	+10	+2	+0	+11	+4	+13	-1	-1	-1	+2
[T][S][L]	-2	-6	+2	-2	-3	+5	+6	+1	-8	-0	-5	+2
[T][S][L]Cache	+1	-2	+13	+2	+3	+7	+9	+7	-5	+2	-3	+2
[T][S]Sparse	+2	+9	+14	+4	+7	+12	+8	+13	+5	+6	+4	+4
step_sgd	-7	-4	-0	-5	-1	-6	+2	-0	-6	-5	-5	-2
step_tween	-7	-6	-0	-13	-2	-3	-3	-2	-5	-7	-6	-6
step_tween_chain	-5	-4	-1	-6	-4	+1	-4	+2	-4	-4	-3	-6
tween	-8	-3	+2	-9	+1	+1	-2	+1	-8	-7	-4	-5
tween_chain	-5	-5	+3	-9	+1	+1	-1	-1	-4	-4	-4	-2

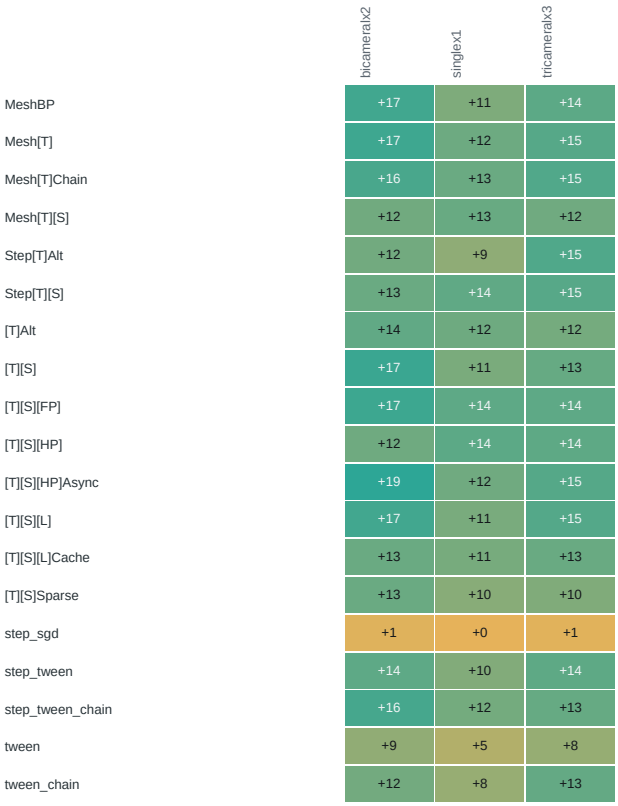
AvailD vs sgd, every mode x dtype (cols 25-34)

AvailD vs sgd, every mode x dtype (cols 25-34)

	uint16	uint2	uint3	uint32	uint4	uint5	uint6	uint64	uint8	uintptr
MeshBP	+7	+5	-2	-3	+1	-3	+1	-5	+1	-2
Mesh[T]	+0	+1	-5	-5	-3	-3	+0	-6	-0	-2
Mesh[T]Chain	-1	+7	-5	+0	+1	+1	+1	-5	-0	+4
Mesh[T][S]	+4	+5	+7	+5	+6	+2	+4	+8	+7	+9
Step[T]Alt	-4	-5	-5	-3	-9	-4	-5	-7	-3	-5
Step[T][S]	+3	+3	+4	+5	-2	+2	+0	-5	-0	+1
[T]Alt	-3	+1	-4	-4	-8	-4	-7	-9	-3	-2
[T][S]	+8	+7	+7	+7	+3	+5	+8	+1	+3	+3
[T][S][FP]	+3	+9	+5	+1	+3	+1	+9	-1	+6	+2
[T][S][HP]	+4	+6	+8	-1	+0	+5	+6	-3	+1	+3
[T][S][HP]Async	+9	+13	+6	+5	+3	+7	+11	+4	+5	+7
[T][S][L]	+3	-1	-2	-0	-4	+4	+2	-4	-4	+2
[T][S][L]Cache	+11	+7	+4	+2	+3	+11	+9	-2	+7	+5
[T][S]Sparse	+2	+12	+11	+6	+6	+6	+9	+7	+9	+8
step_sgd	-5	-1	-9	-6	-7	-7	+1	-8	-1	-0
step_tween	-4	-3	-7	-6	+2	-3	-7	-5	-0	-6
step_tween_chain	-0	-4	-2	-8	-0	-7	-3	-4	-3	-4
tween	+0	-4	+3	-3	+1	-3	-2	-6	+0	+2
tween_chain	+3	+3	-4	-3	-4	+1	-2	-10	+1	+0

AccD vs sgd, every mode x arch

AccD vs sgd, every mode x arch



Family collapse - Step* vs non-Step

Step* is a 1D pipe (one sample enters layer 0 per tick; output is the sample that entered depth ticks ago). Non-Step of the same family is a full-chain update. AccD is a real scheduler split, not leftover warm-up forwards.

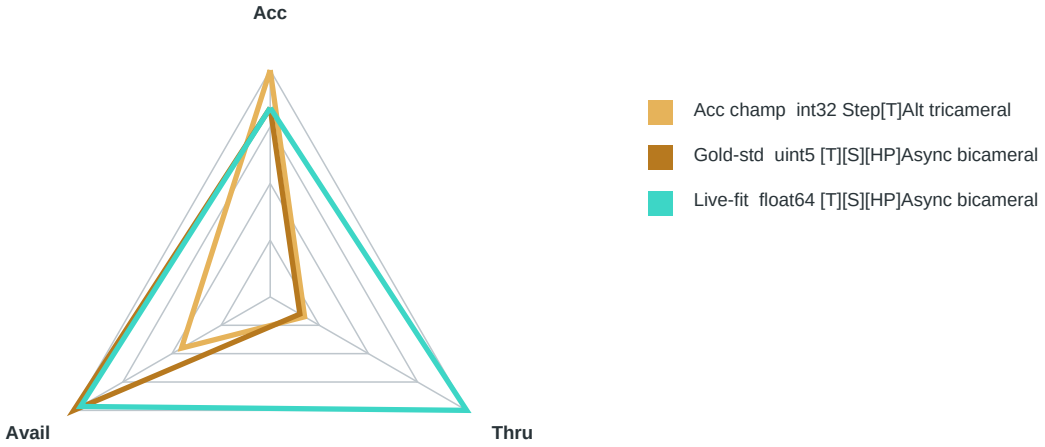
step	plain	n	mean |AccD|
Step[T]Alt	[T]Alt	102	14.94
Step[T][S]	[T][S]	102	13.44
step_sgd	sgd	102	4.35
step_tween	tween	102	7.88
step_tween_chain	tween_chain	102	7.36

Consciousness - Acc, Throughput, Availability

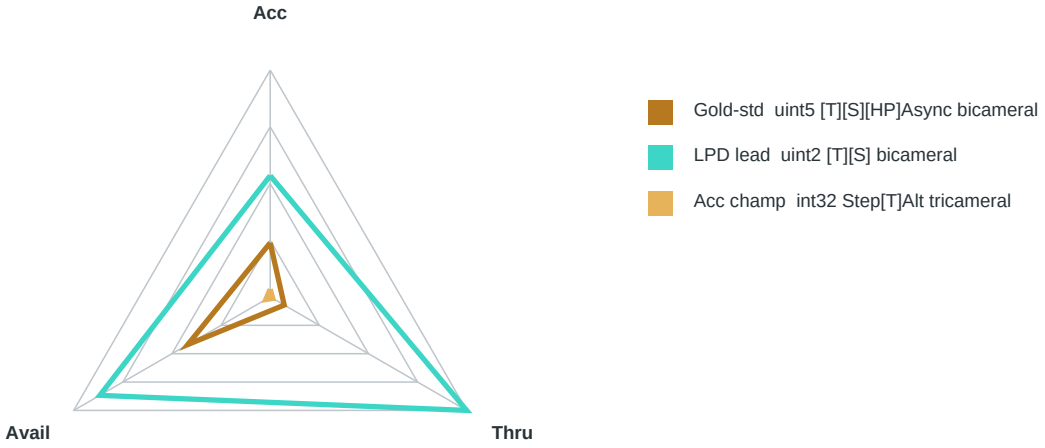
Synthetic organism / Lucy density: can the net run and train at the same time in a small box. Lucy Score = Throughput x Availability x Acc / 10,000 (hard Acc; SoftAcc is serve-confidence only). SGD that blocks serve dies on Availability. Q = geomean Acc/Thru/Avail vs learner peaks (traps do not set Thru/Avail). LPD = Q x shrink vs Acc-champ RAM; 0 unless Acc keep >=70%. Gold = all 3 pillars >=80% at <=20% Acc-champ RAM. Gold-std = Acc >=80% plus Thru or Avail, then smallest then fastest. Score/MiB is the binary trap.
Acc champ int32|none|Step[T]Alt|tricameral|simd Acc 75.0 Thru 12 Avail 10.3% 66.5 KiB (RAM reference)
Lucy Score champ (T x Avail x Acc) float32|none|[T][S]|single|simd Score 28.7 Acc 25.0 Soft 25 2.5 KiB
Live-fit champ (best Q) float64|none|[T][S][HP]Async|bicameral|simd Acc 62.5 Thru 69 Avail 22.0% 101.0 KiB
Gold-std (2+ pillars, Acc keep >= 80%, then smallest then fastest): uint5|none|[T][S][HP]Async|bicameral|simd mode [T][S][HP]Async Acc 62.5 Thru 10 7.9 KiB
Board fastest ternary|none|sgd|single|simd Thru 534 (traps may own this) Best availability int3|none|[T][S]Sparse|bicameral|simd 38.9%
Learner Thru peak 69 learner Avail peak 22.8%

Consciousness radar - Acc / Thru / Avail vs learner peaks

Consciousness radar - Acc / Thru / Avail vs learner peaks



Memory density radar - same pillars x shrink vs Acc champ (traps sit at origin)



No gold cell yet. Need all three pillars at 80% of learner peaks in one fifth of Acc-champ RAM.

Gold-standard train modes - 2+ pillars, Acc keep >= 80%, smallest then fastest

Mode	n	Acc	KiB	Thru	Cell
[T][S][HP]Async	3	62.5	7.9	69	uint5 [T][S][HP]Async bicameral / float64 [T][S][HP]Async bicameral
[T][S][FP]	1	62.5	16.6	28	fp8e4m3 [T][S][FP] tricameral

Near-gold - 2+ pillars, RAM <= 50% of Acc champ

Band	Cell	Acc%	Thru%	Avail%	Q%	RAM%	xSmall	LPD	Acc	Thru	KiB
near	uint5 [T][S][HP]Async bicameral	83	15	100	50	12	8.4	4.21	62.5	10	7.9
near	fp8e4m3 [T][S][FP] tricameral	83	41	95	69	25	4.0	2.75	62.5	28	16.6

Lucy density (LPD) - Q x shrink vs Acc-champ RAM; 0 if Acc keep < 70%

Band	Cell	Acc%	Thru%	Avail%	Q%	RAM%	xSmall	LPD	Acc	Thru	KiB
-	uint2 [T][S] bicameral	75	85	83	81	5	20.9	16.92	56.2	59	3.2
-	uint5 [T][S][L] single	78	26	63	50	1	32.0	16.14	58.3	18	0.4
acc	uint4 [T][S][HP] single	92	28	39	47	0	32.0	14.94	68.8	20	0.3

-	uint2 Mesh[T][S] bicameral	75	28	95	59	5	20.9	12.29	56.2	20	3.2
-	fp4 [T][S][HP] tricameral	75	52	98	72	12	8.0	5.79	56.2	36	8.3
acc	int3 [T][S][L] tricameral	83	17	69	47	9	10.7	4.96	62.5	12	6.2
near	uint5 [T][S][HP]Async bicameral	83	15	100	50	12	8.4	4.21	62.5	10	7.9
near	fp8e4m3 [T][S][FP] tricameral	83	41	95	69	25	4.0	2.75	62.5	28	16.6
acc	bfloat16 [T][S][L] bicameral	83	39	48	54	38	2.6	1.43	62.5	27	25.2
keep	float64 [T][S][HP]Async bicameral	83	100	97	93	152	0.7	0.61	62.5	69	101.0
acc	int32 Step[T]Alt tricameral	100	18	45	43	100	1.0	0.43	75.0	12	66.5
keep	uint [T][S][HP]Async tricameral	83	23	84	55	200	0.5	0.27	62.5	16	133.0
acc	uintptr [T]Alt tricameral	83	21	53	45	200	0.5	0.23	62.5	14	133.0
trap	int64 [T][S][HP] single	56	100	100	82	8	13.3	0.00	41.7	105	5.0
-	uint64 [T][S] bicameral	67	79	100	81	152	0.7	0.00	50.0	55	101.0
trap	fp8e5m2 [T][S][HP]Async single	58	100	90	81	1	32.0	0.00	43.8	106	0.6
trap	binary [T][S]Sparse bicameral	50	100	100	79	2	32.0	0.00	37.5	85	1.6
trap	uint32 Step[T][S] single	50	100	100	79	4	26.5	0.00	37.5	175	2.5
-	int [T][S] bicameral	50	100	100	79	152	0.7	0.00	37.5	73	101.0
-	float16 [T][S] bicameral	58	99	82	78	38	2.6	0.00	43.8	68	25.2

Consciousness rank - Q = geomean Acc/Thru/Avail keep

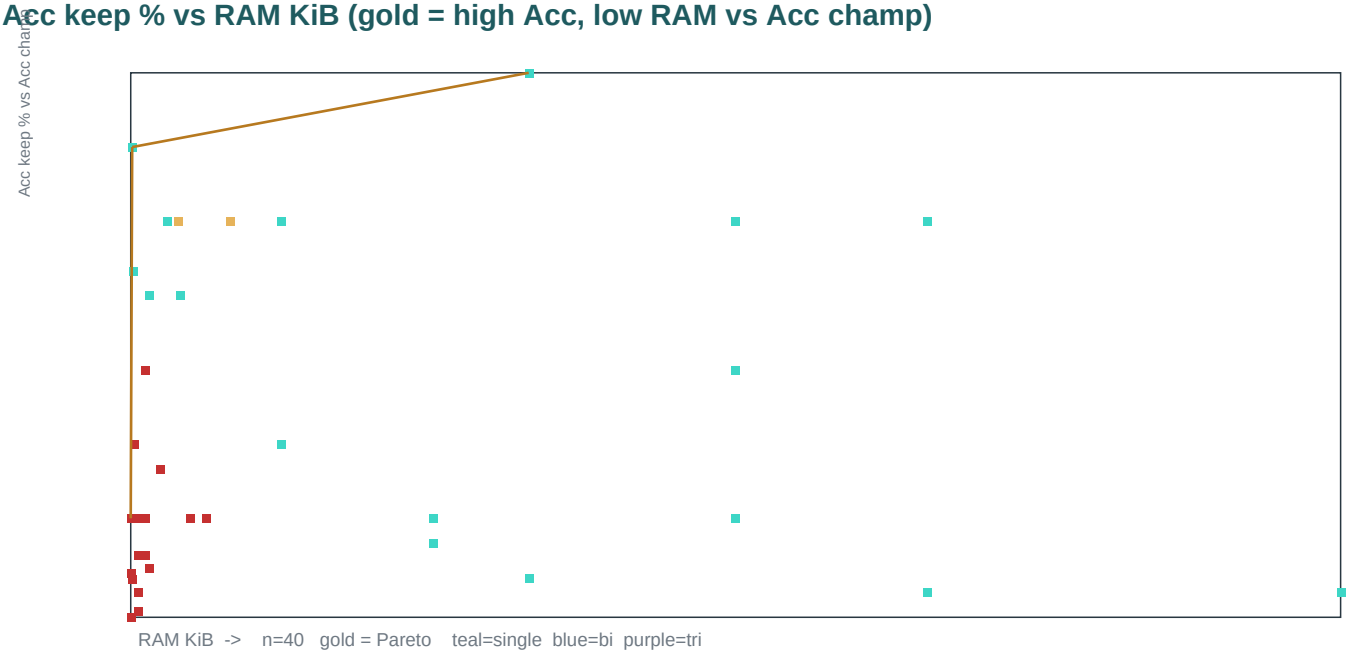
Band	Cell	Acc%	Thru%	Avail%	Q%	LPD	Thru	Avail
keep	float64 [T][S][HP]Async bicameral	83	100	97	93	0.61	69	22.0
-	uint2 [T][S] bicameral	75	85	83	81	16.92	59	19.0
-	fp4 [T][S][HP] tricameral	75	52	98	72	5.79	36	22.3
near	fp8e4m3 [T][S][FP] tricameral	83	41	95	69	2.75	28	21.8
-	uint2 Mesh[T][S] bicameral	75	28	95	59	12.29	20	21.7
keep	uint [T][S][HP]Async tricameral	83	23	84	55	0.27	16	19.2
acc	bfloat16 [T][S][L] bicameral	83	39	48	54	1.43	27	11.0
-	uint5 [T][S][L] single	78	26	63	50	16.14	18	14.3
near	uint5 [T][S][HP]Async bicameral	83	15	100	50	4.21	10	22.8
acc	uint4 [T][S][HP] single	92	28	39	47	14.94	20	8.9

Trap - tiny RAM, Acc keep < 70% (Score/MiB and SoftAcc Score lie here)

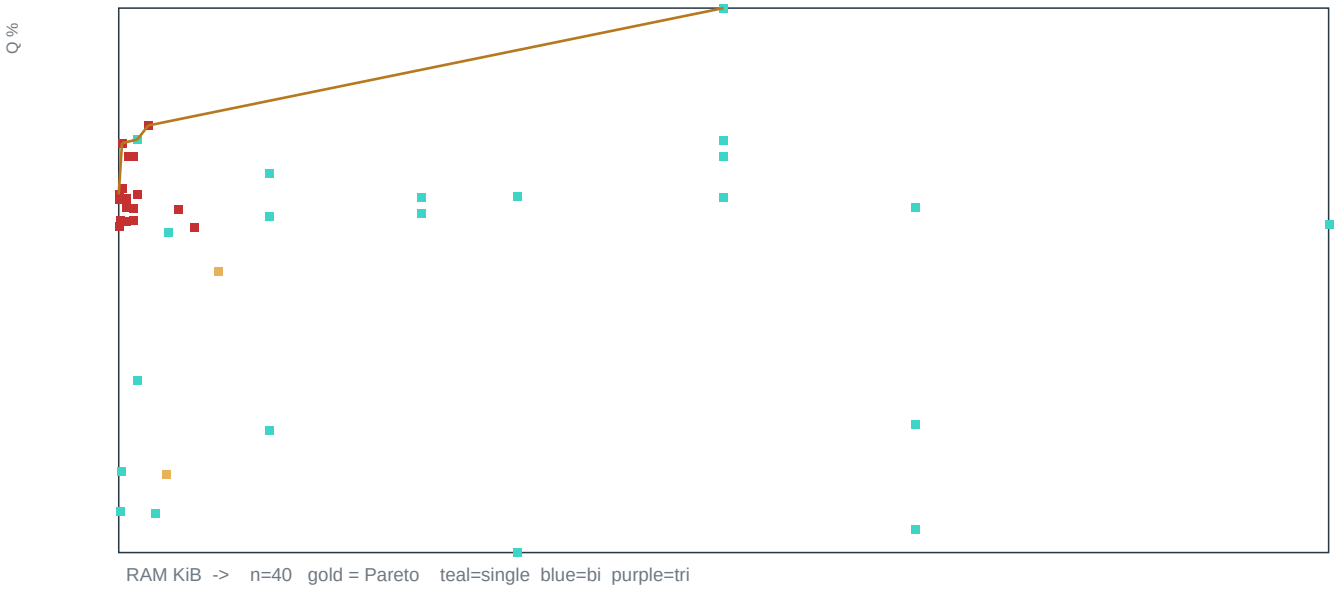
Band	Cell	Acc%	Thru%	Avail%	Q%	RAM%	xSmall	LPD	Acc	Thru	KiB
trap	binary sgd single	19	100	60	48	0	32.0	0.00	13.9	265	0.1
trap	binary step_sgd single	21	100	36	42	0	32.0	0.00	15.4	246	0.1
trap	binary tween single	28	100	44	49	0	32.0	0.00	20.7	325	0.1
trap	binary tween_chain single	28	100	64	57	0	32.0	0.00	21.3	410	0.1
trap	binary step_tween single	36	100	42	53	0	32.0	0.00	27.0	215	0.1
trap	binary step_tween_chain single	44	100	100	76	0	32.0	0.00	32.9	305	0.1
trap	binary MeshBP single	52	100	24	50	0	32.0	0.00	39.1	148	0.1
trap	binary Mesh[T] single	48	100	79	72	0	32.0	0.00	36.0	263	0.1
trap	binary Mesh[T]Chain single	31	100	67	59	0	32.0	0.00	22.9	199	0.1
trap	binary [T][S] single	22	100	88	58	0	32.0	0.00	16.7	369	0.1

Acc keep % vs RAM KiB (gold = high Acc, low RAM vs Acc champ)

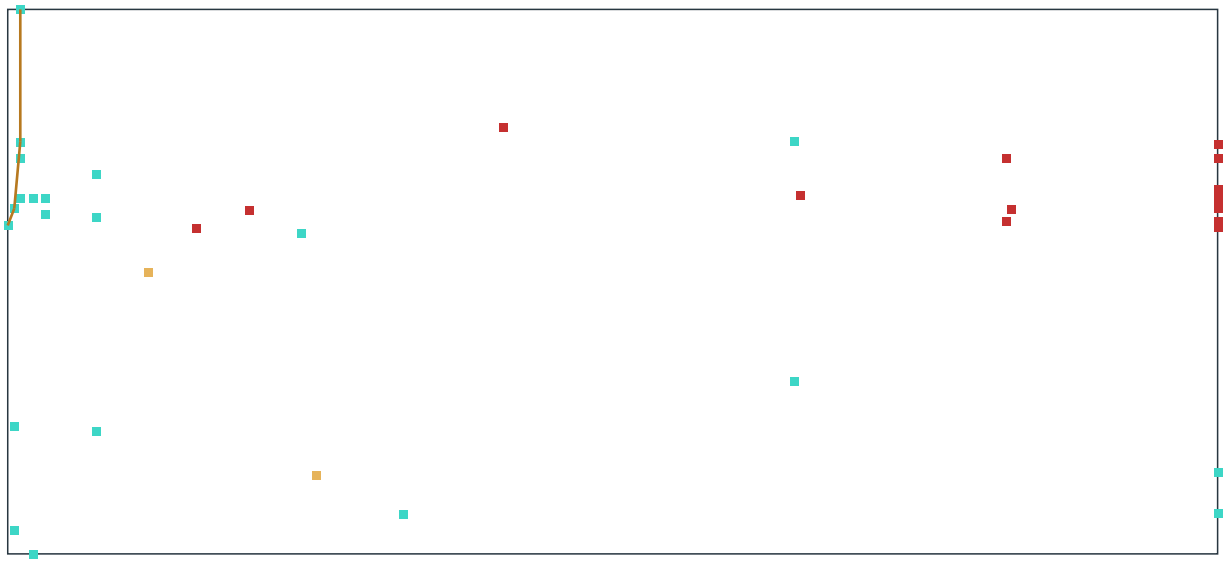
Acc keep % vs RAM KiB (gold = high Acc, low RAM vs Acc champ)



Q% vs RAM KiB (gold = high consciousness, low RAM)

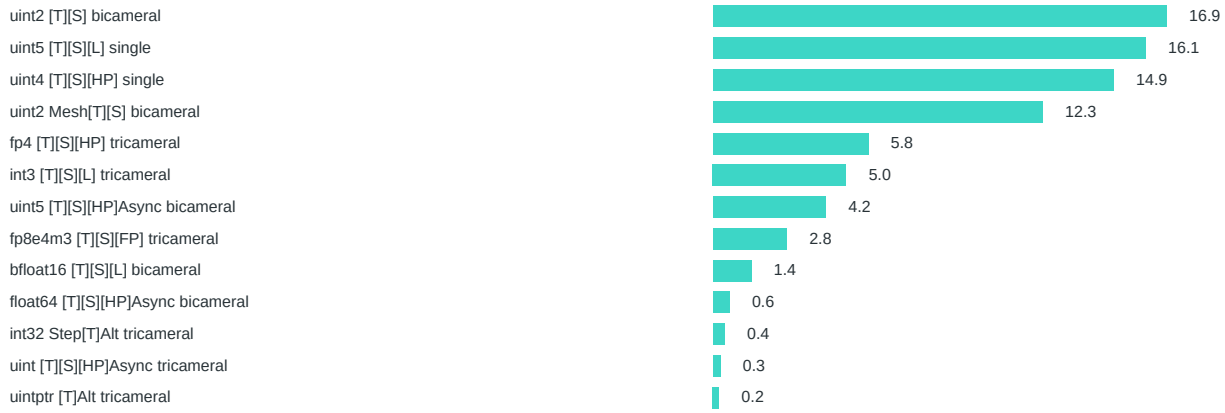


Q% vs shrink vs Acc champ (gold = upper right)

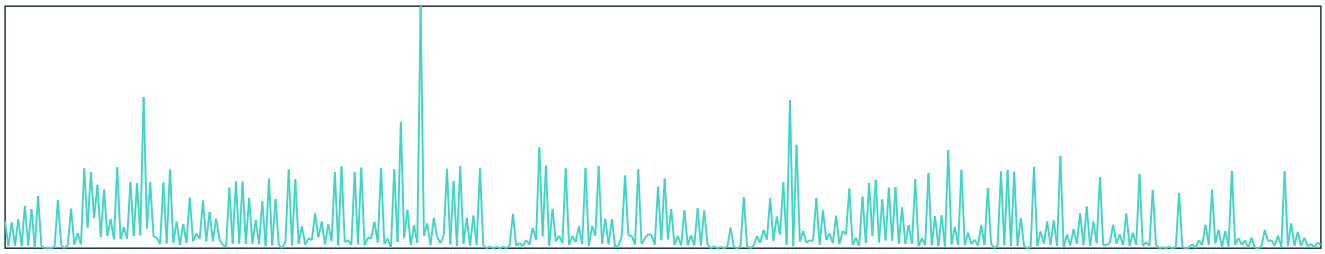



times smaller than Acc champ -> n=40 gold = Pareto teal=single blue=bi purple=tri
Q %

Top Lucy density (LPD)

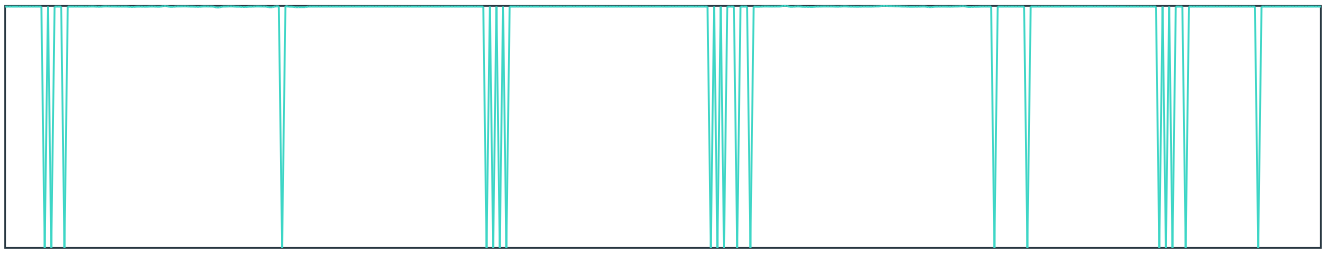


Live pulse (Score)



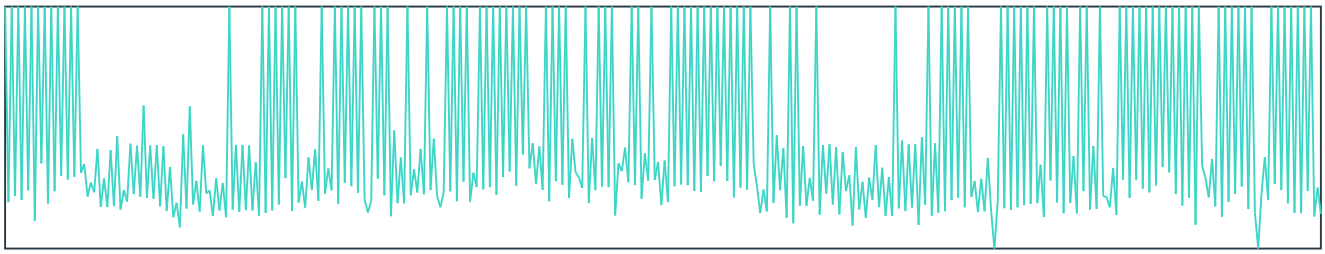
n=400 min=0.00 max=93.85

Live pulse (SoftAcc)



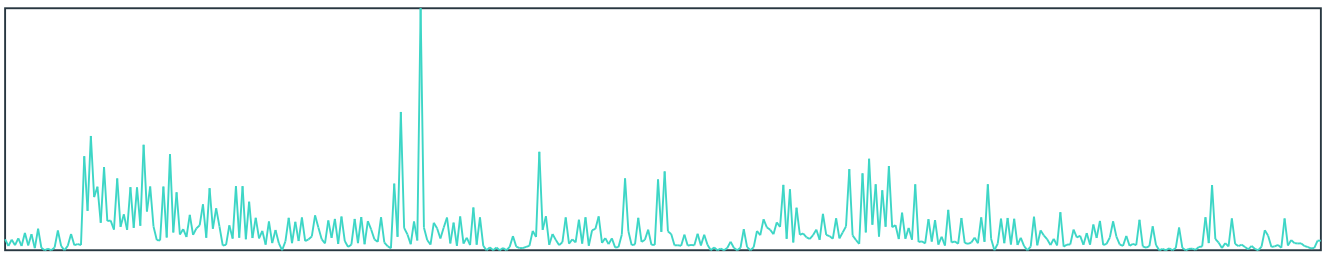
n=400 min=0.00 max=25.08

Live pulse (Availability)



n=400 min=0.00 max=100.00

Live pulse (Throughput)



n=400 min=0.00 max=911.63

Queue by train mode (this epoch)

Mode	Done	Run	Left	Total