tide rnn

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
done - epoch 1/1 (1 left, 100% overall) - lr unset - 2026-08-23 13:32:55 -
This epoch 2346 / 2346 cells. Recorded 2346 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 - rnn - offline report

Lucy champions (this tide)

Axis	Cell	Score	Soft	Acc	Thru	Avail
hard acc	int|none|Mesh[T]Alt|single|simd	2.06	25.4	34.4	71.5	11.3
throughput	float32|none|sgd|single|simd	150.33	22.3	39.7	2328.2	29.0
availability	complex64|none|Mesh[T][S]Sparse|bicameral|simd	3.79	25.0	18.8	39.4	38.5
lucy score	int8|none|sgd|single|simd	183.03	25.2	37.7	2171.7	33.4
mobile score (trap)	binary|none|sgd|single|simd	93.58	20.9	16.2	1608.1	27.8
t->50%	int5|none|[T][S]|tricameral|simd	3.63	25.0	62.5	51.9	28.0
acc/sec	int8|none|sgd|single|simd	183.03	25.2	37.7	2171.7	33.4

Lucy axis champions (this tide)

Axis	Mode	DType	Arch	Value
hard_acc	[T][S]	uint5	tricameralx3	87.50
throughput	sgd	float32	singlex1	2328.18
availability	Mesh[T][S]Sparse	complex64	bicameralx2	38.46
score	sgd	int8	singlex1	183.03
soft_acc	Mesh[T]Alt	int	singlex1	25.42
acc_thru	sgd	float32	singlex1	924.58
realtime	sgd	int8	singlex1	725.21
adapt	tween_chain	float64	singlex1	25.46
keep_learn	tween	int2	tricameralx3	17.70
acc_per_sec	sgd	int8	singlex1	12.59
time_to_50	[T][S]	int5	tricameralx3	0.09
consistency	sgd	int8	singlex1	100.00
stability	tween_chain	fp4	singlex1	100.00
mobile_score	sgd	binary	singlex1	908566.48
lpd	[T][S][HP]	uint6	singlex1	25.17
mspeed	[T][S][HP]	uint6	singlex1	1.00
mavail	[T][S][HP]	uint5	tricameralx3	1.00
mix	[T][S][HP]	uint6	singlex1	0.81

Best settings per train mode

Mode	DType	Format	Score	Soft	Acc	Avail	n
sgd	int8	none	183.0	25.2	37.7	33.4	102
[T][S]	float32	none	117.2	24.9	19.2	26.8	102
tween_chain	float64	none	87.0	25.4	45.4	27.4	102
tween	int8	none	76.1	23.4	35.0	26.8	102
step_sgd	int8	none	72.6	21.9	26.2	23.0	102
step_tween_chain	float32	none	70.4	25.3	37.9	21.5	102
MeshBP	binary	none	61.1	25.4	39.0	21.2	102
Step[T][S]	float32	none	60.3	24.9	14.5	21.7	102
Mesh[T]	ternary	none	58.3	24.8	23.1	21.1	102
step_tween	fp4	none	49.2	25.0	23.6	20.9	102

[T]Alt	float32	none	48.5	25.0	25.0	22.8	102
Mesh[T]Chain	fp4	none	45.9	25.0	27.8	23.9	102
[T][S][L]Cache	float32	none	44.4	24.9	27.8	27.6	102
[T][S][HP]	int8	none	38.5	25.1	28.5	21.4	102
[T][S][FP]	float32	none	35.3	25.1	45.0	24.1	102
[T][S][HP]Async	float32	none	31.9	25.0	26.2	30.3	102
[T][S][L]	uint8	none	30.5	24.9	12.5	25.7	102
[T][S]Sparse	int8	none	24.0	25.0	17.1	24.0	102
Step[T]Alt	float32	none	18.0	24.9	12.5	13.8	102
Mesh[T][S]	uint64	none	17.5	25.1	35.6	30.9	102
Mesh[T][S][FP]	int4	none	17.4	25.0	35.2	24.2	102
Mesh[T][S]Sparse	ternary	none	16.1	25.0	14.6	25.0	102
Mesh[T]Alt	uint16	none	4.7	25.0	25.0	15.5	102

Best dtype per mode

Mode	Winner dtype	Score	Soft	Acc
sgd	int8	183.0	25.2	37.7
[T][S]	float32	117.2	24.9	19.2
tween_chain	float64	87.0	25.4	45.4
tween	int8	76.1	23.4	35.0
step_sgd	int8	72.6	21.9	26.2
step_tween_chain	float32	70.4	25.3	37.9
MeshBP	binary	61.1	25.4	39.0
Step[T][S]	float32	60.3	24.9	14.5
Mesh[T]	ternary	58.3	24.8	23.1
step_tween	fp4	49.2	25.0	23.6
[T]Alt	float32	48.5	25.0	25.0
Mesh[T]Chain	fp4	45.9	25.0	27.8
[T][S][L]Cache	float32	44.4	24.9	27.8
[T][S][HP]	int8	38.5	25.1	28.5
[T][S][FP]	float32	35.3	25.1	45.0
[T][S][HP]Async	float32	31.9	25.0	26.2
[T][S][L]	uint8	30.5	24.9	12.5
[T][S]Sparse	int8	24.0	25.0	17.1
Step[T]Alt	float32	18.0	24.9	12.5
Mesh[T][S]	uint64	17.5	25.1	35.6
Mesh[T][S][FP]	int4	17.4	25.0	35.2
Mesh[T][S]Sparse	ternary	16.1	25.0	14.6
Mesh[T]Alt	uint16	4.7	25.0	25.0

Best mode per dtype

DType	Winner mode	Score	Soft	Acc
int8	sgd	183.0	25.2	37.7
float32	sgd	150.3	22.3	39.7
int4	sgd	102.3	22.4	19.1
binary	sgd	93.6	20.9	16.2
int2	sgd	88.7	22.2	22.4
float64	tween_chain	87.0	25.4	45.4
uint8	[T][S]	84.2	24.9	24.0
bfloat16	sgd	73.4	20.7	28.7
fp8e4m3	tween_chain	66.3	25.0	21.4
int64	tween_chain	65.6	25.2	34.6

uint16	sgd	61.2	22.6	30.8
ternary	Mesh[T]	58.3	24.8	23.1
uint64	sgd	56.0	22.0	36.5
uint32	sgd	54.3	21.4	32.8
uintptr	[T][S]	52.7	25.0	25.0
uint2	tween_chain	51.8	25.0	19.5
nf4	tween	50.7	24.9	20.1
int16	[T][S]	49.4	25.0	16.2
fp4	step_tween	49.2	25.0	23.6
fp8e5m2	Step[T][S]	44.0	24.9	29.2
int32	sgd	43.8	19.4	25.1
float16	[T][S]	43.4	25.1	45.8
complex128	tween_chain	41.2	25.2	40.8
complex64	tween_chain	40.6	25.2	32.1
uint	sgd	39.5	18.9	22.2
uint4	[T][S]	35.0	25.0	28.6
int	[T][S]	32.3	24.9	9.7
int3	[T][S]	31.4	25.1	25.0
int5	sgd	31.2	23.0	25.5
uint3	[T][S]	30.0	24.7	2.1
uint6	[T][S]	27.6	24.9	8.3
fp6	tween_chain	24.1	25.1	38.4
int6	tween_chain	22.5	25.0	25.7
uint5	tween_chain	22.4	25.0	23.4

Leaderboard (Lucy Score)

#	Cell	Score	Soft	Acc	Thru	Avail
1	int8|none|sgd|single|simd	183.0	25.2	37.7	2171.7	33.4
2	float32|none|sgd|single|simd	150.3	22.3	39.7	2328.2	29.0
3	float32|none|[T][S]|single|simd	117.2	24.9	19.2	1754.5	26.8
4	int4|none|sgd|single|simd	102.3	22.4	19.1	1738.0	26.3
5	binary|none|sgd|single|simd	93.6	20.9	16.2	1608.1	27.8
6	int2|none|sgd|single|simd	88.7	22.2	22.4	1599.2	25.0
7	float64|none|tween_chain|single|simd	87.0	25.4	45.4	1250.2	27.4
8	int2|none|tween_chain|single|simd	84.3	24.8	15.8	1442.5	23.6
9	float64|none|sgd|single|simd	84.2	23.3	37.2	1353.3	26.8
10	uint8|none|[T][S]|single|simd	84.2	24.9	24.0	1357.6	24.9
11	int8|none|tween|single|simd	76.1	23.4	35.0	1212.2	26.8
12	bfloat16|none|sgd|single|simd	73.4	20.7	28.7	1259.1	28.2
13	int8|none|step_sgd|single|simd	72.6	21.9	26.2	1443.6	23.0
14	uint8|none|sgd|single|simd	70.5	19.4	34.0	1561.2	23.2
15	binary|none|[T][S]|single|simd	70.4	25.2	32.8	1118.2	24.9
16	float32|none|step_tween_chain|single|simd	70.4	25.3	37.9	1293.4	21.5
17	float64|none|[T][S]|single|simd	67.4	24.8	17.9	1080.4	25.2
18	fp8e4m3|none|tween_chain|single|simd	66.3	25.0	21.4	1079.3	24.6
19	float32|none|tween|single|simd	66.2	25.0	26.3	1291.4	20.5
20	int64|none|tween_chain|single|simd	65.6	25.2	34.6	983.0	26.5

Leaderboard (SoftAcc)

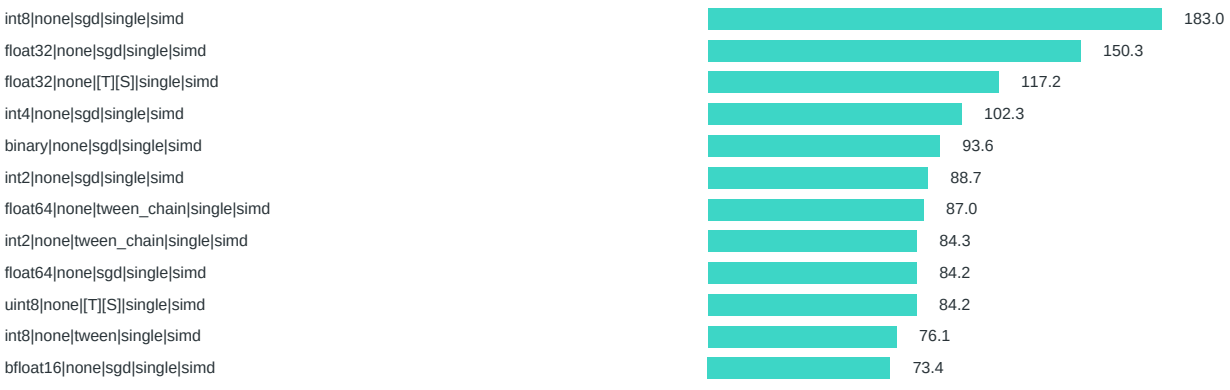
#	Cell	Score	Soft	Acc	Thru	Avail
1	binary|none|MeshBP|single|simd	61.1	25.4	39.0	1137.2	21.2
2	float64|none|tween_chain|single|simd	87.0	25.4	45.4	1250.2	27.4

3	float32|none|step_tween_chain|single|simd	70.4	25.3	37.9	1293.4	21.5
4	binary|none|tween_chain|single|simd	57.8	25.3	31.0	1180.9	19.3
5	int8|none|sgd|single|simd	183.0	25.2	37.7	2171.7	33.4
6	binary|none|[T][S]|single|simd	70.4	25.2	32.8	1118.2	24.9
7	int2|none|[T][S]|single|simd	53.5	25.2	12.5	1133.0	18.8
8	uint8|none|tween|single|simd	65.3	25.2	34.7	1062.8	24.4
9	int64|none|tween_chain|single|simd	65.6	25.2	34.6	983.0	26.5
10	uint8|none|tween_chain|single|simd	64.0	25.2	31.2	1214.6	20.9
11	int4|none|[T][S]|single|simd	65.1	25.1	38.3	1203.7	21.5
12	float32|none|MeshBP|single|simd	56.0	25.1	33.3	1230.3	18.2
13	float32|none|tween|single|simd	66.2	25.0	26.3	1291.4	20.5
14	fp8e4m3|none|tween_chain|single|simd	66.3	25.0	21.4	1079.3	24.6
15	int8|none|[T][S]|single|simd	56.9	25.0	22.2	1162.2	19.6
16	ternary|none|step_tween_chain|single|simd	56.0	25.0	16.1	1002.0	22.4
17	uint8|none|[T][S]|single|simd	84.2	24.9	24.0	1357.6	24.9
18	uint16|none|[T][S]|single|simd	56.5	24.9	18.8	822.3	27.6
19	float32|none|[T][S]|single|simd	117.2	24.9	19.2	1754.5	26.8
20	float32|none|Step[T][S]|single|simd	60.3	24.9	14.5	1116.9	21.7

Leaderboard (hard Acc)

#	Cell	Score	Soft	Acc	Thru	Avail
1	float64|none|tween_chain|single|simd	87.0	25.4	45.4	1250.2	27.4
2	float32|none|sgd|single|simd	150.3	22.3	39.7	2328.2	29.0
3	binary|none|MeshBP|single|simd	61.1	25.4	39.0	1137.2	21.2
4	int4|none|[T][S]|single|simd	65.1	25.1	38.3	1203.7	21.5
5	float32|none|step_tween_chain|single|simd	70.4	25.3	37.9	1293.4	21.5
6	int8|none|sgd|single|simd	183.0	25.2	37.7	2171.7	33.4
7	float64|none|sgd|single|simd	84.2	23.3	37.2	1353.3	26.8
8	uint64|none|sgd|single|simd	56.0	22.0	36.5	1005.9	25.3
9	int8|none|tween|single|simd	76.1	23.4	35.0	1212.2	26.8
10	uint8|none|tween|single|simd	65.3	25.2	34.7	1062.8	24.4
11	int64|none|tween_chain|single|simd	65.6	25.2	34.6	983.0	26.5
12	uint8|none|sgd|single|simd	70.5	19.4	34.0	1561.2	23.2
13	float32|none|MeshBP|single|simd	56.0	25.1	33.3	1230.3	18.2
14	uint32|none|sgd|single|simd	54.3	21.4	32.8	994.1	25.5
15	binary|none|[T][S]|single|simd	70.4	25.2	32.8	1118.2	24.9
16	uint8|none|tween_chain|single|simd	64.0	25.2	31.2	1214.6	20.9
17	binary|none|tween_chain|single|simd	57.8	25.3	31.0	1180.9	19.3
18	uint16|none|sgd|single|simd	61.2	22.6	30.8	1018.3	26.6
19	bfloat16|none|sgd|single|simd	73.4	20.7	28.7	1259.1	28.2
20	uint8|none|step_sgd|single|simd	56.6	20.9	26.6	1187.1	22.8

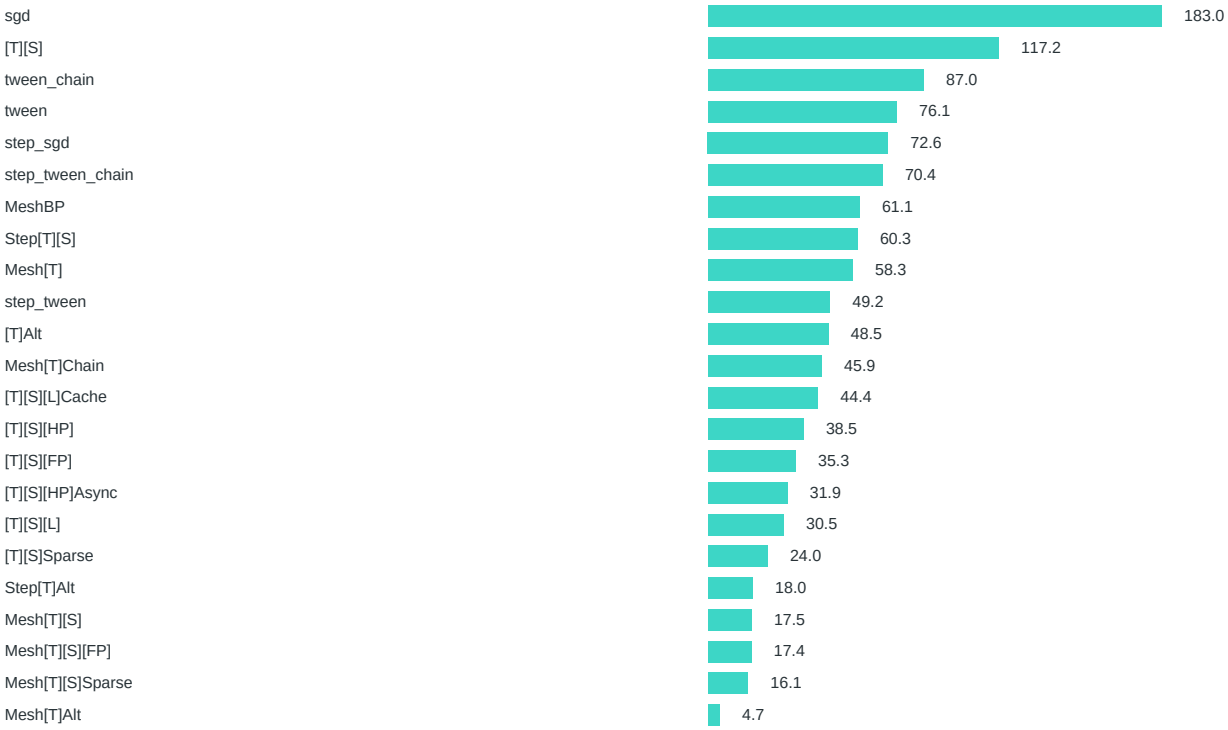
Top scores



Top scores



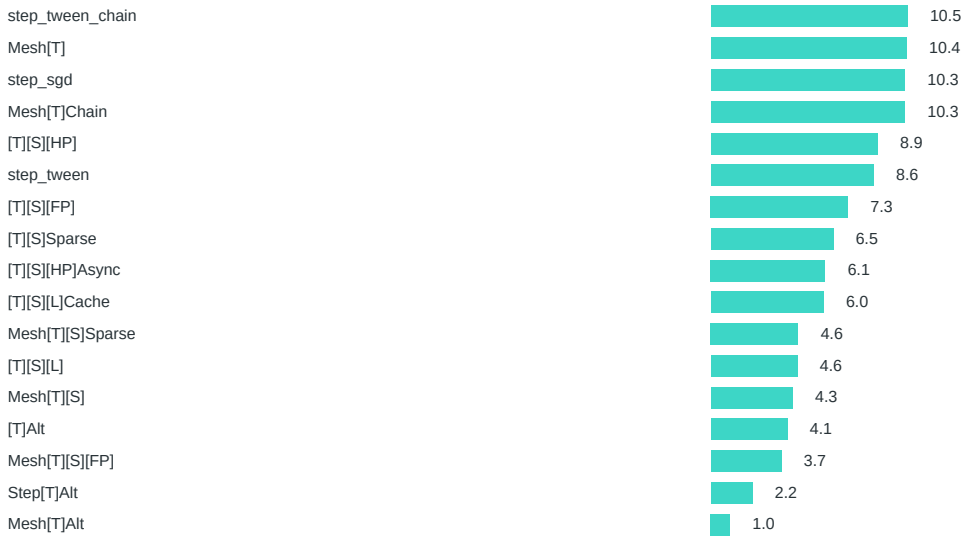
Best settings per mode



Mean Score by train mode



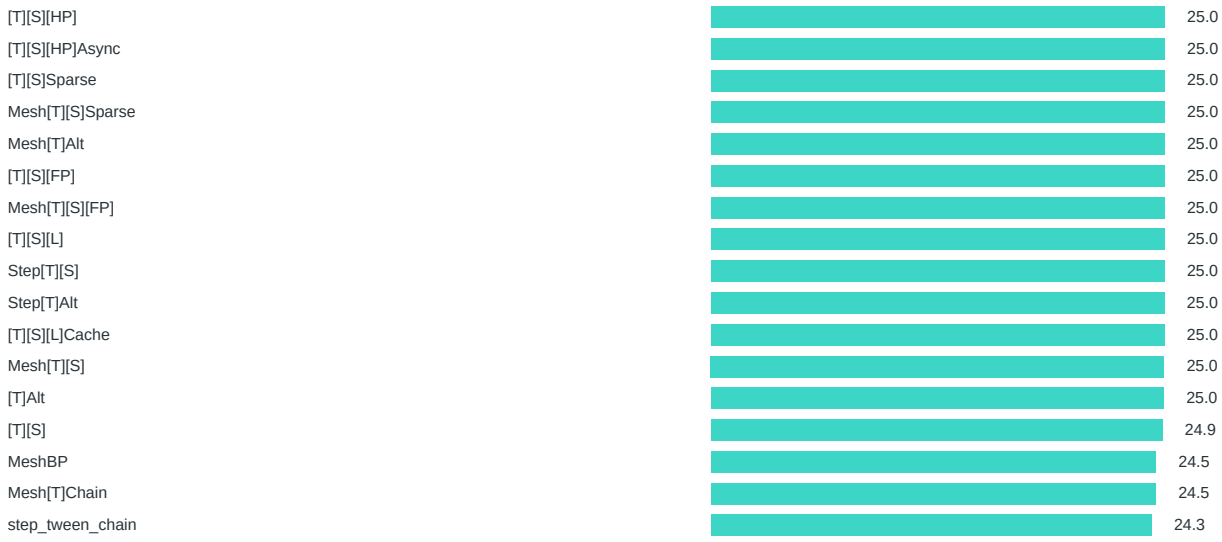
Mean Score by train mode



Mean hard Acc by train mode



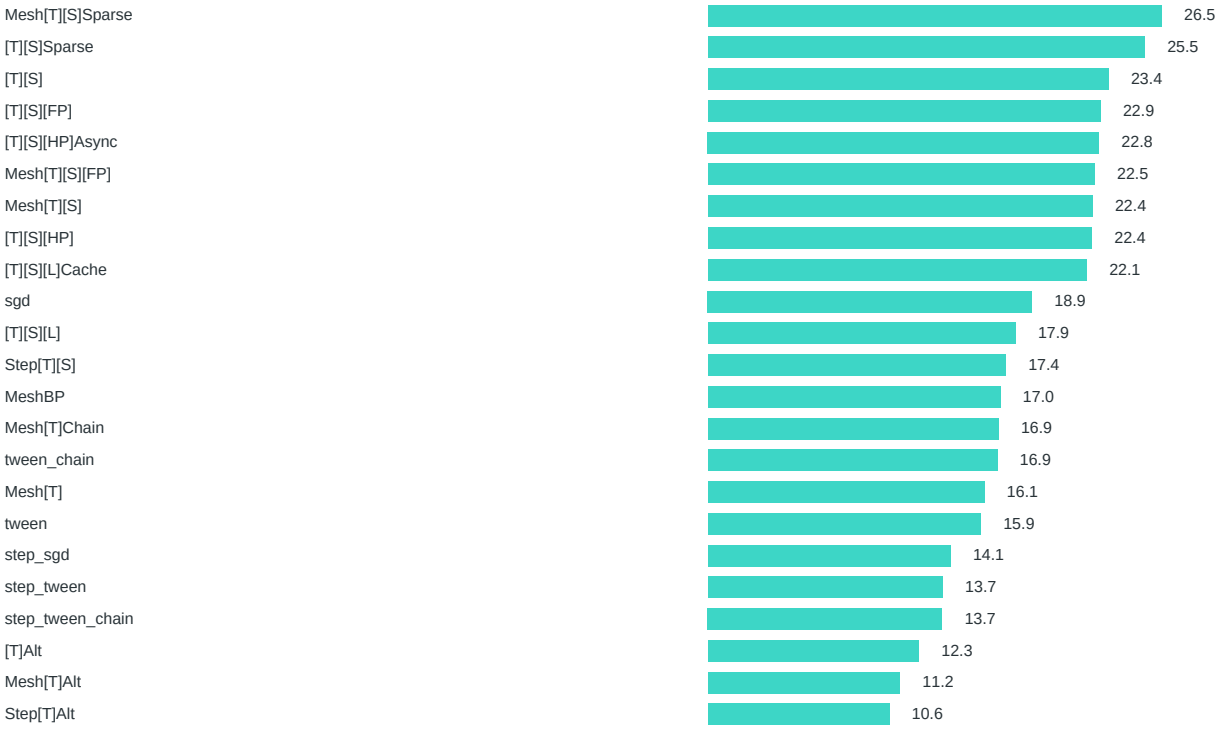
Mean SoftAcc by train mode



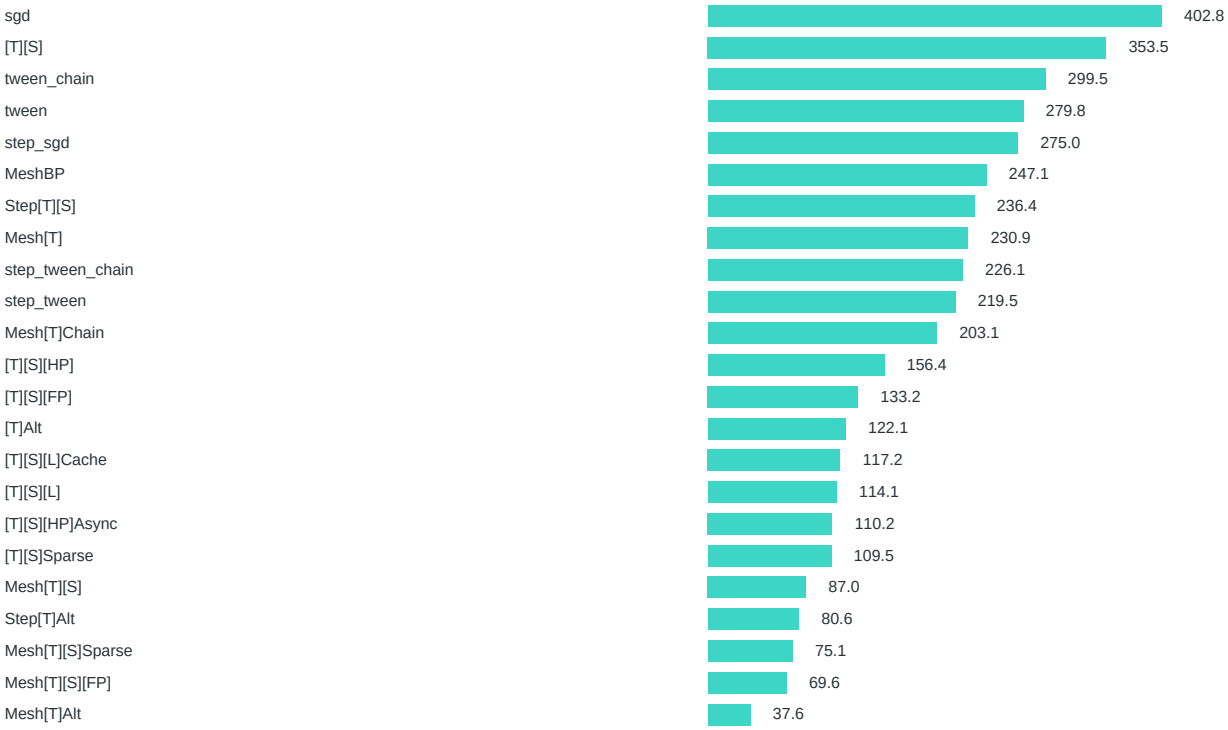
Mean SoftAcc by train mode



Mean Availability by train mode



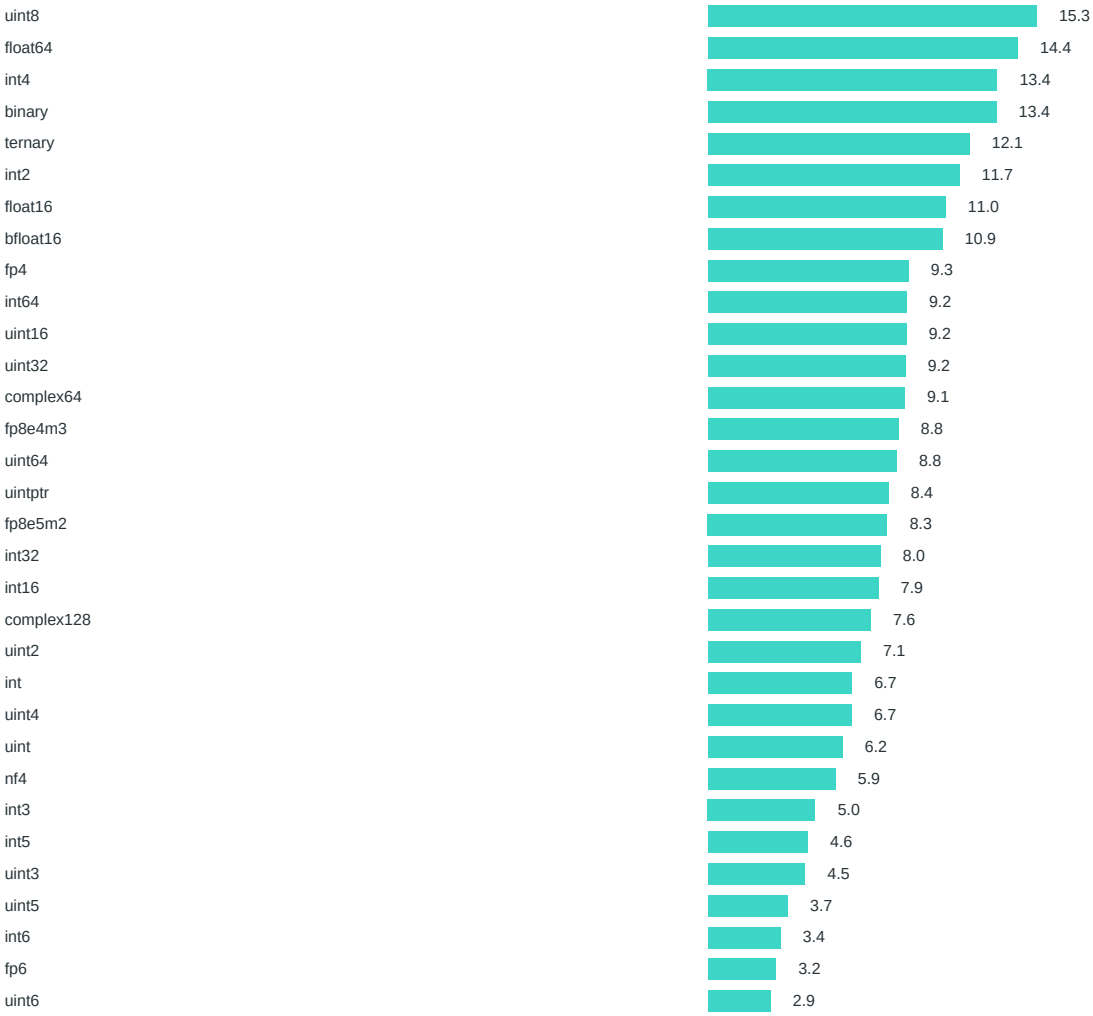
Mean Throughput by train mode



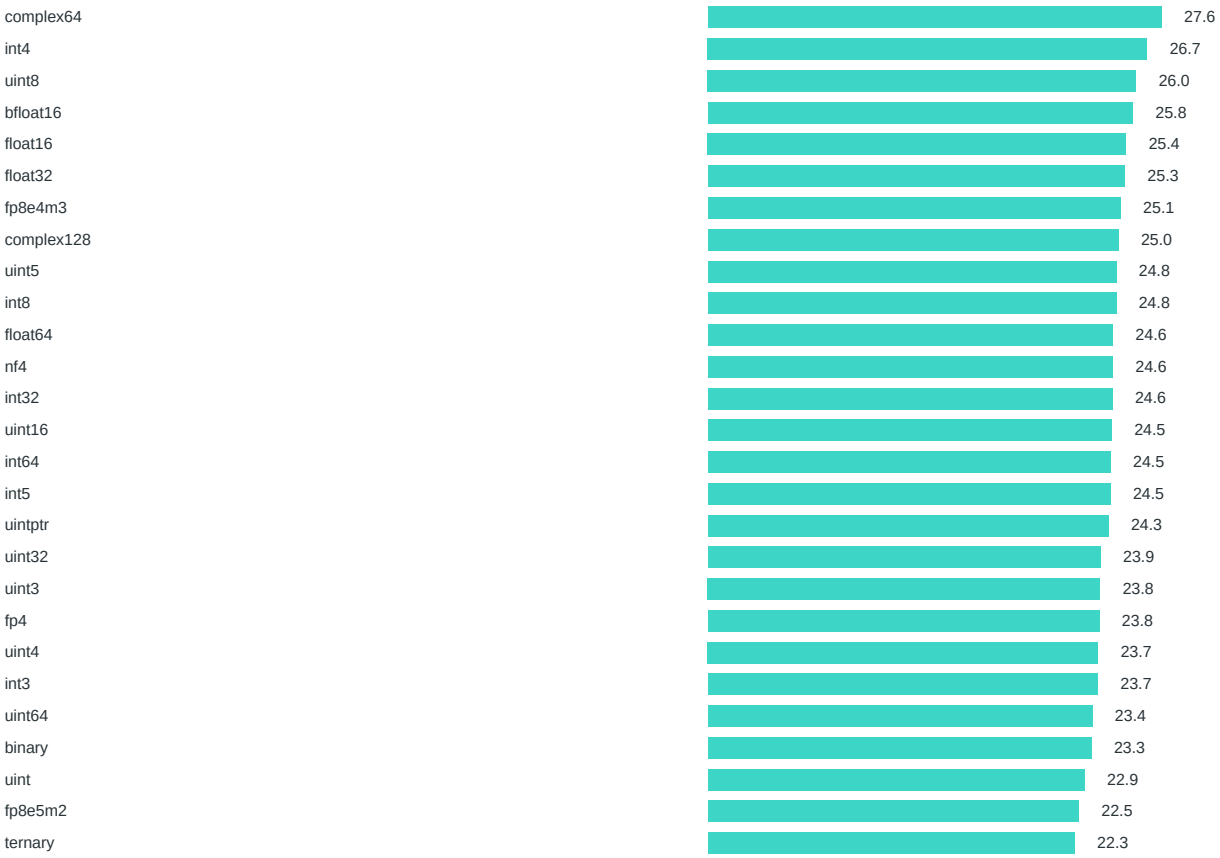
Mean Score by dtype



Mean Score by dtype



Mean hard Acc by dtype



Mean hard Acc by dtype



Mean Score by arch



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

	bfloat16	binary	complex128	complex64	float16	float32	float64	fp4	fp6	fp8e4m3	fp8e5m2	int
MeshBP	25	33	10	16	16	32	33	12	4	11	20	11
Mesh[T]	11	8	7	10	19	14	15	17	4	15	5	10
Mesh[T]Alt	2	1	1	1	1	2	2	1	1	1	1	1
Mesh[T]Chain	16	13	11	10	14	21	9	18	3	8	13	13
Mesh[T][S]	6	7	3	4	5	6	4	5	2	4	4	4
Mesh[T][S][FP]	4	4	3	5	4	7	4	5	2	3	4	2
Mesh[T][S]Sparse	4	11	5	5	5	13	4	3	1	4	6	3
Step[T]Alt	3	4	2	1	3	4	5	3	1	2	1	1
Step[T][S]	11	13	10	10	8	15	10	7	5	8	19	7
[T]Alt	4	6	2	7	5	17	2	4	1	2	3	4
[T][S]	18	33	19	23	32	35	26	17	8	35	25	8
[T][S][FP]	6	12	5	9	8	23	13	8	4	7	4	7
[T][S][HP]	4	13	7	4	8	15	13	4	2	11	15	9
[T][S][HP]Async	7	14	3	4	9	14	9	7	1	7	4	6
[T][S][L]	4	4	7	6	10	12	4	6	1	4	5	4
[T][S][L]Cache	8	5	8	4	7	20	10	13	3	5	6	7
[T][S]Sparse	8	11	8	5	6	9	9	7	2	6	8	3
sgd	36	29	16	24	22	94	50	15	2	17	11	15
step_sgd	19	13	2	10	10	27	14	7	3	12	7	6
step_tween	5	19	6	8	21	20	7	17	1	7	7	9
step_tween_chain	14	13	14	11	17	38	10	8	1	7	8	6
tween	17	15	2	14	11	32	25	16	6	4	11	7
tween_chain	18	27	23	19	13	15	53	13	13	22	6	14

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	11	7	10	13	11	10	4	13	13	7	21	5
Mesh[T]	6	25	4	15	15	5	3	12	24	9	19	5
Mesh[T]Alt	0	1	0	1	1	1	1	0	2	1	1	1
Mesh[T]Chain	9	7	5	11	10	6	6	6	19	6	12	7
Mesh[T][S]	4	3	4	5	9	3	2	4	7	3	3	4
Mesh[T][S][FP]	2	4	3	3	9	2	2	4	6	3	4	5
Mesh[T][S]Sparse	3	5	3	3	9	2	1	3	9	3	9	5
Step[T]Alt	2	5	1	3	1	3	1	3	9	1	1	1
Step[T][S]	13	13	6	9	16	10	3	9	24	11	39	10
[T]Alt	3	2	2	4	4	1	0	4	6	4	6	2
[T][S]	15	21	12	11	38	11	6	15	22	18	20	9
[T][S][FP]	4	6	8	5	10	5	2	6	14	7	10	5
[T][S][HP]	10	14	7	7	23	5	3	7	21	1	8	8
[T][S][HP]Async	7	12	2	5	9	3	3	7	9	2	8	7
[T][S][L]	7	1	3	5	3	4	2	4	5	5	9	3
[T][S][L]Cache	7	16	4	10	5	2	3	4	4	5	5	2
[T][S]Sparse	7	8	4	7	17	3	4	11	7	3	12	2
sgd	26	34	7	20	33	12	6	23	96	2	25	16
step_sgd	8	7	6	14	13	2	4	11	35	7	9	12
step_tween	6	17	4	3	17	3	4	3	7	2	18	6
step_tween_chain	8	18	9	11	15	3	3	19	15	5	13	8
tween	12	21	2	12	19	4	5	12	48	15	12	11
tween_chain	13	23	7	10	22	9	9	31	16	16	16	8

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	14	7	8	12	11	5	5	6	25	16
Mesh[T]	11	7	3	15	5	5	4	7	10	11
Mesh[T]Alt	2	1	0	1	1	1	0	1	2	1
Mesh[T]Chain	11	9	8	9	9	5	3	11	21	12
Mesh[T][S]	8	3	4	3	5	2	1	10	4	5
Mesh[T][S][FP]	3	5	2	3	1	2	2	6	5	5
Mesh[T][S]Sparse	3	8	2	2	2	2	1	5	7	7
Step[T]Alt	1	1	2	4	1	0	1	2	1	1
Step[T][S]	10	10	7	11	9	3	5	9	22	12
[T]Alt	9	4	2	5	3	3	1	1	9	4
[T][S]	17	19	4	22	20	4	4	19	33	20
[T][S][FP]	6	3	7	5	5	4	4	8	9	9
[T][S][HP]	13	10	5	8	11	8	6	7	6	10
[T][S][HP]Async	3	9	6	5	5	4	2	4	5	4
[T][S][L]	5	6	3	3	4	3	1	2	8	2
[T][S][L]Cache	3	4	3	5	3	3	0	5	7	9
[T][S]Sparse	8	4	5	11	5	2	3	2	9	5
sgd	29	15	9	30	11	5	6	33	44	9
step_sgd	10	9	1	14	9	3	6	8	26	9
step_tween	12	7	5	6	4	3	4	9	20	8
step_tween_chain	13	7	2	12	6	4	3	5	19	10
tween	7	2	6	3	13	7	3	17	31	9
tween_chain	14	15	11	24	10	8	1	25	29	15

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	38	23	32	23	33	31	25	29	18	26	41	23
Mesh[T]	30	28	28	31	41	28	32	28	22	23	21	28
Mesh[T]Alt	49	31	26	25	15	22	39	20	19	25	19	28
Mesh[T]Chain	30	34	28	29	27	28	19	22	22	23	25	24
Mesh[T][S]	24	24	31	31	26	23	14	28	19	19	12	21
Mesh[T][S][FP]	20	18	18	31	24	34	28	30	18	34	26	21
Mesh[T][S]Sparse	28	31	30	26	23	24	18	22	11	26	41	15
Step[T]Alt	23	15	50	15	41	32	26	32	11	38	6	14
Step[T][S]	27	16	28	48	16	19	21	21	27	27	24	13
[T]Alt	20	18	19	31	15	27	14	18	11	12	21	31
[T][S]	20	18	25	37	31	17	23	26	19	36	31	16
[T][S][FP]	25	30	17	43	15	26	22	21	18	28	16	28
[T][S][HP]	14	20	15	27	26	24	32	27	19	36	24	19
[T][S][HP]Async	27	26	27	21	32	29	37	26	18	27	15	22
[T][S][L]	22	22	23	30	28	32	19	20	7	17	28	21
[T][S][L]Cache	33	18	20	26	21	23	27	30	18	19	19	25
[T][S]Sparse	31	25	28	23	27	19	22	29	23	31	30	22
sgd	18	17	14	21	20	23	27	11	7	16	15	17
step_sgd	16	15	13	17	17	22	22	14	10	16	14	12
step_tween	24	30	30	20	29	23	23	24	28	27	19	25
step_tween_chain	27	25	29	28	24	30	26	23	26	27	28	31
tween	27	21	17	24	18	23	25	22	14	20	22	27
tween_chain	23	29	23	28	36	25	24	23	26	26	22	28

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	26	19	22	32	25	22	20	20	29	24	36	27
Mesh[T]	21	32	25	19	32	22	17	22	25	29	20	23
Mesh[T]Alt	16	6	8	28	21	30	18	12	35	30	16	15
Mesh[T]Chain	22	25	18	25	24	19	22	20	22	37	20	18
Mesh[T][S]	19	15	28	34	31	24	23	34	36	20	19	27
Mesh[T][S][FP]	18	21	42	28	19	30	12	21	19	24	22	29
Mesh[T][S]Sparse	27	18	26	30	28	21	12	25	26	26	24	24
Step[T]Alt	21	42	23	26	38	42	25	25	22	23	11	9
Step[T][S]	27	27	24	31	27	28	10	28	29	23	42	30
[T]Alt	21	19	45	31	28	28	7	38	25	42	17	17
[T][S]	22	30	17	23	28	32	28	27	20	31	13	14
[T][S][FP]	14	14	36	20	30	40	9	24	35	31	21	33
[T][S][HP]	23	24	32	25	26	32	13	23	30	15	18	27
[T][S][HP]Async	22	31	15	19	33	31	12	26	20	18	25	28
[T][S][L]	29	9	14	25	29	22	17	24	19	26	20	32
[T][S][L]Cache	13	30	17	25	22	27	9	27	12	36	20	15
[T][S]Sparse	35	22	33	25	37	15	21	47	13	28	36	19
sgd	21	19	8	12	18	12	10	18	26	8	20	13
step_sgd	14	17	12	16	16	6	12	14	26	14	17	15
step_tween	21	24	28	17	30	15	20	19	22	17	27	25
step_tween_chain	25	27	37	24	25	19	14	28	20	20	12	30
tween	19	23	13	29	20	16	12	17	35	17	28	26
tween_chain	24	19	22	23	27	28	20	24	25	28	26	33

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	30	20	24	34	19	32	20	17	26	29
Mesh[T]	28	27	24	30	20	17	27	22	17	22
Mesh[T]Alt	21	30	24	32	22	43	11	24	37	36
Mesh[T]Chain	24	24	24	28	19	19	20	27	26	28
Mesh[T][S]	45	28	26	18	32	22	3	36	29	22
Mesh[T][S][FP]	28	29	17	19	5	17	33	39	32	44
Mesh[T][S]Sparse	25	30	24	23	22	22	10	31	30	36
Step[T]Alt	14	14	20	25	18	8	27	16	21	21
Step[T][S]	15	17	14	34	30	35	19	18	43	28
[T]Alt	32	21	21	11	36	22	8	16	19	27
[T][S]	16	21	17	28	35	29	11	17	22	17
[T][S][FP]	43	9	30	19	23	26	23	30	39	27
[T][S][HP]	31	26	42	19	36	39	30	27	21	21
[T][S][HP]Async	12	23	41	19	26	30	11	11	20	15
[T][S][L]	40	31	36	22	30	40	6	23	29	11
[T][S][L]Cache	12	23	17	31	26	20	1	43	25	29
[T][S]Sparse	29	16	29	33	19	30	25	9	27	14
sgd	17	15	10	21	18	8	10	22	21	11
step_sgd	14	15	10	19	13	12	14	11	21	16
step_tween	20	25	29	17	28	21	18	26	25	23
step_tween_chain	21	23	24	28	22	30	15	18	28	26
tween	17	13	19	14	20	24	18	25	17	26
tween_chain	33	23	25	28	25	25	17	30	25	30

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	21	25
Mesh[T]Alt	25	25	25	25	25	25	25	25	25	25	25	25
Mesh[T]Chain	25	25	25	25	25	25	25	25	21	25	25	25
Mesh[T][S]	25	25	25	25	25	25	25	25	25	25	25	25
Mesh[T][S][FP]	25	25	25	25	25	25	25	25	25	25	25	25
Mesh[T][S]Sparse	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	21	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	14	19	11	13	15	19	19	11	9	13	14	12
step_sgd	14	19	11	13	13	18	20	14	10	15	15	12
step_tween	25	25	25	25	23	25	25	25	23	25	23	23
step_tween_chain	25	25	25	25	25	25	25	25	19	25	25	25
tween	21	22	19	22	21	23	25	21	16	20	22	20
tween_chain	24	25	22	25	25	24	22	25	20	25	23	25

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	21	25	25	25	25	25
Mesh[T]	25	25	25	25	25	21	21	25	25	25	21	25
Mesh[T]Alt	25	25	25	25	25	25	25	25	25	25	25	25
Mesh[T]Chain	25	25	25	25	25	25	21	21	25	25	25	25
Mesh[T][S]	25	25	25	25	25	25	25	25	25	25	25	25
Mesh[T][S][FP]	25	25	25	25	25	25	25	25	25	25	25	25
Mesh[T][S]Sparse	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	24	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	14	20	10	12	20	12	11	13	20	9	19	13
step_sgd	13	15	12	11	17	10	11	13	21	13	18	13
step_tween	25	25	22	24	25	19	23	21	25	23	25	25
step_tween_chain	25	25	25	22	25	25	19	22	25	25	25	25
tween	18	23	18	23	20	19	13	20	24	23	23	22
tween_chain	24	24	22	20	24	22	22	23	24	24	25	25

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	25	25	21	25	25	25	25	25
Mesh[T]	25	25	25	25	21	21	21	25	25	25
Mesh[T]Alt	25	25	25	25	25	25	25	25	25	25
Mesh[T]Chain	25	25	25	25	25	25	21	25	25	25
Mesh[T][S]	25	25	25	25	25	25	25	25	25	25
Mesh[T][S][FP]	25	25	25	25	25	25	25	25	25	25
Mesh[T][S]Sparse	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	13	14	10	15	12	11	11	15	16	11
step_sgd	12	14	8	14	12	11	9	13	19	13
step_tween	22	25	25	21	25	22	21	23	23	23
step_tween_chain	25	25	25	25	25	22	22	25	25	22
tween	20	18	19	19	18	20	19	22	19	21
tween_chain	24	25	22	25	23	19	23	23	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	16	13	17	18	19	15	19	15	21	17	18	17
Mesh[T]	16	11	17	16	17	13	14	16	19	20	16	15
Mesh[T]Alt	10	7	12	13	13	8	13	10	12	9	10	11
Mesh[T]Chain	14	14	19	16	19	15	16	18	18	16	18	21
Mesh[T][S]	22	17	23	27	25	19	21	20	23	22	23	25
Mesh[T][S][FP]	20	15	24	25	23	16	19	18	26	21	23	23
Mesh[T][S]Sparse	24	23	29	31	27	30	27	23	28	25	25	26
Step[T]Alt	10	8	9	11	13	8	10	9	11	9	10	11
Step[T][S]	15	14	19	16	20	16	14	14	21	17	18	17
[T]Alt	14	10	12	16	12	12	12	10	18	15	9	14
[T][S]	23	18	21	27	23	19	24	18	27	25	24	25
[T][S][FP]	22	19	24	27	24	17	24	22	32	21	22	22
[T][S][HP]	22	17	26	24	24	16	22	18	24	23	24	27
[T][S][HP]Async	22	18	24	25	26	21	21	20	27	23	22	27
[T][S][L]	16	12	23	21	21	17	14	19	22	17	17	19
[T][S][L]Cache	20	14	24	23	26	22	24	19	26	24	22	24
[T][S]Sparse	24	22	31	28	25	21	27	23	26	25	27	25
sgd	20	18	17	20	20	19	20	14	19	20	20	20
step_sgd	13	12	11	14	16	14	15	13	17	15	16	14
step_tween	12	12	14	12	15	13	12	15	14	14	14	18
step_tween_chain	13	11	15	12	13	13	12	13	15	14	11	15
tween	15	13	15	17	17	17	19	16	18	14	16	16
tween_chain	16	13	15	20	16	14	16	15	19	18	15	18

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	17	14	21	16	11	20	18	18	12	17	14	14
Mesh[T]	21	15	16	18	11	22	17	15	15	16	11	15
Mesh[T]Alt	11	7	12	11	7	15	14	10	7	12	6	13
Mesh[T]Chain	17	13	18	17	12	20	18	20	12	14	12	19
Mesh[T][S]	22	17	24	21	19	26	26	24	16	21	14	25
Mesh[T][S][FP]	25	17	25	23	20	26	30	24	16	23	18	26
Mesh[T][S]Sparse	25	27	27	26	25	27	29	28	22	27	26	25
Step[T]Alt	10	7	13	12	8	14	16	11	10	9	9	9
Step[T][S]	19	12	17	19	14	22	20	17	15	19	19	17
[T]Alt	11	6	13	13	7	12	12	12	14	11	8	12
[T][S]	26	17	26	24	15	26	27	24	15	24	15	24
[T][S][FP]	23	16	28	22	19	27	29	22	16	21	17	22
[T][S][HP]	21	17	24	22	19	25	25	24	18	20	17	25
[T][S][HP]Async	24	17	26	22	18	25	26	22	16	23	16	25
[T][S][L]	20	10	23	17	11	24	19	17	13	20	12	17
[T][S][L]Cache	23	22	26	25	13	24	26	21	15	23	14	23
[T][S]Sparse	25	21	28	25	21	29	31	26	22	23	20	28
sgd	18	17	21	17	17	25	20	19	18	16	15	21
step_sgd	16	10	16	13	11	11	15	15	16	15	11	14
step_tween	11	14	15	14	13	12	18	11	11	10	14	13
step_tween_chain	15	11	17	12	10	16	19	13	14	13	13	15
tween	16	14	16	18	11	17	10	14	18	21	11	17
tween_chain	15	18	16	15	12	21	22	17	12	19	16	19

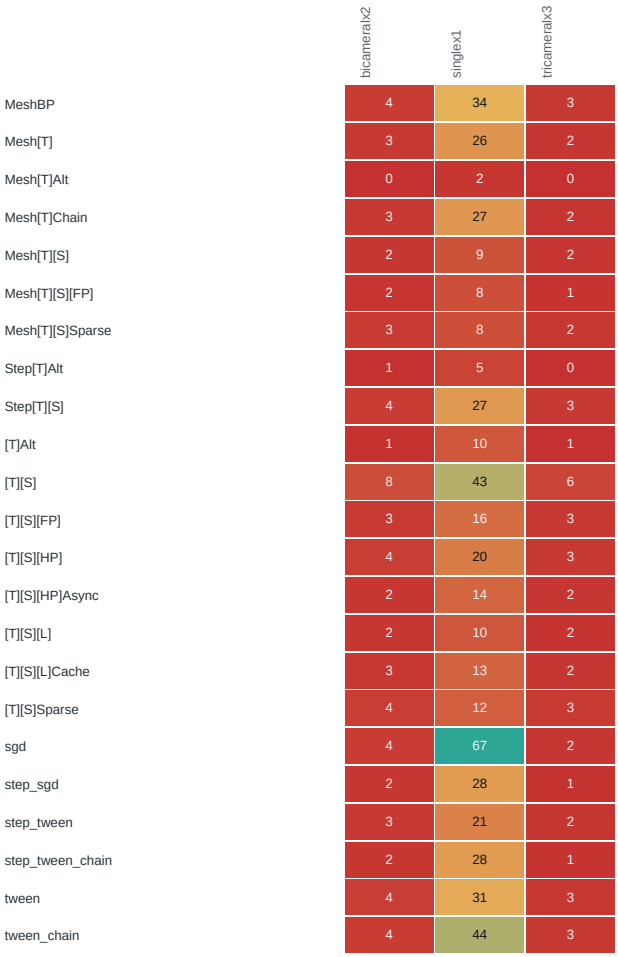
Honesty - mean Avail, every mode x dtype (cols 25-34)

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

	uint16	uint2	uint3	uint32	uint4	uint5	uint6	uint64	uint8	uintptr
MeshBP	17	17	21	17	20	18	19	16	19	18
Mesh[T]	19	15	18	19	17	17	17	16	17	14
Mesh[T]Alt	13	13	16	11	13	13	14	12	9	14
Mesh[T]Chain	19	17	20	16	16	20	19	18	17	19
Mesh[T][S]	23	23	25	24	25	27	29	25	19	22
Mesh[T][S][FP]	23	27	27	21	25	24	25	22	21	26
Mesh[T][S]Sparse	25	30	28	24	27	30	28	27	24	27
Step[T]Alt	10	10	12	12	10	13	15	11	10	11
Step[T][S]	17	19	17	17	18	20	19	20	16	19
[T]Alt	14	13	13	12	12	18	15	10	11	17
[T][S]	28	26	25	24	28	25	29	22	22	26
[T][S][FP]	21	24	22	28	24	25	25	23	21	25
[T][S][HP]	20	25	24	23	24	29	25	24	19	24
[T][S][HP]Async	27	21	26	25	24	29	25	21	20	23
[T][S][L]	19	18	22	15	18	20	22	17	20	19
[T][S][L]Cache	21	24	24	24	21	26	26	19	21	24
[T][S]Sparse	26	27	27	26	28	23	29	26	24	28
sgd	18	21	17	20	17	22	20	21	17	16
step_sgd	15	17	12	15	14	15	14	14	16	16
step_tween	12	15	17	14	16	14	14	15	14	13
step_tween_chain	18	13	11	15	13	12	14	14	14	13
tween	14	15	18	14	15	20	20	19	13	16
tween_chain	15	20	19	21	18	16	18	18	14	18

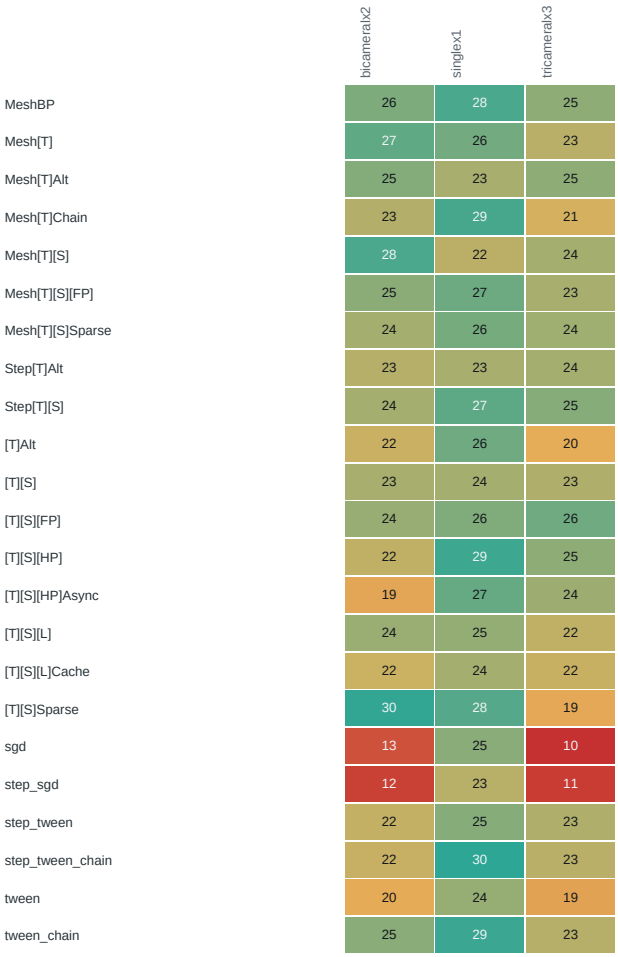
Mean Score, every mode x arch

Mean Score, every mode x arch



Mean hard Acc, every mode x arch

Mean hard Acc, every mode x arch



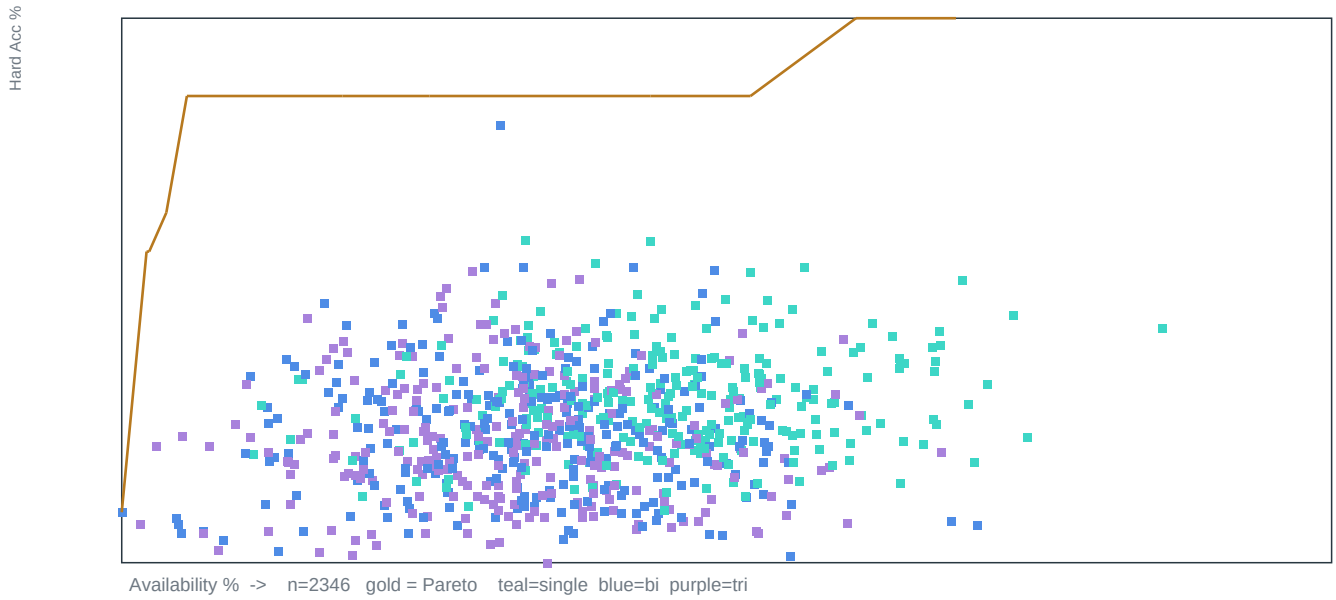
	bicameralx2	singlex1	tricameralx3
MeshBP	26	28	25
Mesh[T]	27	26	23
Mesh[T]Alt	25	23	25
Mesh[T]Chain	23	29	21
Mesh[T][S]	28	22	24
Mesh[T][S][FP]	25	27	23
Mesh[T][S]Sparse	24	26	24
Step[T]Alt	23	23	24
Step[T][S]	24	27	25
[T]Alt	22	26	20
[T][S]	23	24	23
[T][S][FP]	24	26	26
[T][S][HP]	22	29	25
[T][S][HP]Async	19	27	24
[T][S][L]	24	25	22
[T][S][L]Cache	22	24	22
[T][S]Sparse	30	28	19
sgd	13	25	10
step_sgd	12	23	11
step_tween	22	25	23
step_tween_chain	22	30	23
tween	20	24	19
tween_chain	25	29	23

Mean Avail, every mode x arch

Mean Avail, every mode x arch

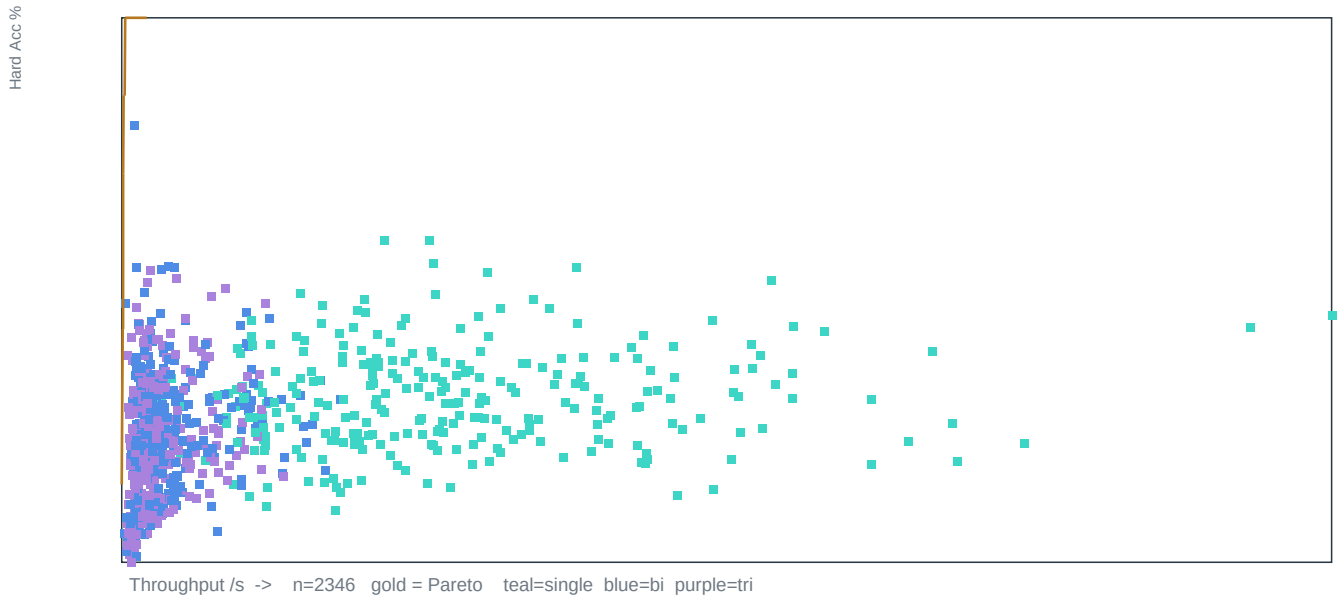
	bicameralx2	singlex1	tricameralx3
MeshBP	15	20	16
Mesh[T]	15	18	15
Mesh[T]Alt	11	11	11
Mesh[T]Chain	16	20	15
Mesh[T][S]	23	21	23
Mesh[T][S][FP]	23	21	24
Mesh[T][S]Sparse	28	22	29
Step[T]Alt	10	12	10
Step[T][S]	17	18	17
[T]Alt	12	13	11
[T][S]	23	23	24
[T][S][FP]	24	22	23
[T][S][HP]	23	21	24
[T][S][HP]Async	24	22	23
[T][S][L]	18	17	19
[T][S][L]Cache	23	21	22
[T][S]Sparse	27	21	28
sgd	17	24	16
step_sgd	13	18	12
step_tween	13	15	12
step_tween_chain	13	16	12
tween	15	17	15
tween_chain	15	21	15

Pillars - Availability vs hard Acc

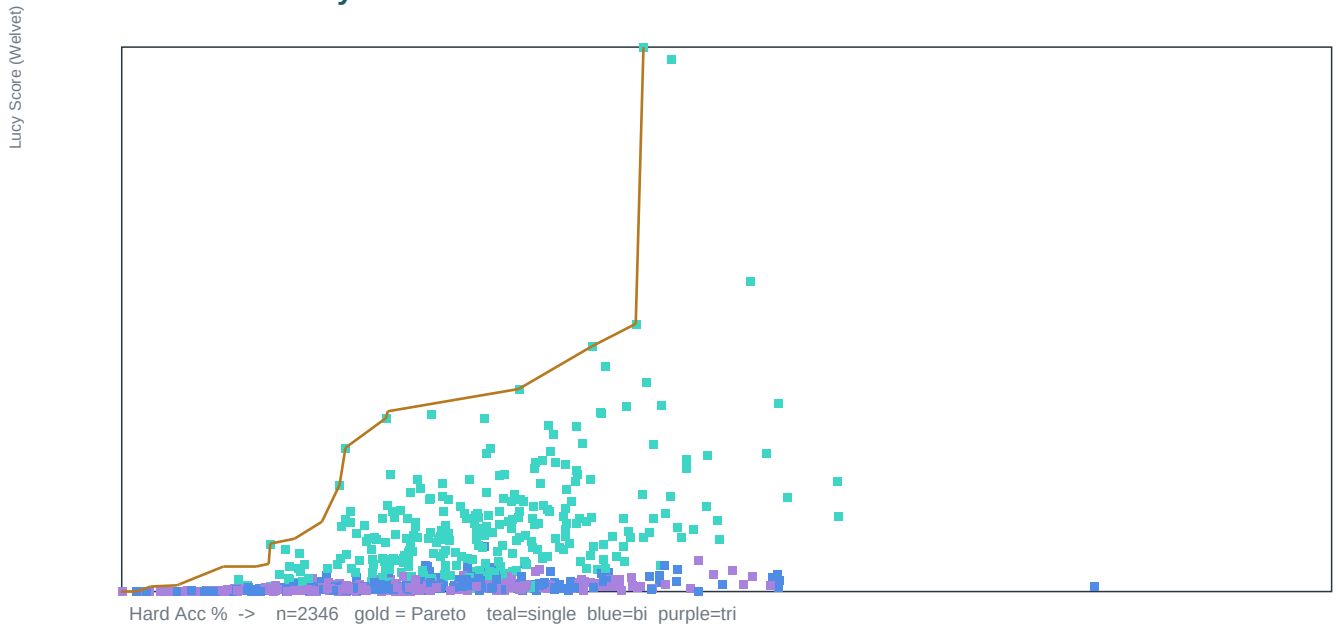


Pillars - Throughput vs hard Acc

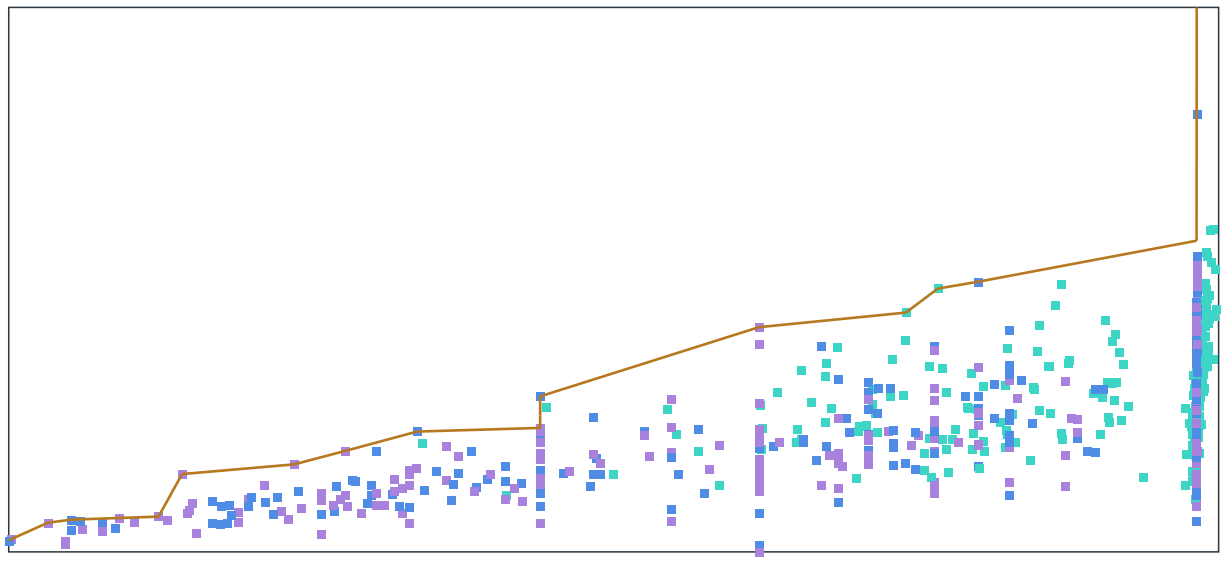
Pillars - Throughput vs hard Acc



Pareto - hard Acc vs Lucy Score

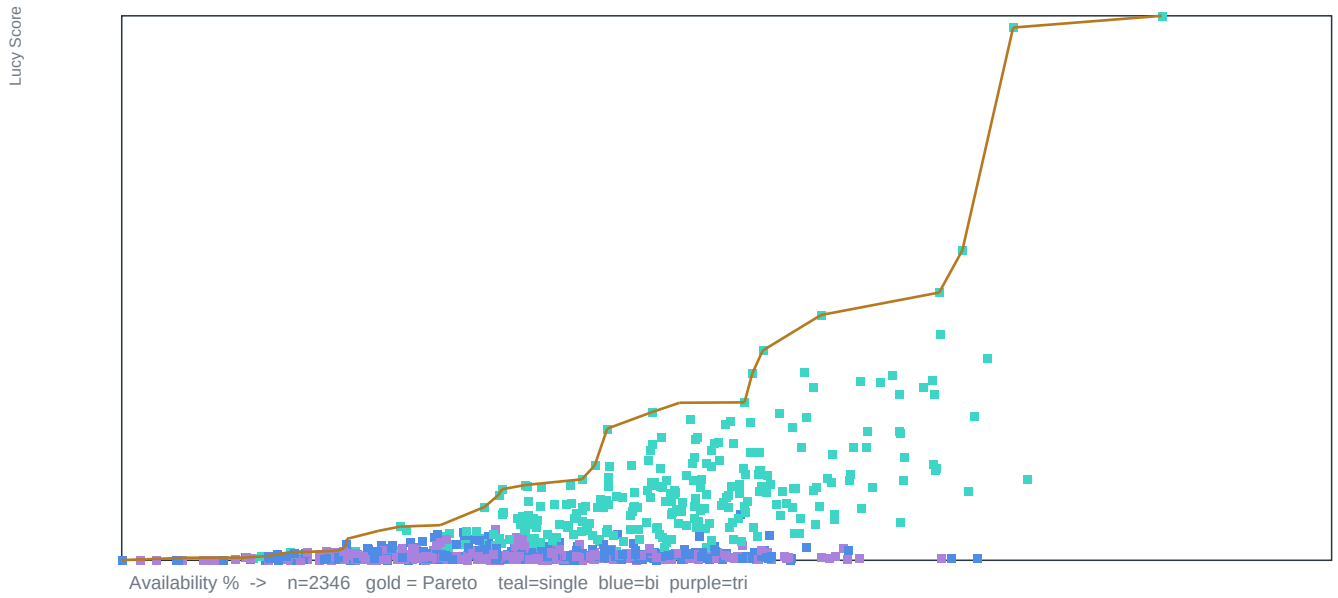


SoftAcc (serve-confidence) vs hard Acc

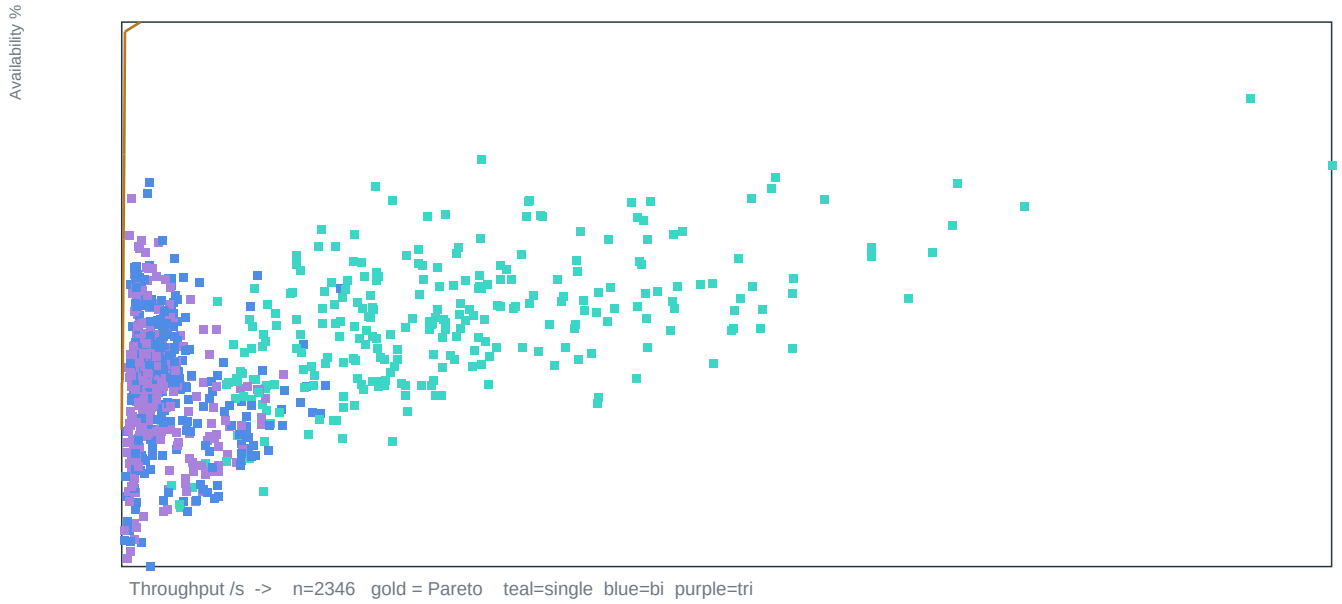



SoftAcc % -> n=2346 gold = Pareto teal=single blue=bi purple=tri
Hard Acc %

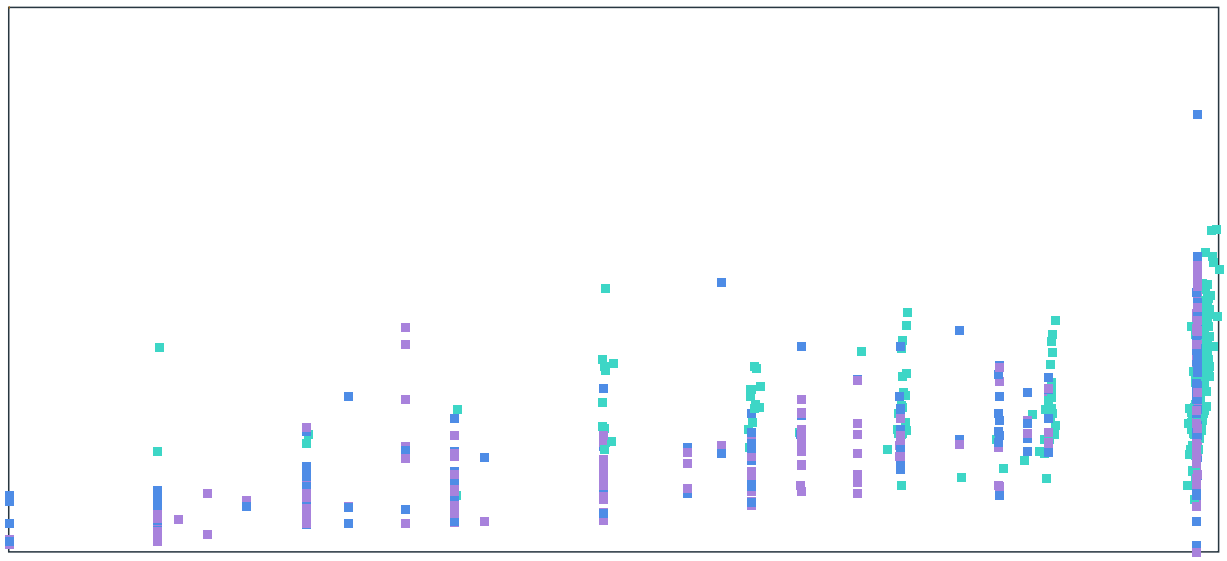
Avail vs Lucy Score (duty clock)



Pillars - Throughput vs Availability



AdaptPct vs hard Acc



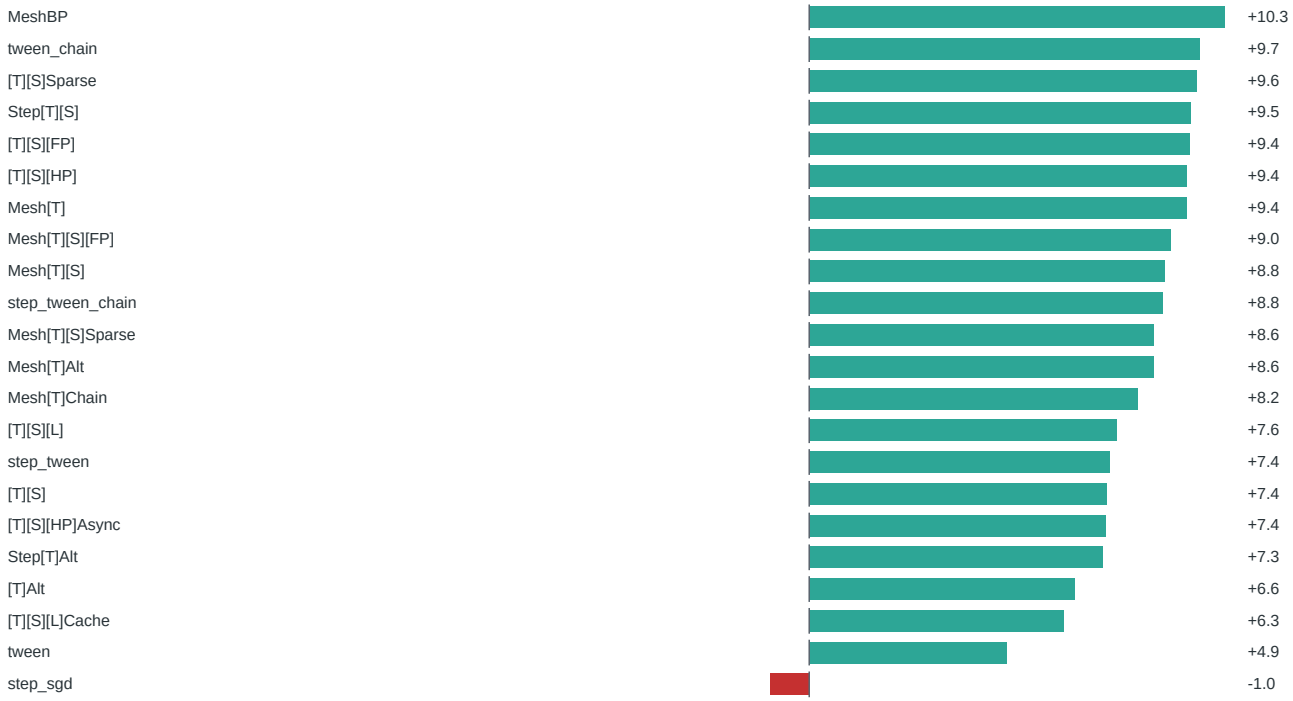

AdaptPct % -> n=2346 gold = Pareto teal=single blue=bi purple=tri
Hard Acc %

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%
MeshBP	102	+10.3	79	+10.6	-1.8	-156	-10.7	31
tween_chain	102	+9.7	83	+9.5	-2.0	-103	-7.4	42
[T][S]Sparse	102	+9.6	70	+11.1	+6.6	-293	-17.6	28
Step[T][S]	102	+9.5	70	+11.1	-1.5	-166	-12.9	31
[T][S][FP]	102	+9.4	69	+11.1	+4.0	-270	-16.9	30
[T][S][HP]	102	+9.4	72	+11.1	+3.5	-246	-15.3	38
Mesh[T]	102	+9.4	76	+10.1	-2.8	-172	-13.7	22
Mesh[T][S][FP]	102	+9.0	63	+11.1	+3.7	-333	-20.4	11
Mesh[T][S]	102	+8.8	67	+11.1	+3.5	-316	-19.8	15
step_tween_chain	102	+8.8	80	+10.4	-5.2	-177	-13.7	14
Mesh[T][S]Sparse	102	+8.6	65	+11.1	+7.6	-328	-19.5	23
Mesh[T]Alt	102	+8.6	65	+11.1	-7.7	-365	-23.1	0
Mesh[T]Chain	102	+8.2	75	+10.6	-2.0	-200	-13.8	18
[T][S][L]	102	+7.6	62	+11.1	-1.0	-289	-19.5	18
step_tween	102	+7.4	75	+9.8	-5.2	-183	-15.5	18
[T][S]	102	+7.4	65	+11.0	+4.5	-49	-5.4	59
[T][S][HP]Async	102	+7.4	62	+11.1	+3.9	-293	-18.1	13
Step[T]Alt	102	+7.3	61	+11.1	-8.3	-322	-21.9	0
[T]Alt	102	+6.6	63	+11.1	-6.6	-281	-20.1	5
[T][S][L]Cache	102	+6.3	62	+11.1	+3.2	-286	-18.2	20
tween	102	+4.9	69	+6.5	-3.0	-123	-11.5	25
step_sgd	102	-1.0	43	-0.2	-4.8	-128	-13.8	9

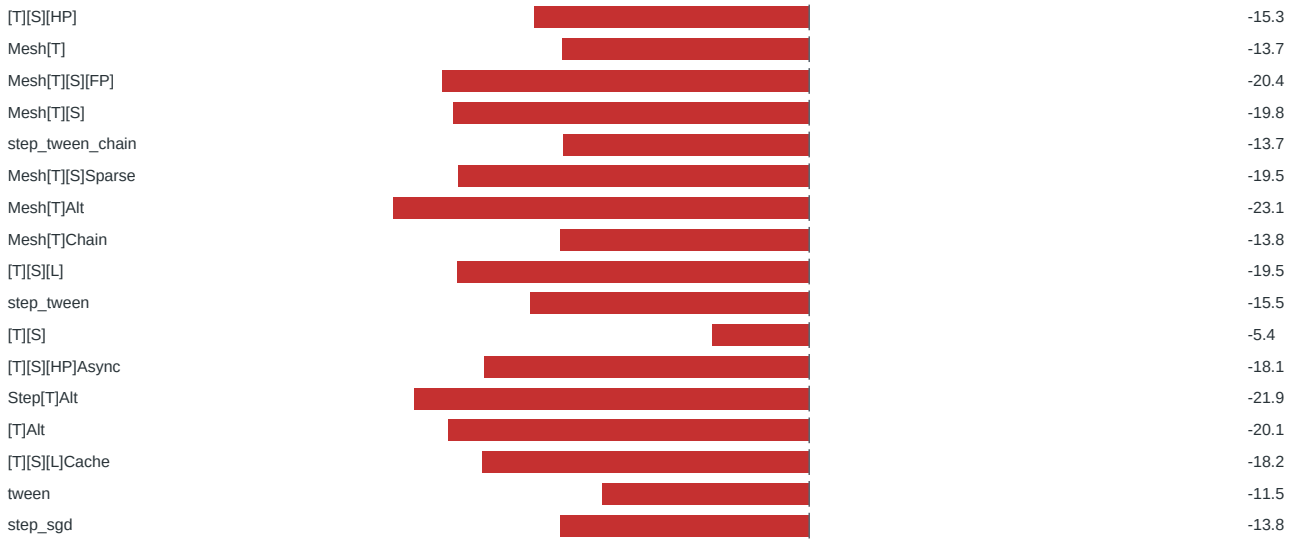
mean AccD vs sgd



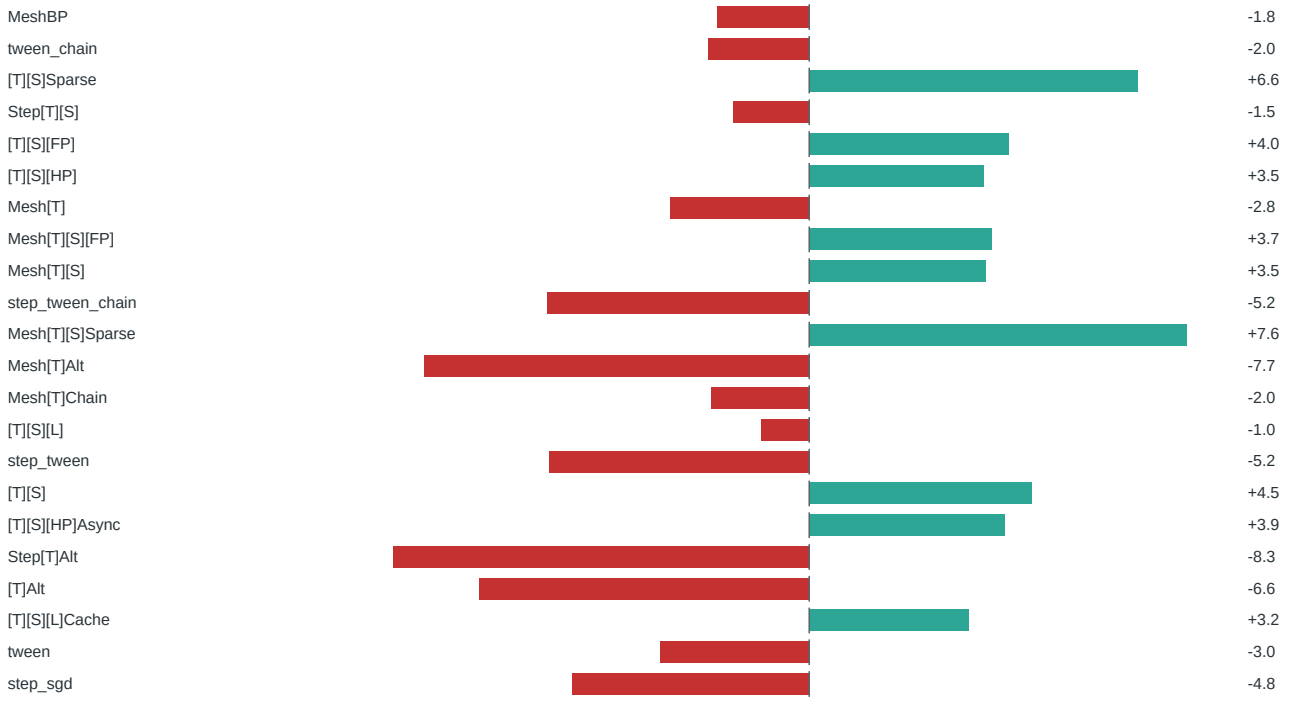
mean ScoreD vs sgd (duty clock)



mean ScoreD vs sgd (duty clock)



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	+20	+6	+18	+3	+13	+9	-2	+18	+11	+10	+26	+6
Mesh[T]	+12	+11	+14	+10	+21	+6	+5	+17	+15	+7	+7	+11
Mesh[T]Alt	+31	+14	+12	+4	-5	-1	+12	+9	+12	+9	+4	+11
Mesh[T]Chain	+12	+17	+13	+9	+7	+5	-8	+12	+14	+7	+10	+7
Mesh[T][S]	+7	+7	+17	+11	+5	+1	-13	+17	+12	+3	-3	+4
Mesh[T][S][FP]	+2	+1	+4	+10	+4	+11	+1	+19	+11	+18	+12	+4
Mesh[T][S]Sparse	+10	+14	+16	+6	+2	+1	-9	+11	+3	+10	+27	-2
Step[T]Alt	+6	-2	+36	-6	+21	+9	-1	+21	+3	+22	-9	-3
Step[T][S]	+9	-1	+14	+27	-4	-4	-6	+10	+20	+11	+10	-4
[T]Alt	+2	+1	+5	+10	-5	+5	-13	+7	+4	-4	+6	+14
[T][S]	+2	+1	+11	+16	+11	-6	-4	+16	+12	+21	+16	-1
[T][S][FP]	+7	+13	+3	+23	-6	+3	-5	+10	+10	+12	+1	+11
[T][S][HP]	-4	+3	+1	+6	+6	+1	+5	+16	+12	+20	+9	+2
[T][S][HP]Async	+9	+9	+12	+0	+12	+6	+10	+15	+11	+11	+0	+5
[T][S][L]	+4	+4	+8	+9	+8	+9	-8	+9	-0	+1	+13	+4
[T][S][L]Cache	+15	+0	+6	+5	+1	-0	+0	+19	+10	+3	+5	+8
[T][S]Sparse	+13	+8	+14	+2	+7	-4	-5	+18	+16	+15	+15	+5
step_sgd	-1	-2	-1	-4	-3	-1	-5	+4	+3	+0	-1	-5
step_tween	+6	+13	+16	-0	+9	-0	-4	+13	+20	+11	+4	+8
step_tween_chain	+9	+8	+15	+8	+4	+8	-1	+12	+18	+11	+14	+14
tween	+9	+4	+3	+4	-2	+0	-2	+11	+7	+4	+8	+10
tween_chain	+5	+12	+9	+8	+16	+2	-3	+12	+19	+10	+7	+11

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	+4	-0	+14	+20	+8	+10	+10	+2	+3	+15	+16	+15
Mesh[T]	-1	+13	+18	+6	+15	+10	+7	+4	-0	+20	-0	+10
Mesh[T]Alt	-6	-13	+1	+15	+4	+18	+8	-6	+9	+22	-4	+2
Mesh[T]Chain	+1	+6	+11	+13	+7	+6	+12	+1	-4	+28	+0	+6
Mesh[T][S]	-2	-4	+20	+21	+13	+12	+13	+16	+10	+11	-1	+14
Mesh[T][S][FP]	-3	+2	+34	+15	+2	+17	+1	+3	-6	+15	+1	+16
Mesh[T][S]Sparse	+6	-1	+18	+17	+11	+8	+2	+7	+1	+18	+4	+12
Step[T]Alt	-1	+23	+15	+13	+20	+30	+15	+7	-4	+15	-9	-3
Step[T][S]	+6	+8	+16	+18	+9	+16	+0	+9	+3	+15	+22	+18
[T]Alt	-1	+0	+38	+19	+10	+16	-3	+19	-0	+33	-4	+4
[T][S]	+1	+10	+9	+11	+10	+20	+17	+9	-6	+22	-7	+2
[T][S][FP]	-8	-5	+29	+8	+13	+28	-1	+6	+9	+23	+0	+21
[T][S][HP]	+2	+5	+24	+12	+8	+20	+3	+5	+4	+7	-2	+15
[T][S][HP]Async	+1	+11	+8	+6	+16	+19	+2	+8	-6	+9	+5	+15
[T][S][L]	+8	-10	+7	+13	+12	+9	+6	+6	-6	+17	-0	+20
[T][S][L]Cache	-8	+10	+10	+13	+4	+15	-1	+9	-14	+28	-0	+2
[T][S]Sparse	+13	+3	+26	+12	+19	+2	+11	+29	-13	+19	+16	+6
step_sgd	-7	-2	+5	+4	-2	-6	+2	-4	+0	+5	-3	+2
step_tween	-0	+4	+20	+4	+12	+3	+10	+0	-3	+8	+7	+12
step_tween_chain	+3	+7	+29	+12	+7	+6	+3	+10	-5	+12	-8	+17
tween	-2	+4	+5	+17	+2	+4	+1	-1	+10	+9	+7	+13
tween_chain	+3	+0	+14	+10	+9	+15	+10	+6	-1	+19	+6	+20

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	+13	+5	+15	+13	+1	+24	+10	-4	+6	+18
Mesh[T]	+11	+12	+14	+9	+2	+9	+17	+1	-4	+11
Mesh[T]Alt	+4	+15	+14	+11	+5	+34	+1	+2	+17	+25
Mesh[T]Chain	+7	+9	+15	+7	+1	+10	+10	+5	+6	+17
Mesh[T][S]	+28	+13	+16	-3	+14	+14	-7	+14	+8	+10
Mesh[T][S][FP]	+11	+14	+8	-2	-12	+8	+23	+18	+11	+32
Mesh[T][S]Sparse	+8	+15	+14	+2	+5	+13	+0	+9	+9	+25
Step[T]Alt	-2	-2	+10	+4	-0	-0	+17	-6	+1	+9
Step[T][S]	-2	+2	+4	+13	+13	+27	+9	-4	+22	+17
[T]Alt	+15	+6	+11	-10	+18	+13	-2	-6	-1	+16
[T][S]	-1	+6	+8	+7	+17	+21	+1	-5	+1	+5
[T][S][FP]	+26	-6	+21	-2	+6	+17	+13	+8	+18	+16
[T][S][HP]	+14	+10	+33	-3	+19	+30	+20	+5	+1	+10
[T][S][HP]Async	-5	+8	+31	-2	+8	+21	+1	-11	-1	+4
[T][S][L]	+23	+16	+26	+0	+12	+31	-4	+1	+9	-0
[T][S][L]Cache	-4	+8	+7	+10	+8	+12	-9	+21	+4	+17
[T][S]Sparse	+13	+1	+19	+12	+1	+22	+15	-13	+6	+3
step_sgd	-2	-0	-0	-2	-5	+4	+4	-11	+0	+4
step_tween	+3	+10	+20	-4	+10	+12	+8	+4	+4	+12
step_tween_chain	+4	+8	+14	+7	+5	+22	+5	-4	+7	+14
tween	+1	-2	+9	-7	+3	+16	+8	+4	-3	+15
tween_chain	+16	+8	+16	+6	+7	+17	+7	+8	+4	+19

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	-11	+3	-6	-8	-7	-63	-17	-3	+2	-6	+9	-4
Mesh[T]	-24	-21	-9	-13	-4	-81	-35	+2	+2	-2	-5	-4
Mesh[T]Alt	-34	-28	-15	-23	-22	-92	-48	-14	-1	-16	-10	-13
Mesh[T]Chain	-19	-17	-5	-14	-8	-73	-41	+3	+1	-9	+2	-2
Mesh[T][S]	-29	-23	-13	-20	-18	-88	-46	-10	+0	-13	-7	-11
Mesh[T][S][FP]	-31	-25	-13	-19	-19	-87	-47	-10	+0	-14	-7	-13
Mesh[T][S]Sparse	-32	-19	-11	-19	-18	-82	-47	-12	-1	-13	-5	-12
Step[T]Alt	-33	-25	-14	-22	-19	-90	-45	-12	-1	-16	-10	-13
Step[T][S]	-24	-17	-5	-14	-15	-80	-40	-8	+3	-10	+8	-8
[T]Alt	-31	-24	-14	-17	-18	-77	-49	-11	-0	-15	-7	-11
[T][S]	-17	+4	+3	-1	+9	-59	-25	+2	+6	+17	+15	-7
[T][S][FP]	-29	-17	-11	-15	-14	-71	-38	-7	+2	-11	-7	-8
[T][S][HP]	-32	-16	-9	-20	-15	-79	-38	-11	+0	-7	+4	-5
[T][S][HP]Async	-29	-16	-13	-20	-13	-80	-41	-8	-0	-11	-7	-9
[T][S][L]	-31	-25	-9	-18	-12	-82	-47	-9	-0	-13	-6	-11
[T][S][L]Cache	-28	-25	-8	-20	-15	-75	-41	-2	+1	-13	-5	-7
[T][S]Sparse	-27	-18	-8	-18	-16	-85	-41	-8	+0	-11	-3	-12
step_sgd	-17	-16	-14	-14	-12	-68	-37	-8	+2	-5	-4	-9
step_tween	-31	-11	-10	-16	-2	-74	-43	+2	-0	-10	-4	-6
step_tween_chain	-22	-16	-2	-13	-6	-56	-40	-7	-0	-10	-3	-9
tween	-19	-14	-14	-10	-11	-62	-25	+1	+4	-14	+0	-7
tween_chain	-17	-2	+8	-4	-9	-79	+2	-2	+11	+4	-5	-0

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	-15	-27	+3	-7	-22	-2	-2	-10	-82	+5	-4	-11
Mesh[T]	-21	-9	-2	-5	-18	-7	-3	-11	-72	+7	-6	-11
Mesh[T]Alt	-26	-33	-7	-19	-32	-11	-5	-23	-94	-1	-25	-15
Mesh[T]Chain	-18	-27	-2	-9	-23	-6	-0	-16	-77	+4	-13	-9
Mesh[T][S]	-22	-31	-3	-15	-24	-9	-4	-19	-89	+1	-23	-12
Mesh[T][S][FP]	-24	-30	-3	-16	-24	-10	-4	-19	-90	+2	-22	-11
Mesh[T][S]Sparse	-23	-29	-4	-16	-24	-10	-5	-20	-87	+1	-17	-11
Step[T]Alt	-24	-29	-5	-16	-31	-9	-5	-20	-87	-1	-25	-16
Step[T][S]	-13	-21	-1	-10	-17	-2	-3	-14	-72	+10	+13	-6
[T]Alt	-23	-32	-4	-16	-29	-11	-5	-19	-90	+2	-20	-14
[T][S]	-11	-13	+5	-9	+5	-1	+0	-8	-74	+16	-5	-7
[T][S][FP]	-22	-28	+1	-14	-23	-7	-4	-17	-82	+5	-16	-11
[T][S][HP]	-16	-20	+1	-13	-10	-7	-2	-16	-75	-0	-18	-9
[T][S][HP]Async	-19	-22	-4	-15	-23	-9	-3	-16	-86	+0	-17	-10
[T][S][L]	-19	-33	-4	-15	-30	-8	-4	-19	-91	+3	-17	-13
[T][S][L]Cache	-19	-18	-2	-10	-28	-10	-3	-19	-91	+4	-21	-14
[T][S]Sparse	-19	-26	-2	-13	-16	-9	-2	-12	-89	+1	-13	-14
step_sgd	-18	-27	-1	-6	-20	-10	-2	-12	-61	+5	-16	-5
step_tween	-21	-17	-2	-16	-16	-9	-2	-20	-88	+0	-8	-11
step_tween_chain	-19	-16	+2	-9	-18	-9	-3	-4	-81	+3	-13	-9
tween	-14	-13	-5	-8	-14	-8	-1	-11	-48	+13	-13	-5
tween_chain	-13	-11	-0	-10	-11	-3	+3	+8	-80	+14	-9	-8

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	-15	-8	-2	-18	-1	-0	-0	-26	-18	+7
Mesh[T]	-18	-8	-6	-15	-6	+0	-2	-26	-33	+2
Mesh[T]Alt	-27	-14	-9	-29	-11	-4	-5	-32	-42	-8
Mesh[T]Chain	-17	-6	-2	-21	-2	-0	-3	-21	-23	+3
Mesh[T][S]	-21	-12	-6	-26	-6	-3	-5	-23	-40	-4
Mesh[T][S][FP]	-25	-11	-7	-27	-10	-3	-4	-27	-38	-4
Mesh[T][S]Sparse	-25	-7	-7	-27	-9	-3	-4	-28	-37	-2
Step[T]Alt	-28	-14	-8	-26	-10	-5	-4	-31	-43	-7
Step[T][S]	-19	-5	-2	-19	-3	-2	-1	-23	-22	+3
[T]Alt	-19	-11	-7	-24	-8	-2	-5	-31	-35	-5
[T][S]	-12	+4	-6	-8	+8	-1	-1	-14	-11	+11
[T][S][FP]	-22	-12	-3	-24	-7	-1	-1	-24	-34	+0
[T][S][HP]	-16	-5	-5	-22	-1	+3	+1	-26	-37	+1
[T][S][HP]Async	-26	-6	-3	-24	-6	-1	-4	-29	-39	-5
[T][S][L]	-23	-9	-6	-27	-8	-2	-5	-30	-36	-6
[T][S][L]Cache	-25	-11	-7	-24	-8	-2	-5	-28	-37	+0
[T][S]Sparse	-21	-11	-5	-19	-7	-3	-3	-31	-34	-3
step_sgd	-18	-6	-9	-16	-3	-2	+0	-25	-17	+0
step_tween	-16	-8	-4	-24	-7	-2	-2	-24	-23	-1
step_tween_chain	-16	-8	-8	-18	-6	-1	-2	-28	-25	+1
tween	-21	-13	-4	-27	+1	+2	-2	-16	-13	-0
tween_chain	-14	+0	+1	-6	-1	+3	-4	-8	-15	+6

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	-5	-1	-2	-2	-4	-1	+1	+2	-3	-2	-3
Mesh[T]	-4	-7	-1	-4	-4	-7	-6	+2	-1	+0	-4	-6
Mesh[T]Alt	-9	-11	-6	-7	-8	-11	-8	-4	-7	-10	-10	-9
Mesh[T]Chain	-6	-4	+1	-4	-1	-5	-5	+4	-1	-4	-2	+0
Mesh[T][S]	+2	-1	+6	+7	+4	-0	+0	+6	+4	+2	+3	+5
Mesh[T][S][FP]	+1	-3	+6	+5	+2	-3	-1	+4	+6	+2	+3	+2
Mesh[T][S]Sparse	+4	+4	+11	+11	+6	+10	+6	+10	+8	+5	+5	+5
Step[T]Alt	-10	-10	-9	-9	-8	-12	-10	-5	-8	-11	-10	-9
Step[T][S]	-5	-4	+1	-4	-0	-4	-6	+0	+2	-3	-2	-4
[T]Alt	-5	-8	-6	-4	-9	-7	-8	-4	-2	-5	-11	-7
[T][S]	+3	+0	+4	+7	+3	-0	+4	+4	+8	+6	+4	+4
[T][S][FP]	+2	+1	+7	+7	+4	-3	+4	+8	+13	+1	+2	+2
[T][S][HP]	+2	-1	+8	+4	+3	-3	+2	+4	+5	+3	+4	+7
[T][S][HP]Async	+2	-0	+7	+5	+5	+1	+0	+7	+7	+3	+2	+6
[T][S][L]	-3	-6	+6	+2	+0	-3	-6	+5	+2	-3	-3	-1
[T][S][L]Cache	+0	-5	+7	+4	+6	+2	+3	+6	+6	+4	+2	+4
[T][S]Sparse	+4	+4	+14	+8	+5	+1	+6	+9	+7	+5	+7	+4
step_sgd	-7	-7	-6	-6	-5	-5	-6	-1	-3	-5	-4	-7
step_tween	-7	-6	-4	-7	-5	-6	-9	+1	-6	-6	-6	-3
step_tween_chain	-7	-8	-3	-8	-7	-6	-8	-1	-4	-6	-9	-5
tween	-5	-5	-2	-3	-3	-3	-1	+3	-1	-6	-4	-4
tween_chain	-4	-6	-2	+0	-5	-6	-5	+2	-0	-2	-6	-3

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	-3	-0	-1	-6	-5	-2	-1	-7	+1	-1	-7
Mesh[T]	+3	-2	-4	+1	-7	-3	-3	-4	-3	-0	-4	-6
Mesh[T]Alt	-7	-10	-9	-6	-11	-10	-6	-9	-11	-4	-9	-8
Mesh[T]Chain	-1	-4	-3	-0	-5	-5	-2	+1	-6	-2	-3	-2
Mesh[T][S]	+3	+0	+3	+4	+2	+1	+6	+5	-2	+5	-1	+5
Mesh[T][S][FP]	+6	-0	+4	+6	+3	+1	+10	+5	-2	+7	+3	+5
Mesh[T][S]Sparse	+7	+10	+6	+8	+7	+2	+9	+10	+4	+11	+11	+4
Step[T]Alt	-9	-10	-8	-5	-9	-11	-4	-8	-9	-7	-6	-11
Step[T][S]	+0	-5	-4	+2	-3	-3	+0	-2	-3	+2	+4	-4
[T]Alt	-8	-11	-8	-5	-10	-13	-8	-7	-5	-5	-7	-9
[T][S]	+7	+0	+5	+7	-2	+1	+7	+5	-3	+8	+0	+3
[T][S][FP]	+5	-1	+7	+5	+2	+2	+9	+3	-2	+5	+2	+2
[T][S][HP]	+2	+0	+3	+5	+2	+1	+5	+5	-1	+4	+2	+4
[T][S][HP]Async	+5	-0	+5	+5	+0	+0	+5	+3	-2	+7	+1	+5
[T][S][L]	+2	-7	+2	-0	-7	-1	-1	-2	-6	+4	-3	-4
[T][S][L]Cache	+5	+5	+5	+7	-4	-0	+6	+2	-4	+7	-1	+2
[T][S]Sparse	+6	+4	+7	+8	+4	+4	+11	+7	+4	+7	+5	+7
step_sgd	-2	-7	-5	-5	-6	-14	-5	-4	-2	-1	-4	-6
step_tween	-7	-3	-6	-3	-4	-12	-2	-8	-7	-6	-1	-8
step_tween_chain	-3	-6	-4	-5	-7	-9	-1	-5	-4	-3	-3	-5
tween	-3	-3	-5	+1	-6	-8	-10	-5	-1	+5	-5	-4
tween_chain	-4	+1	-4	-2	-5	-3	+2	-2	-6	+3	+1	-2

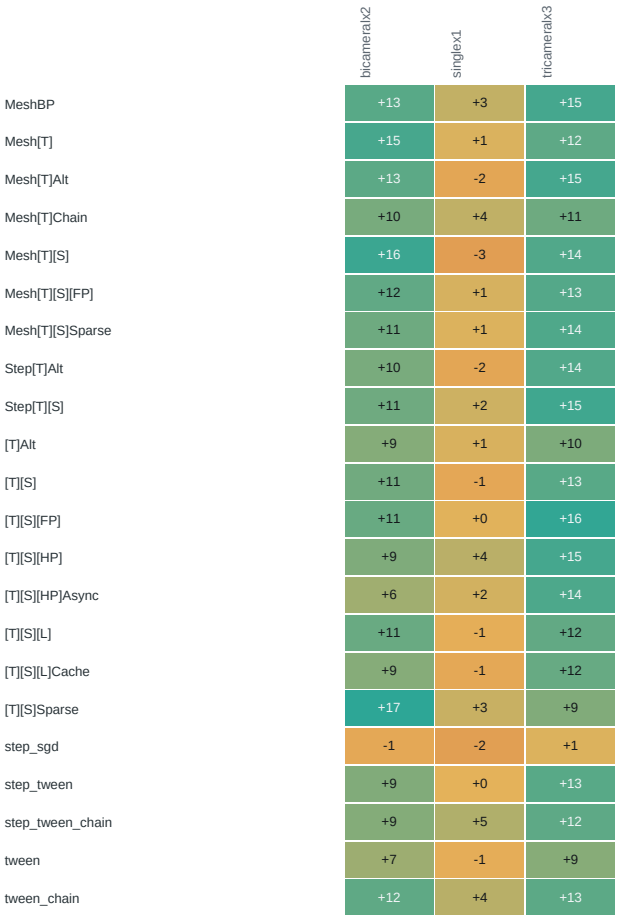
AvailD vs sgd, every mode x dtype (cols 25-34)

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

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

AccD vs sgd, every mode x arch

AccD vs sgd, every mode x arch



Family collapse - Step* vs non-Step

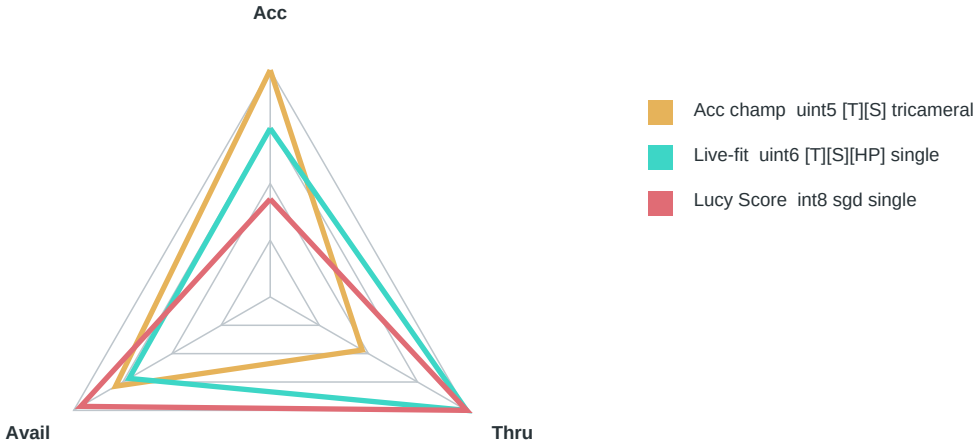
Step* is a 1D pipe (one sample enters layer 0 per tick; output is the sample that entered depth ticks ago). Non-Step of the same family is a full-chain update. AccD is a real scheduler split, not leftover warm-up forwards.

step	plain	n	mean |AccD|
Step[T]Alt	[T]Alt	102	16.24
Step[T][S]	[T][S]	102	13.43
step_sgd	sgd	102	5.12
step_tween	tween	102	8.51
step_tween_chain	tween_chain	102	9.13

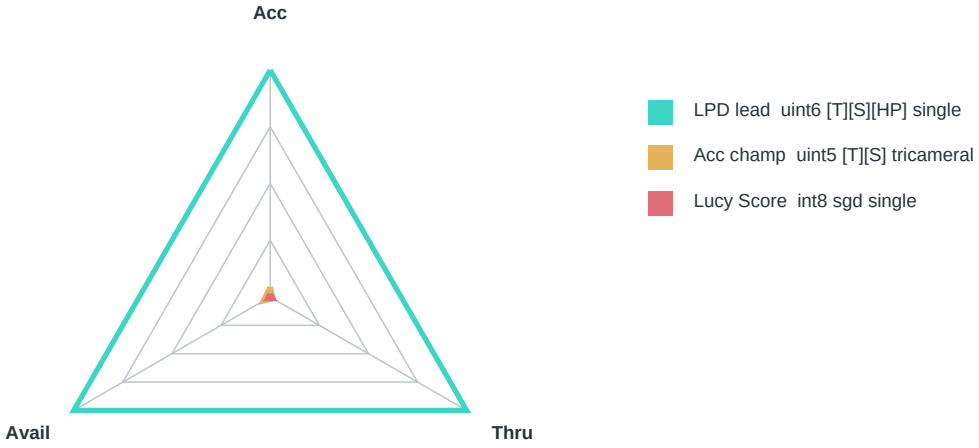
Consciousness - Acc, Throughput, Availability

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 uint5|none|[T][S]|tricameral|simd Acc 87.5 Thru 51 Avail 27.3% 10.3 KiB (RAM reference)
Lucy Score champ (T x Avail x Acc) int8|none|sgd|single|simd Score 273.6 Acc 37.7 Soft 25 0.4 KiB
Live-fit champ (best Q) uint6|none|[T][S][HP]|single|simd Acc 65.0 Thru 109 Avail 24.9% 0.3 KiB
Board fastest float32|none|sgd|single|simd Thru 2328 (traps may own this) Best availability complex64|none|Mesh[T][S]Sparse|bicameral|simd 38.5%
Learner Thru peak 109 learner Avail peak 34.6%

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.

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
-	uint6 [T][S][HP] single	74	100	72	81	3	31.0	25.17	65.0	109	0.3
-	uint4 [T][S] tricameral	71	84	74	76	80	1.2	0.95	62.5	92	8.3
-	uint3 [T][S][HP]Async bicameral	71	15	72	42	46	2.2	0.93	62.5	16	4.7
-	int3 [T]Alt bicameral	71	19	34	36	46	2.2	0.78	62.5	20	4.7
acc	uint5 [T][S] tricameral	100	47	79	72	100	1.0	0.72	87.5	51	10.3
-	int6 [T][S] bicameral	71	51	73	64	90	1.1	0.71	62.5	56	9.3
-	int3 [T][S][HP] tricameral	71	15	63	41	60	1.7	0.68	62.5	16	6.2
-	int5 [T][S] tricameral	71	47	81	65	100	1.0	0.65	62.5	52	10.3
-	uint5 [T][S][HP] tricameral	71	27	100	58	100	1.0	0.58	62.5	30	10.3
acc	uint5 MeshBP bicameral	80	24	39	42	76	1.3	0.56	70.3	27	7.8
acc	int4 Step[T]Alt bicameral	86	36	12	34	61	1.7	0.56	75.0	40	6.2
acc	uint6 Mesh[T][S][FP] bicameral	100	9	70	40	91	1.1	0.44	87.5	10	9.3
-	uint3 Mesh[T]Alt tricameral	71	6	35	24	60	1.7	0.40	62.5	6	6.2
-	nf4 [T]Alt tricameral	71	12	23	27	80	1.3	0.33	62.5	13	8.2

Band	Cell	Acc%	Thru%	Avail%	Q%	RAM%	xSmall	LPD	Acc	Thru	KiB
acc	int5 Step[T]Alt tricameral	86	8	33	29	100	1.0	0.29	75.0	9	10.3
-	int16 [T][S]Sparse bicameral	71	38	73	58	240	0.4	0.24	62.5	41	24.8
-	fp8e4m3 Step[T]Alt tricameral	71	14	25	30	159	0.6	0.19	62.5	16	16.4
-	uint16 [T][S][FP] tricameral	79	35	68	57	318	0.3	0.18	68.8	38	32.8
acc	uint16 [T][S][L] tricameral	86	35	61	57	318	0.3	0.18	75.0	38	32.8
-	bfloat16 Mesh[T]Alt bicameral	79	17	26	33	240	0.4	0.14	68.8	19	24.8

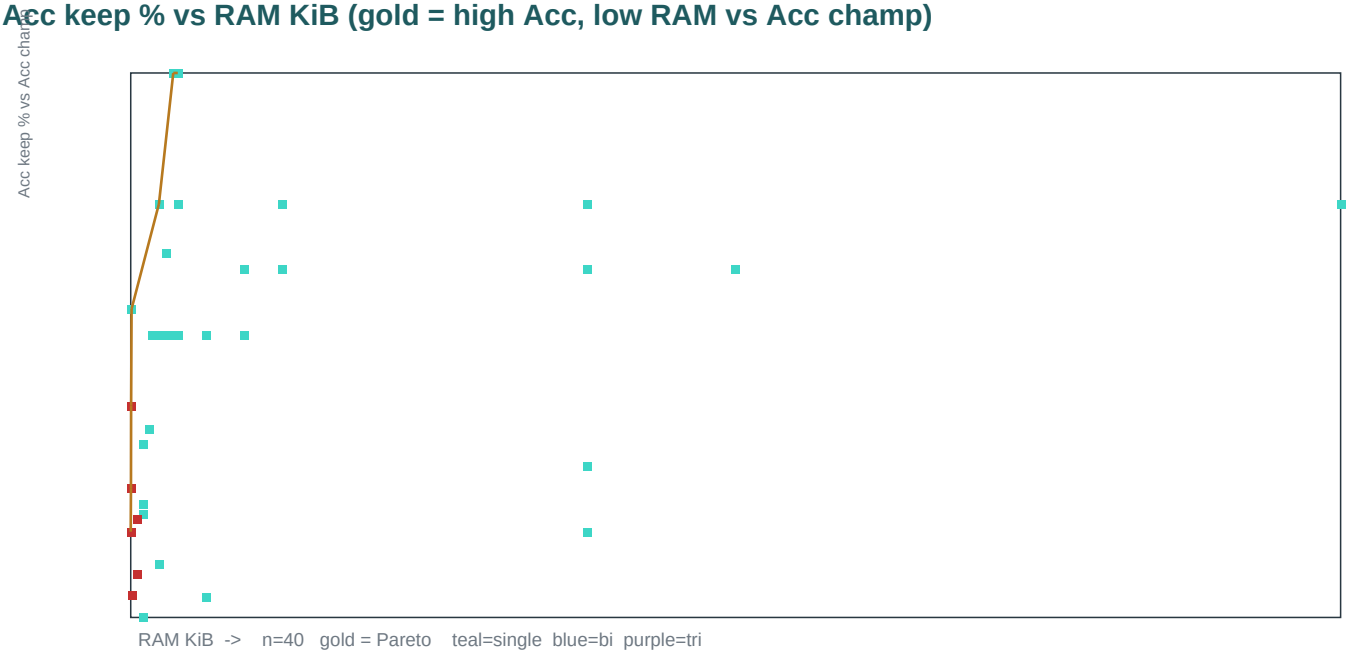
Consciousness rank - Q = geomean Acc/Thru/Avail keep

Band	Cell	Acc%	Thru%	Avail%	Q%	LPD	Thru	Avail
-	uint6 [T][S][HP] single	74	100	72	81	25.17	109	24.9
-	uint4 [T][S] tricameral	71	84	74	76	0.95	92	25.5
acc	uint5 [T][S] tricameral	100	47	79	72	0.72	51	27.3
acc	int64 [T][S]Sparse bicameral	86	44	80	67	0.07	48	27.6
-	int5 [T][S] tricameral	71	47	81	65	0.65	52	28.0
-	int6 [T][S] bicameral	71	51	73	64	0.71	56	25.2
-	complex64 [T][S][FP] tricameral	79	37	87	63	0.05	40	30.1
acc	complex64 Step[T][S] bicameral	86	55	52	63	0.07	60	18.1
-	uint64 [T][S][L]Cache bicameral	79	42	62	59	0.06	46	21.6
-	int16 [T][S]Sparse bicameral	71	38	73	58	0.24	41	25.4

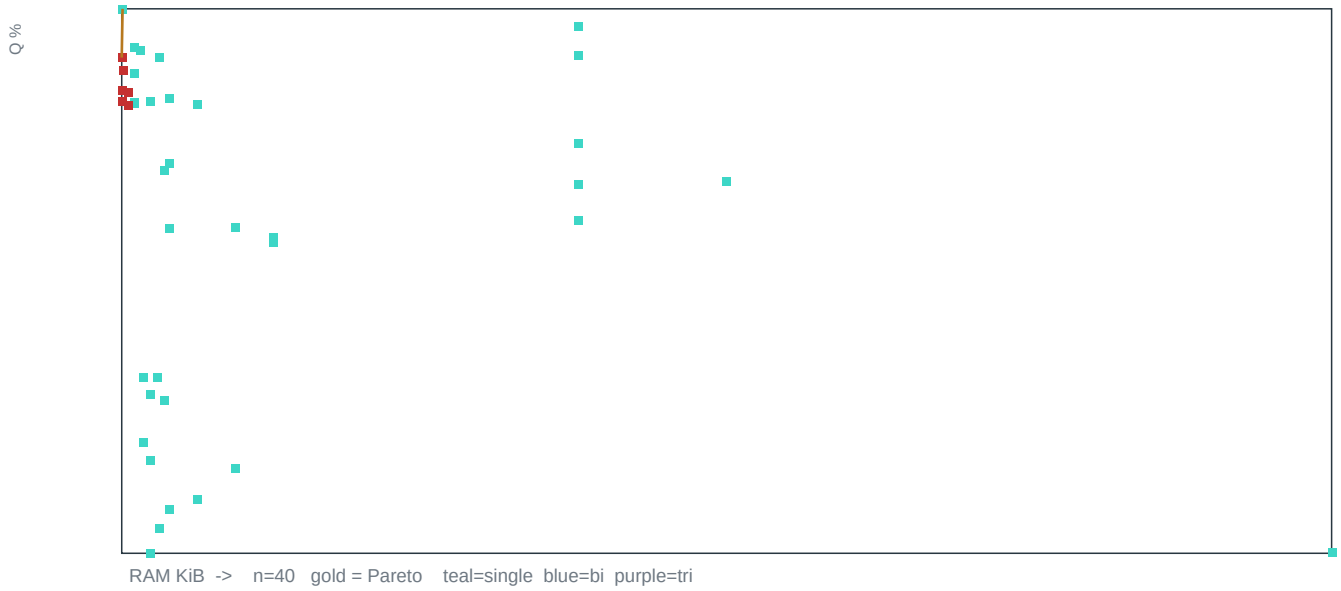
Trap - tiny RAM, Acc keep < 70% (Score/MiB and SoftAcc Score lie here)

Band	Cell	Acc%	Thru%	Avail%	Q%	RAM%	xSmall	LPD	Acc	Thru	KiB
trap	binary sgd single	18	100	80	53	1	32.0	0.00	16.2	1608	0.1
trap	binary step_sgd single	19	100	52	46	1	32.0	0.00	16.5	1174	0.1
trap	binary tween single	28	100	43	50	1	32.0	0.00	24.9	992	0.1
trap	binary tween_chain single	35	100	56	58	1	32.0	0.00	31.0	1181	0.1
trap	binary step_tween single	33	100	53	56	1	32.0	0.00	28.8	875	0.1
trap	binary step_tween_chain single	30	100	39	49	1	32.0	0.00	26.3	920	0.1
trap	binary MeshBP single	45	100	61	65	1	32.0	0.00	39.0	1137	0.1
trap	binary Mesh[T] single	38	100	31	49	1	32.0	0.00	33.1	427	0.1
trap	binary Mesh[T]Chain single	19	100	66	50	1	32.0	0.00	16.6	691	0.1
trap	binary [T][S] single	38	100	72	65	1	32.0	0.00	32.8	1118	0.1

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



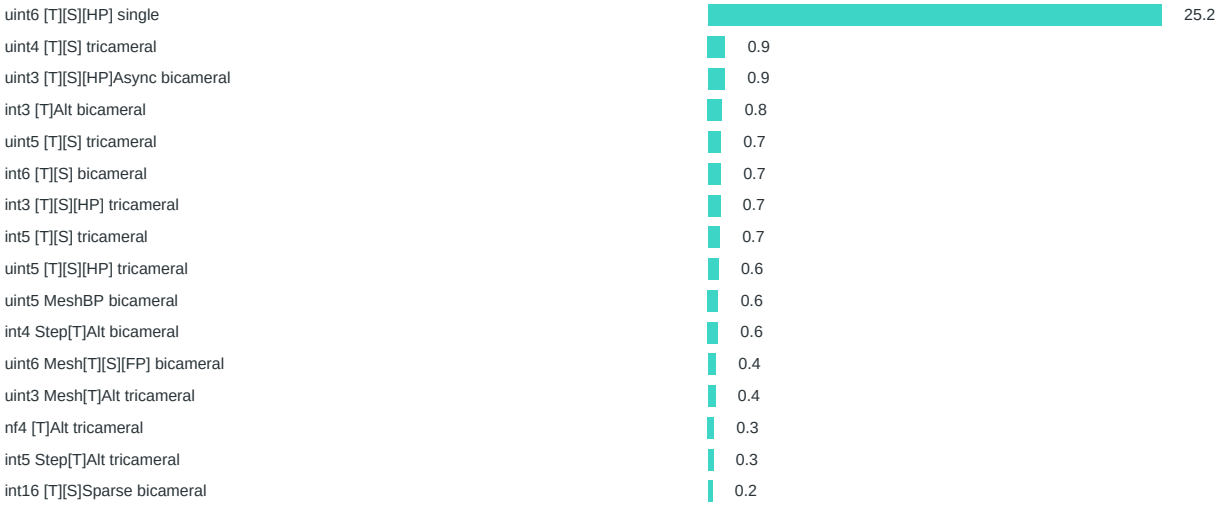
Q% vs RAM KiB (gold = high consciousness, low RAM)



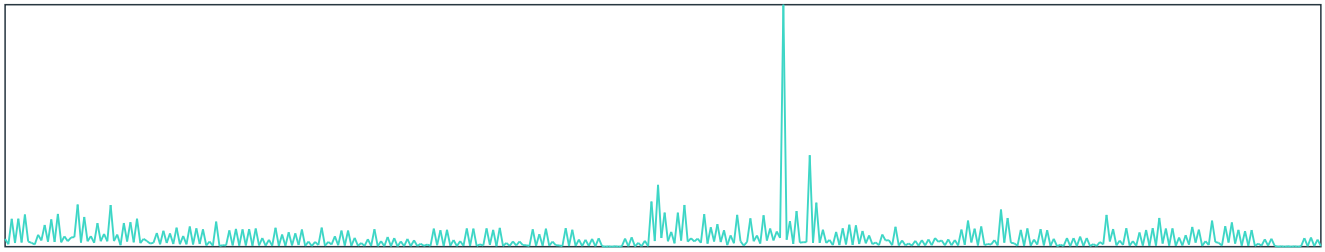
Q% vs shrink vs Acc champ (gold = upper right)



Top Lucy density (LPD)

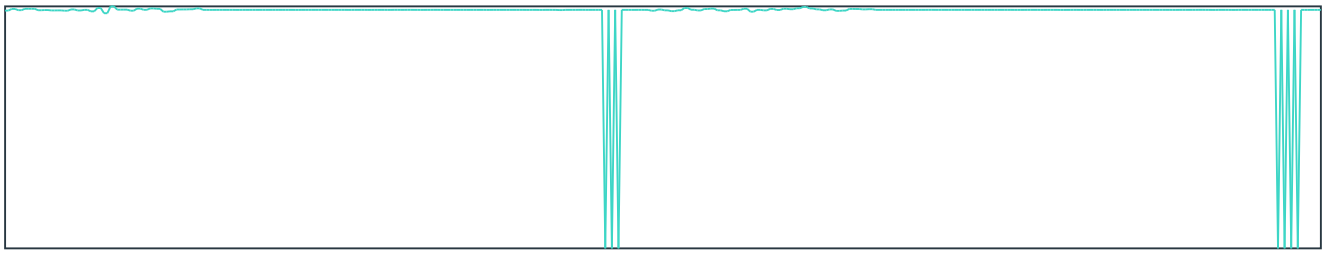


Live pulse (Score)



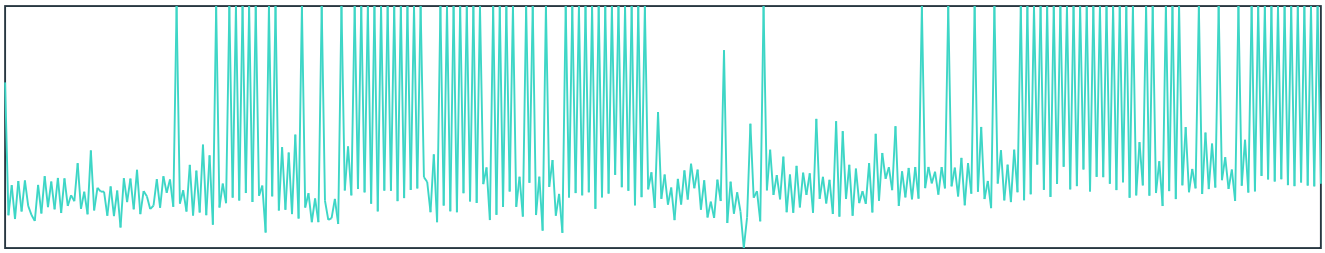
n=400 min=0.00 max=443.53

Live pulse (SoftAcc)



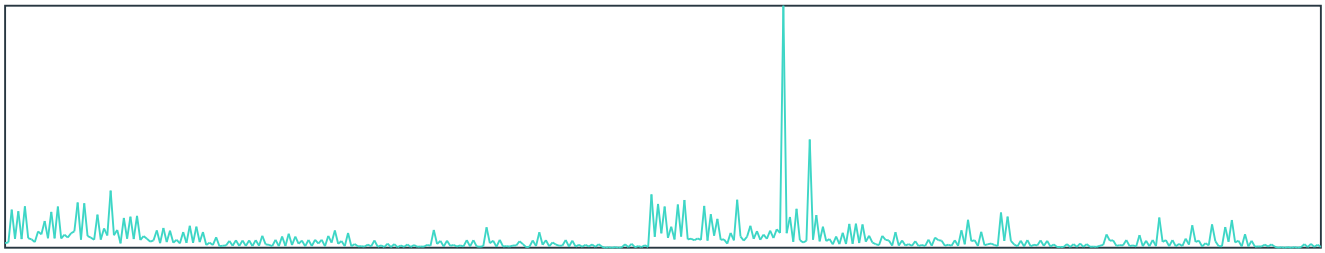
n=400 min=0.00 max=25.37

Live pulse (Availability)



n=400 min=6.06 max=100.00

Live pulse (Throughput)



n=400 min=0.00 max=4251.28

Queue by train mode (this epoch)

Mode	Done	Run	Left	Total