

The Third International Verification of Neural Networks Competition (VNN-COMP 2022): Summary and Results

Stanley Bak^{*}, Changliu Liu[†], Taylor Johnson[‡]

Abstract

This report summarizes the third International Verification of Neural Networks Competition (VNN-COMP 2021), held as a part of the 5th Workshop on Formal Methods for ML-Enabled Autonomous Systems (FOMLAS) that was collocated with the 34th International Conference on Computer-Aided Verification (CAV). The goal of the competition is to provide an objective comparison of the state-of-the-art methods in neural network verification, in terms of scalability and speed. Along this line, we used standard formats (ONNX for neural networks and VNNLIB for specifications), standard hardware (all tools are run by the organizers on AWS), and tool parameters provided by the tool authors. This report summarizes the rules, benchmarks, participating tools, results, and lessons learned from this competition.

1 Total Score

Table 1: Overall Score

#	Tool	Score
1	α, β Crown	1639.5
2	Pyrat	871.8
3	Neuralsat	832.3
4	Marabou	587.6
5	Nnenum	445.9
6	Nnv	272.5
7	Fastbatllnn	100.0

^{*}S. Bak is with Stony Brook University, stanley.bak@stonybrook.edu.

[†]C. Liu is with Carnegie Mellon University, cliu6@andrew.cmu.edu.

[‡]T. Johnson is with Vanderbilt University, taylor.johnson@vanderbilt.edu.

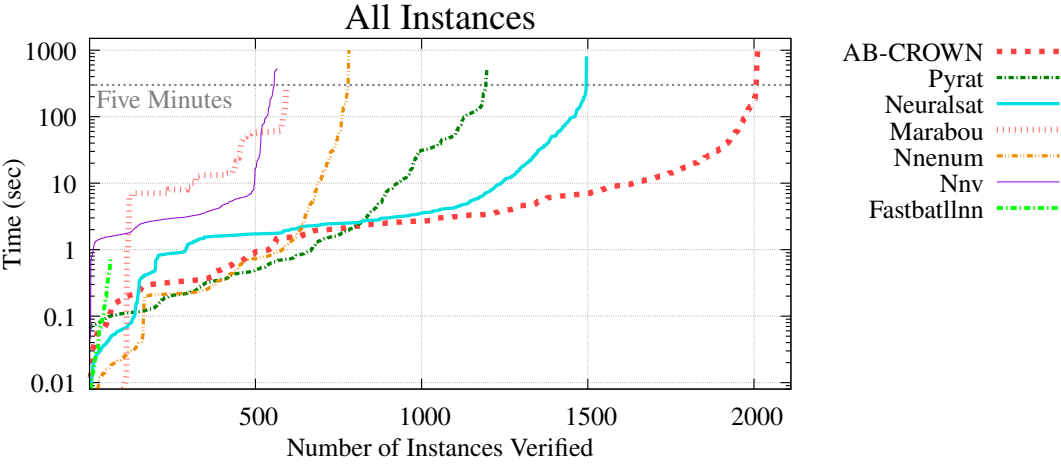


Figure 1: Cactus Plot for All Instances.

2 Scored Benchmarks

Table 2: Benchmark 2022-nn4sys

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	150	0	0	2	1200	100.0%
2	Neuralsat	76	0	0	2	460	38.3%
3	Pyrat	12	0	0	2	-180	0%
4	Nnv	0	2	0	8	-1180	0%
5	Nnenum	20	0	0	2	-100	0%

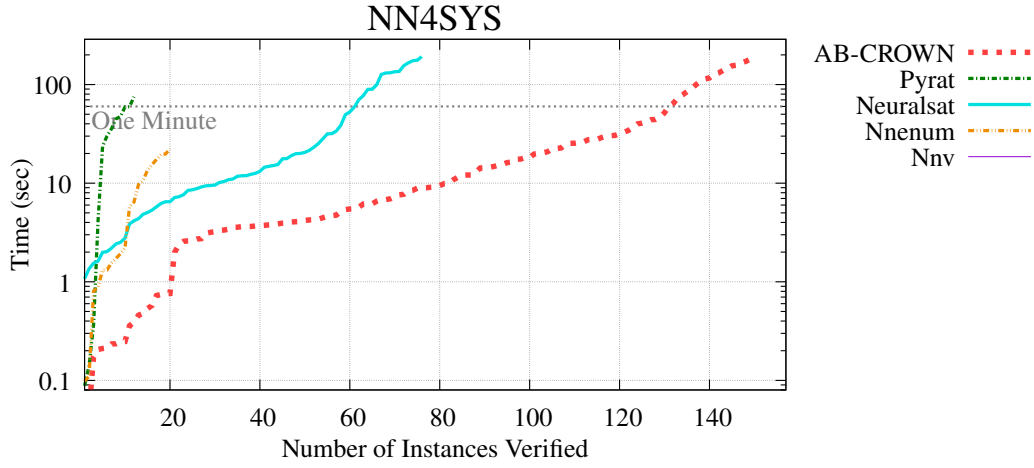


Figure 2: Cactus Plot for NN4SYS.

Table 3: Benchmark 2022-oval21

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	25	1	0	0	260	100.0%
2	Neuralsat	19	1	0	0	200	76.9%
3	Nnv	4	0	0	0	40	15.4%
4	Nnenum	3	1	0	0	40	15.4%
5	Pyrat	1	1	0	0	20	7.7%

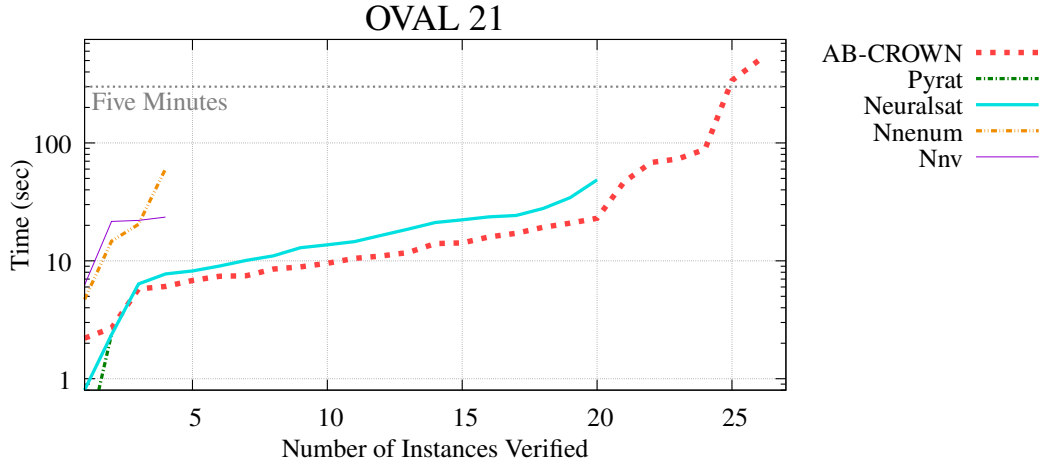


Figure 3: Cactus Plot for OVAL 21.

Table 4: Benchmark 2023-acasxu

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	Nnenum	139	47	0	0	1860	100.0%
2	α, β Crown	139	47	0	0	1860	100.0%
3	Neuralsat	138	46	0	0	1840	98.9%
4	Pyrat	137	45	0	0	1820	97.8%
5	Marabou	135	46	0	0	1810	97.3%
6	Nnv	68	27	0	0	950	51.1%

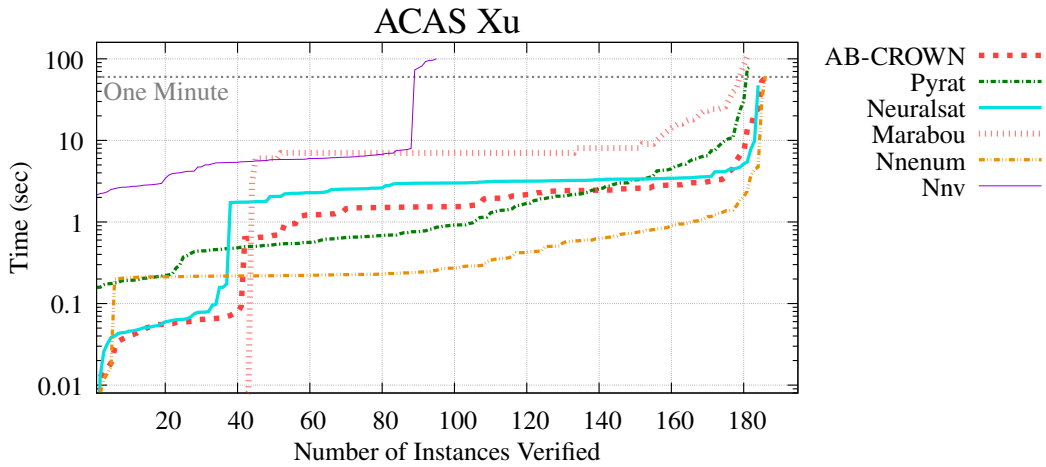


Figure 4: Cactus Plot for ACAS Xu.

Table 5: Benchmark 2023-cctsd-db-yolo

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	11	28	0	0	390	100.0%

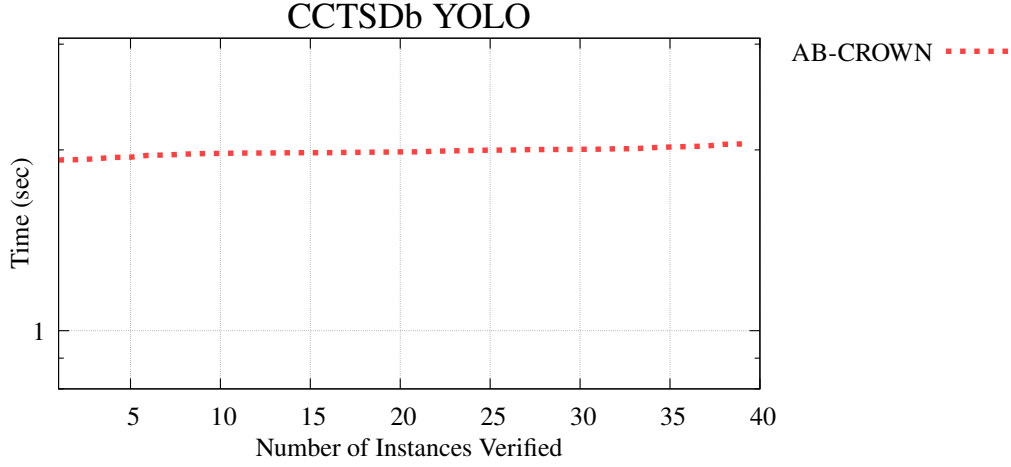


Figure 5: Cactus Plot for CCTSDb YOLO.

Table 6: Benchmark 2023-cgan

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	8	13	0	0	210	100.0%
2	Pyrat	8	11	0	0	190	90.5%
3	Nnenum	6	11	0	0	170	81.0%
4	Nnv	3	11	0	0	140	66.7%
5	Neuralsat	3	11	0	0	140	66.7%
6	Marabou	0	13	0	0	130	61.9%

Table 7: Benchmark 2023-collins-rul-cnn

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	Nnenum	35	27	0	0	620	100.0%
2	Neuralsat	35	27	0	0	620	100.0%
3	Marabou	35	27	0	0	620	100.0%
4	α, β Crown	35	27	0	0	620	100.0%
5	Pyrat	33	27	0	0	600	96.8%
6	Nnv	23	27	0	0	500	80.6%

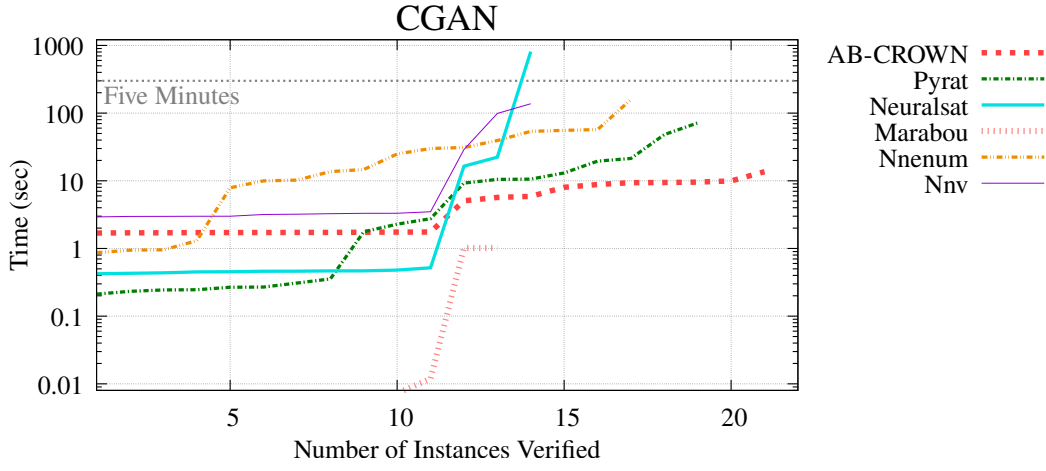


Figure 6: Cactus Plot for CGAN.

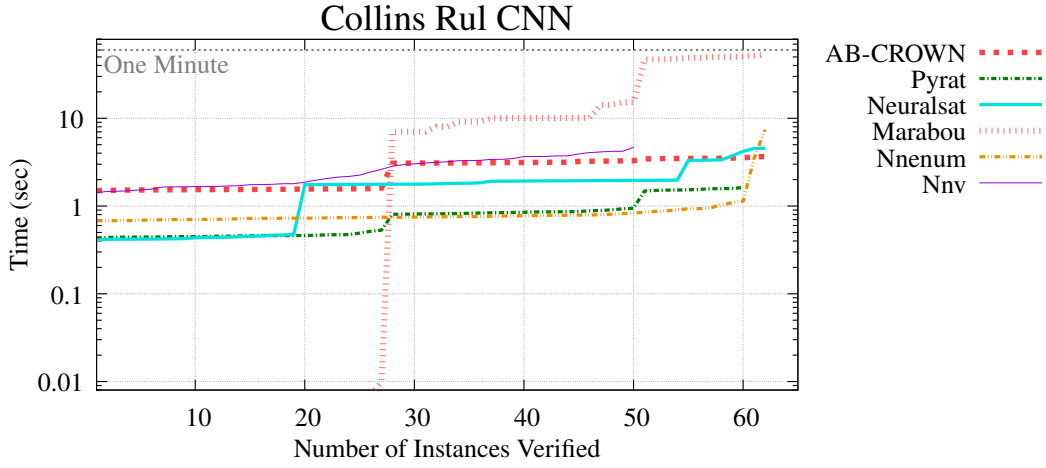


Figure 7: Cactus Plot for Collins Rul CNN.

Table 8: Benchmark 2023-collins-yolo-robustness

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	Pyrat	0	6	0	0	60	100.0%
2	α, β Crown	0	6	0	0	60	100.0%

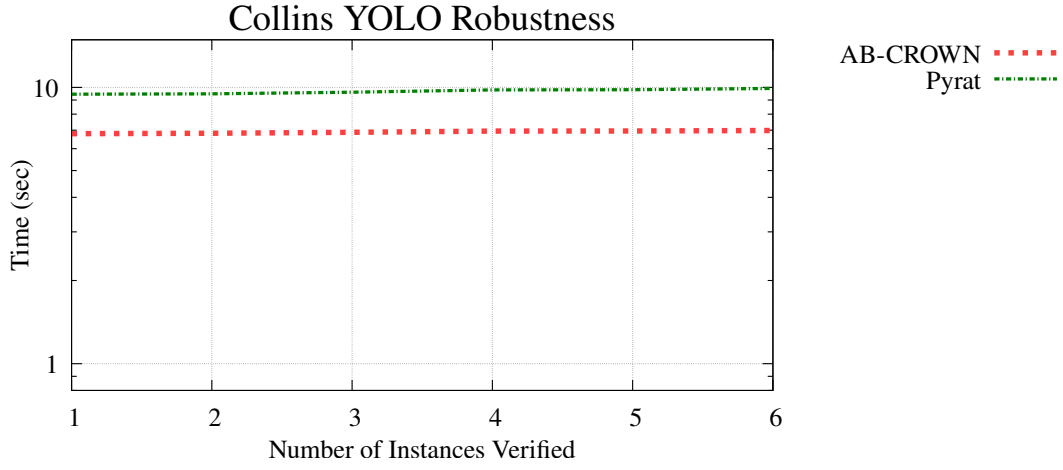


Figure 8: Cactus Plot for Collins YOLO Robustness.

Table 9: Benchmark 2023-dist-shift

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	67	5	0	0	720	100.0%
2	Pyrat	66	5	0	0	710	98.6%
3	Neuralsat	66	5	0	0	710	98.6%
4	Marabou	55	5	0	0	600	83.3%
5	Nnv	0	4	0	0	40	5.6%

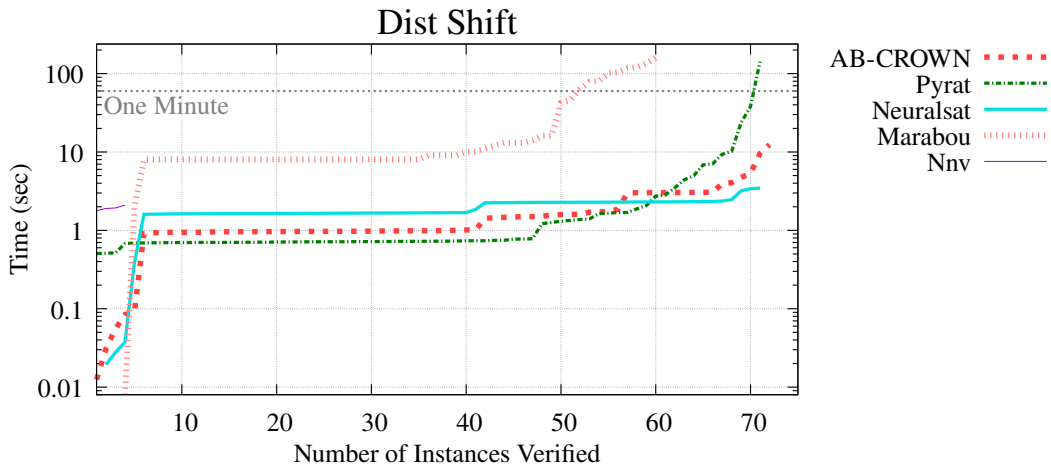


Figure 9: Cactus Plot for Dist Shift.

Table 10: Benchmark 2023-metaroom

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	94	5	0	0	990	100.0%
2	Neuralsat	92	5	0	0	970	98.0%
3	Pyrat	93	2	0	0	950	96.0%

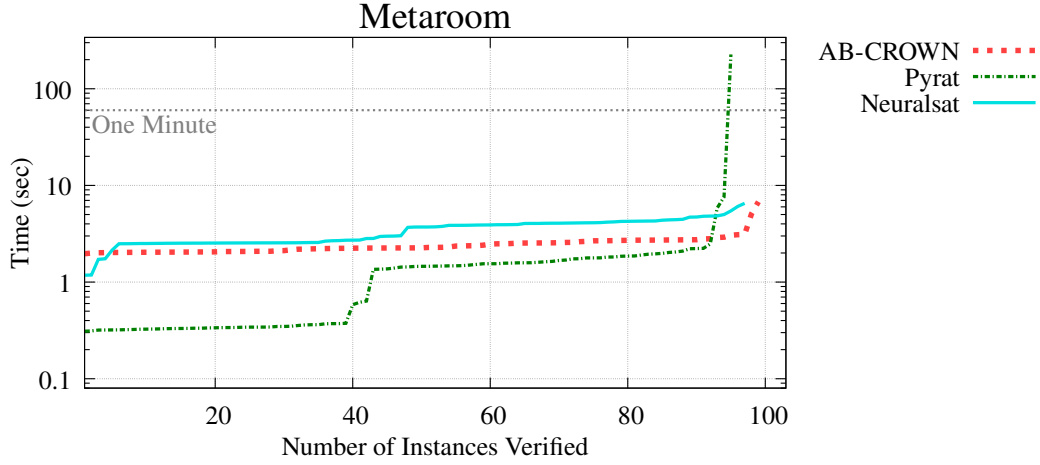


Figure 10: Cactus Plot for Metaroom.

Table 11: Benchmark 2023-ml4acopf

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	18	1	0	0	190	100.0%

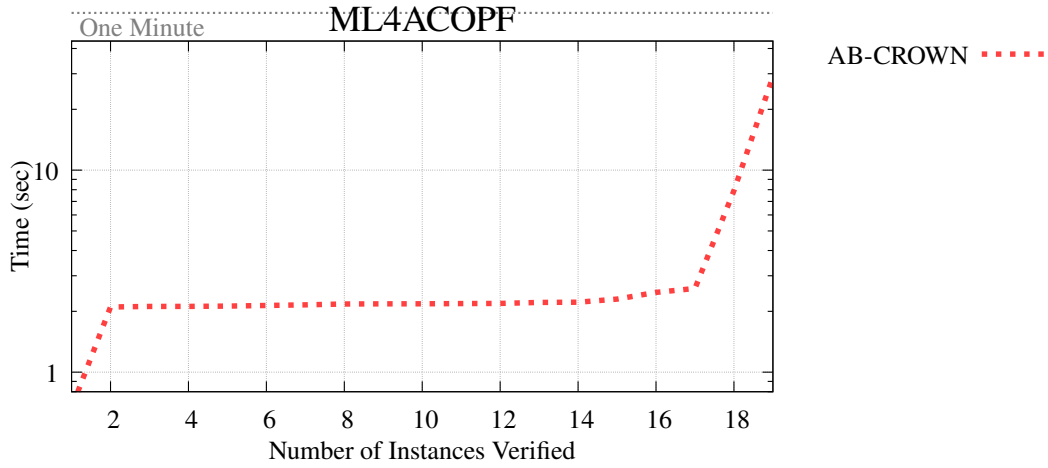


Figure 11: Cactus Plot for ML4ACOPF.

Table 12: Benchmark 2023-nn4sys

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	192	0	0	2	1620	100.0%
2	Neuralsat	81	0	0	2	510	31.5%
3	Marabou	33	0	0	1	180	11.1%
4	Pyrat	38	0	0	2	80	4.9%
5	Nnv	0	2	0	8	-1180	0%
6	Nnenum	20	0	0	2	-100	0%

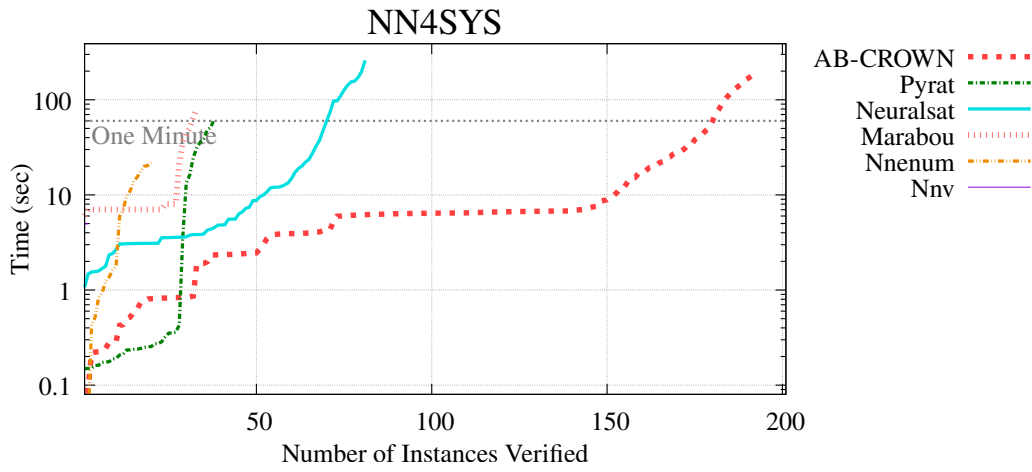


Figure 12: Cactus Plot for NN4SYS.

Table 13: Benchmark 2023-test

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	2	1	0	0	30	100.0%
2	Pyrat	0	1	0	0	10	33.3%

Table 14: Benchmark 2023-tllverifybench

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	Neuralsat	15	17	0	0	320	100.0%
2	Fastbatltnn	15	17	0	0	320	100.0%
3	α, β Crown	15	17	0	0	320	100.0%
4	Pyrat	10	12	0	0	220	68.8%
5	Marabou	5	17	0	0	220	68.8%
6	Nnenum	2	16	0	0	180	56.2%
7	Nnv	1	16	0	0	170	53.1%

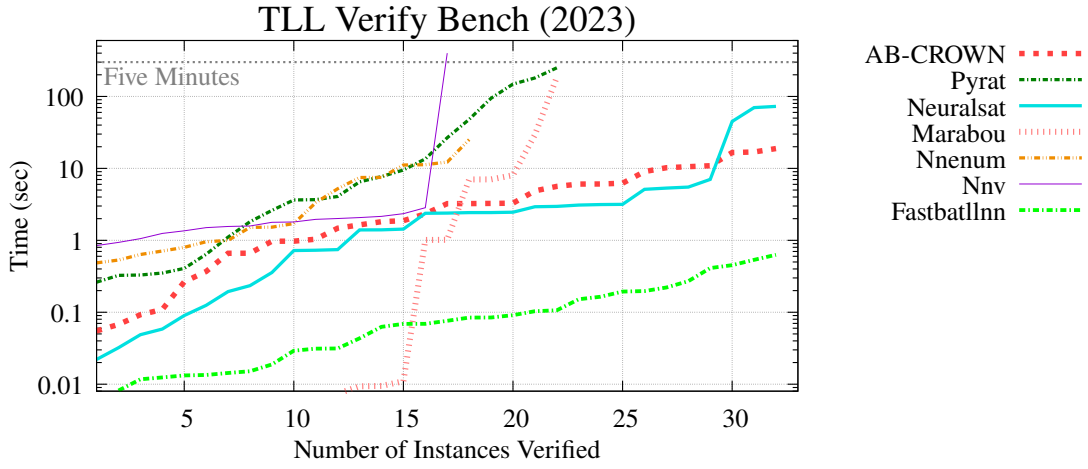
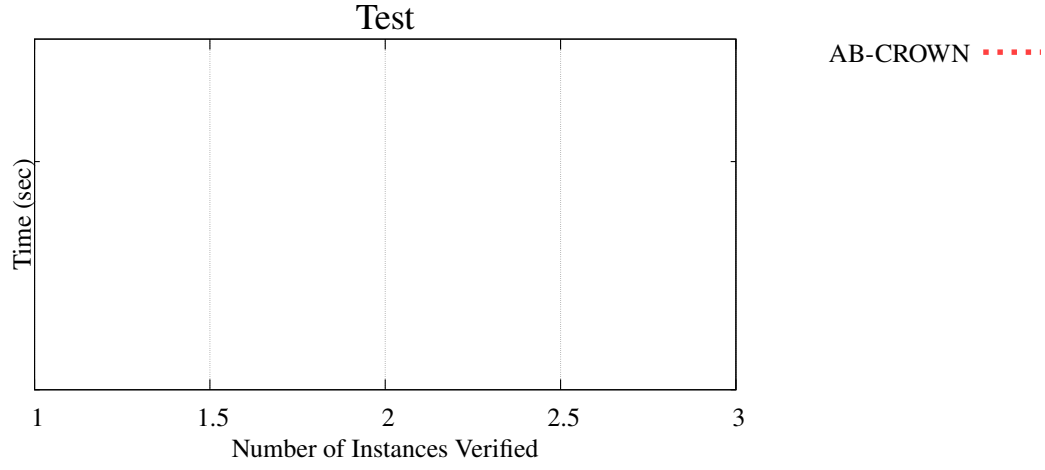


Table 15: Benchmark 2023-traffic-signs-recognition

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	0	42	0	0	420	100.0%
2	Neuralsat	0	35	0	0	350	83.3%
3	Marabou	0	19	0	0	190	45.2%
4	Pyrat	0	8	0	0	80	19.0%

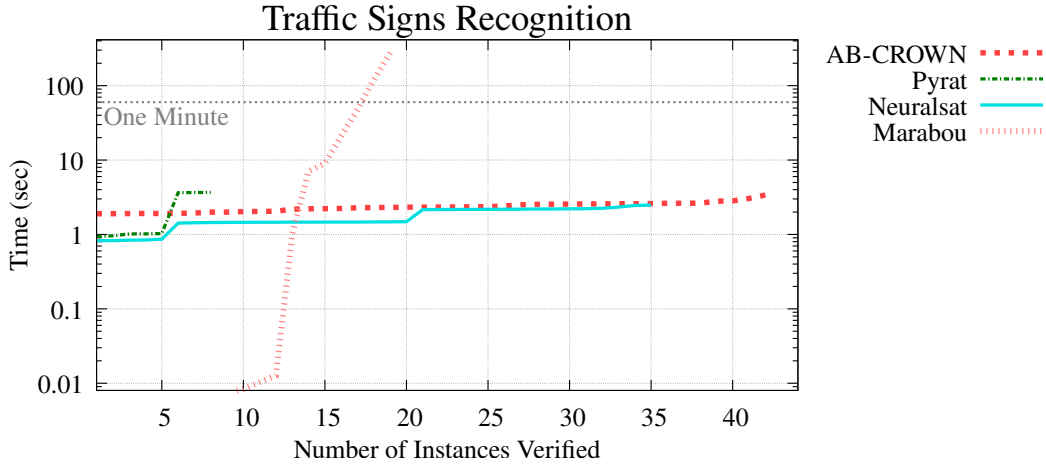


Figure 15: Cactus Plot for Traffic Signs Recognition.

Table 16: Benchmark 2023-vggnet16

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	15	0	0	0	150	100.0%
2	Pyrat	13	1	0	0	140	93.3%
3	Nnenum	14	0	0	0	140	93.3%
4	Neuralsat	5	1	0	0	60	40.0%
5	Marabou	2	1	0	0	30	20.0%

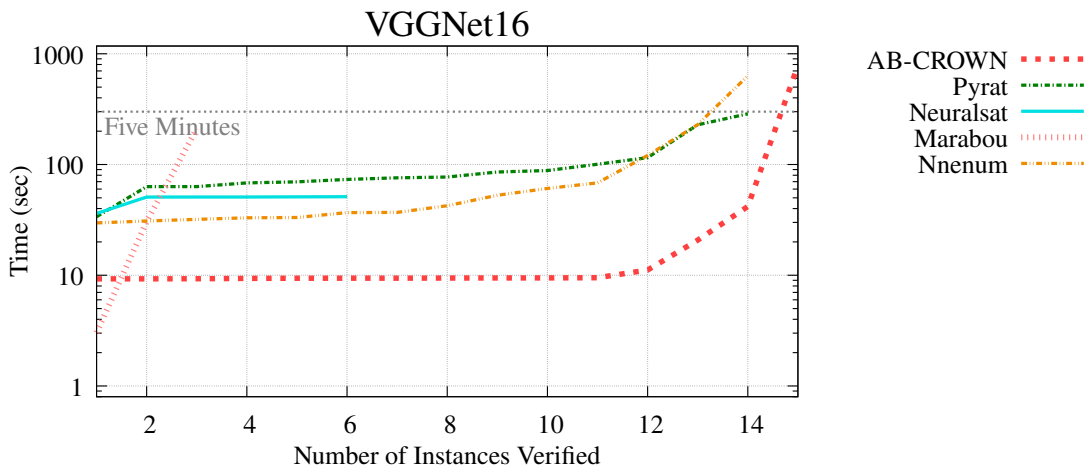


Figure 16: Cactus Plot for VGGNet16.

Table 17: Benchmark 2023-vit

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	Marabou	200	0	0	0	2000	100.0%
2	α, β Crown	79	0	0	0	790	39.5%

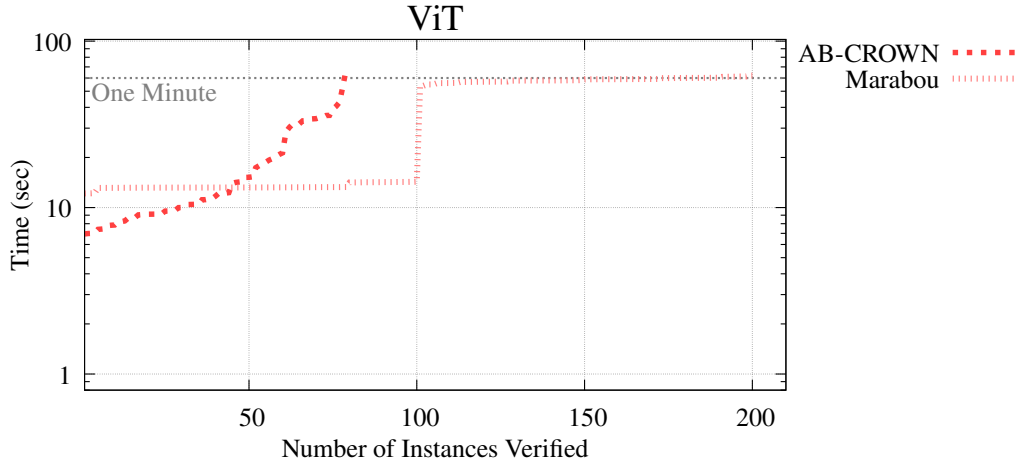


Figure 17: Cactus Plot for ViT.

Table 18: Benchmark 2023-yolo

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	63	0	0	0	630	100.0%
2	Pyrat	41	0	0	0	410	65.1%
3	Nnv	0	8	0	33	-4870	0%

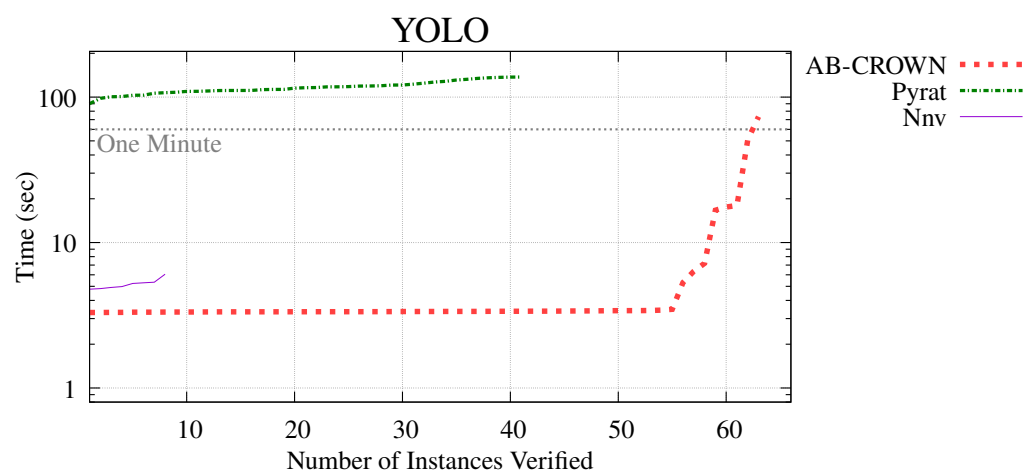


Figure 18: Cactus Plot for YOLO.

3 Unsourced Benchmarks

Table 19: Benchmark 2022-carvana-unet-2022

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	39	0	0	0	390	100.0%

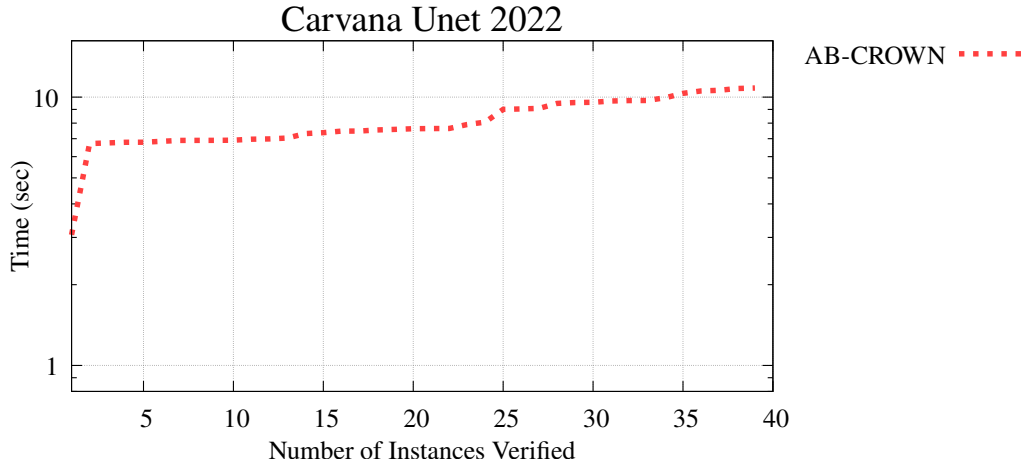


Figure 19: Cactus Plot for Carvana Unet 2022.

Table 20: Benchmark 2022-cifar100-tinyimagenet-resnet

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	69	3	0	0	720	100.0%
2	Neuralsat	56	3	0	0	590	81.9%

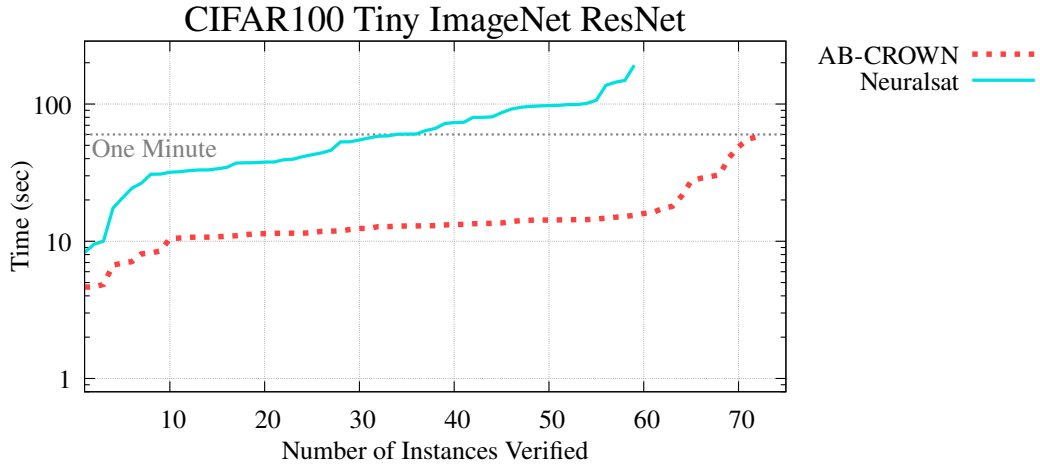


Figure 20: Cactus Plot for CIFAR100 Tiny ImageNet ResNet.

Table 21: Benchmark 2022-cifar2020

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	Neuralsat	148	42	0	0	1900	100.0%
2	α, β Crown	148	41	0	0	1890	99.5%
3	Pyrat	96	39	0	0	1350	71.1%
4	Nnv	32	6	0	0	380	20.0%

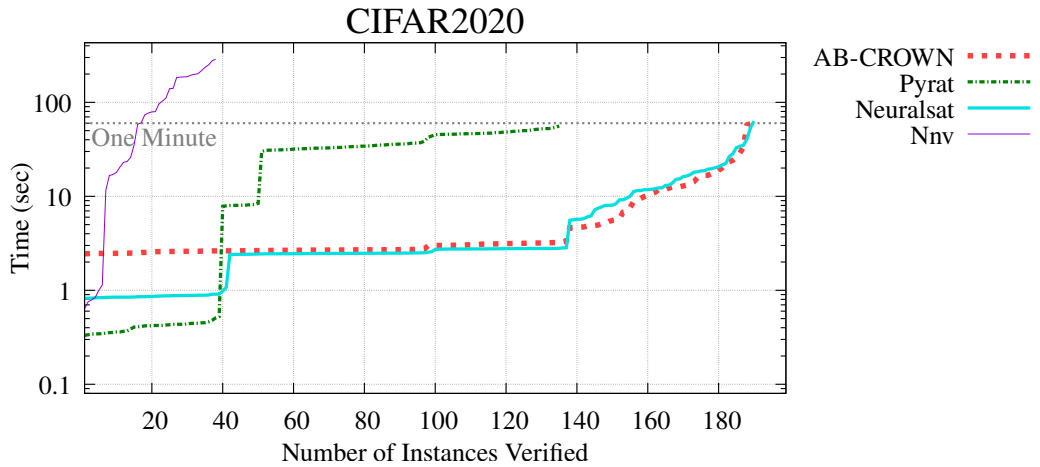


Figure 21: Cactus Plot for CIFAR2020.

Table 22: Benchmark 2022-cifar-biasfield

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	68	1	0	0	690	100.0%
2	Neuralsat	67	1	0	0	680	98.6%
3	Pyrat	51	1	0	0	520	75.4%
4	Nnenum	18	0	0	0	180	26.1%

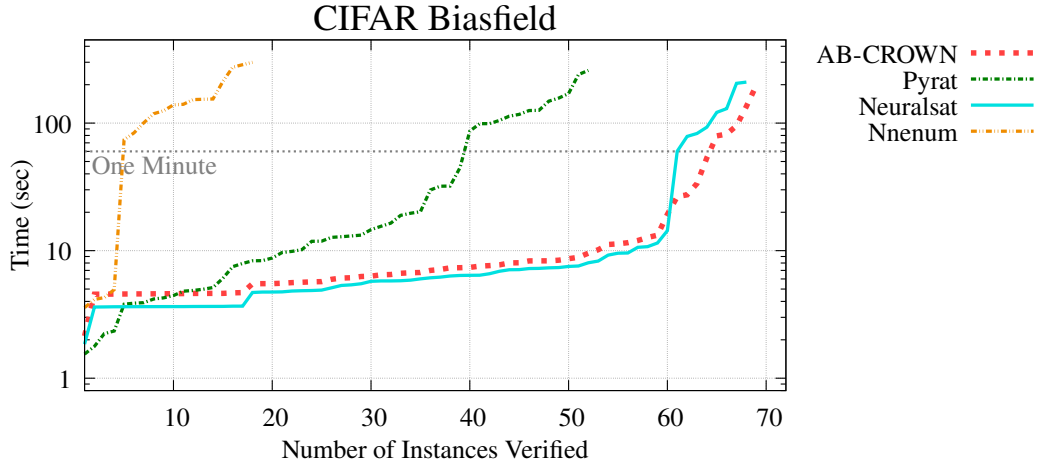


Figure 22: Cactus Plot for CIFAR Biasfield.

Table 23: Benchmark 2022-mnist-fc

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	68	18	0	0	860	100.0%
2	Neuralsat	46	18	0	0	640	74.4%
3	Nnenum	48	11	0	0	590	68.6%
4	Pyrat	35	16	0	0	510	59.3%
5	Nnv	30	4	0	0	340	39.5%

Table 24: Benchmark 2022-reach-prob-density

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	Nnenum	22	14	0	0	360	100.0%
2	α, β Crown	22	14	0	0	360	100.0%
3	Neuralsat	22	12	0	0	340	94.4%
4	Pyrat	17	7	0	0	240	66.7%
5	Nnv	9	0	0	0	90	25.0%

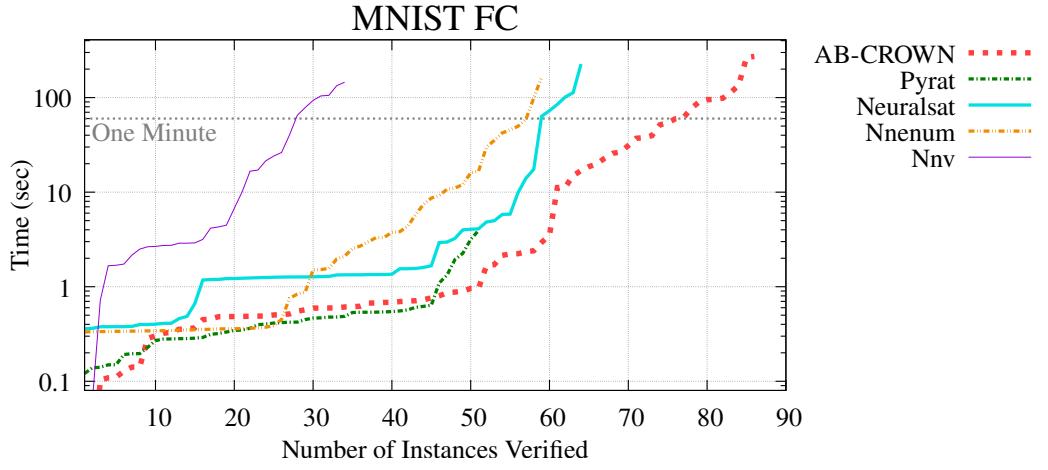


Figure 23: Cactus Plot for MNIST FC.

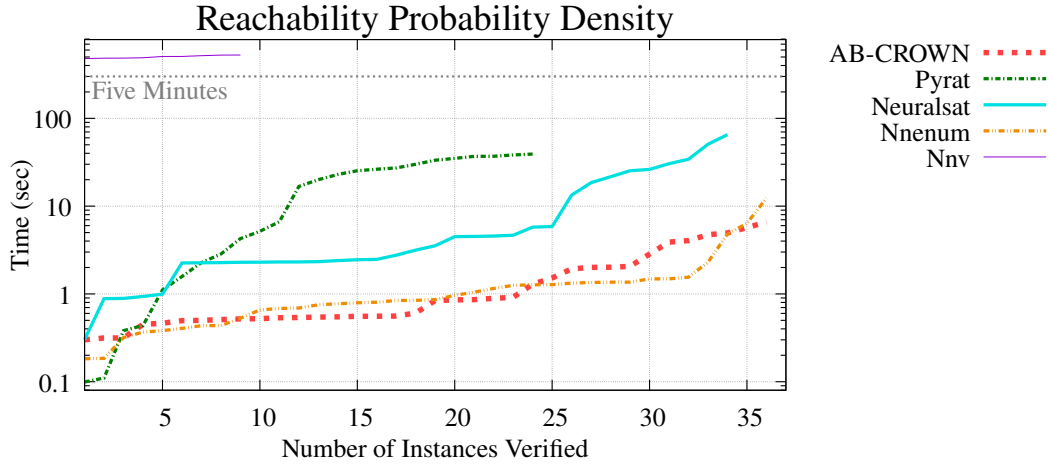


Figure 24: Cactus Plot for Reachability Probability Density.

Table 25: Benchmark 2022-r1-benchmarks

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	Neuralsat	193	103	0	0	2960	100.0%
2	α, β Crown	193	103	0	0	2960	100.0%
3	Nnenum	191	103	0	0	2940	99.3%
4	Nnv	177	90	0	0	2670	90.2%
5	Pyrat	191	96	0	3	2420	81.8%

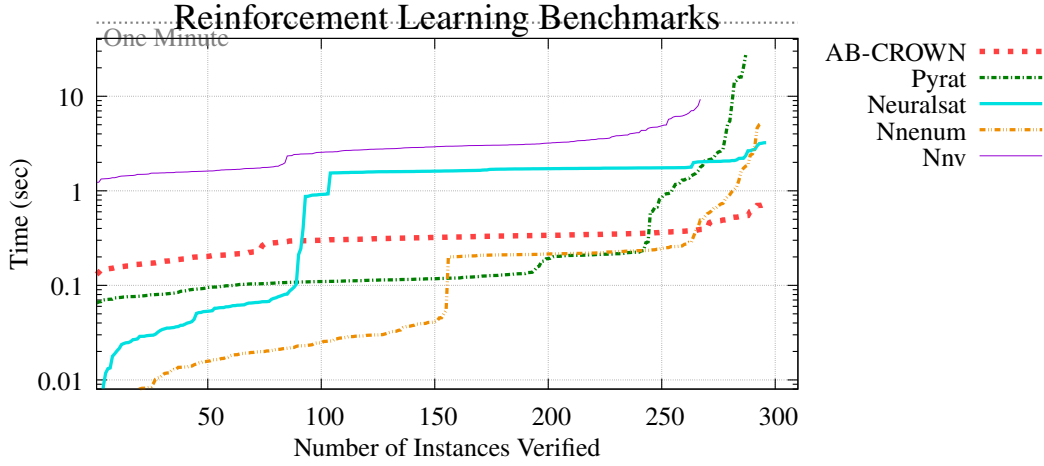


Figure 25: Cactus Plot for Reinforcement Learning Benchmarks.

Table 26: Benchmark 2022-sri-resnet-a

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	20	12	0	0	320	100.0%
2	Neuralsat	18	12	0	0	300	93.8%
3	Pyrat	5	11	0	0	160	50.0%

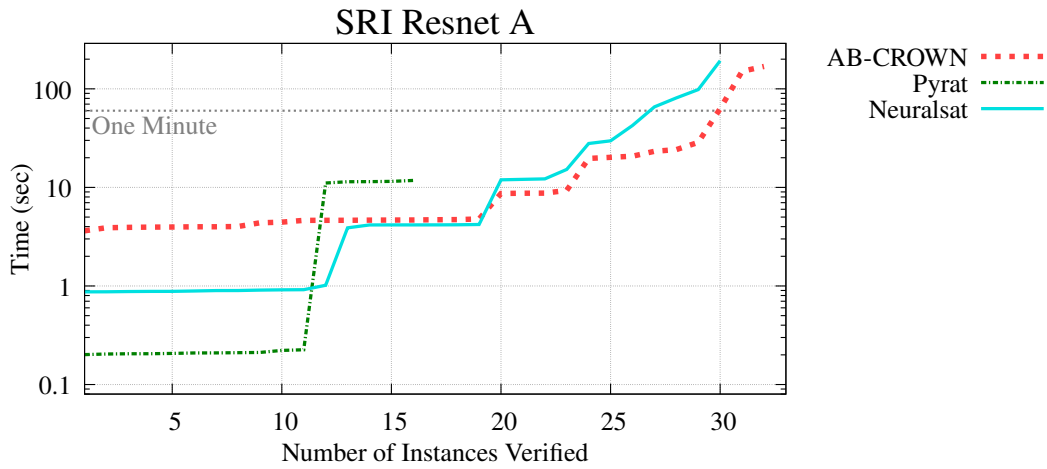


Figure 26: Cactus Plot for SRI Resnet A.

Table 27: Benchmark 2022-sri-resnet-b

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	Neuralsat	28	11	0	0	390	100.0%
2	α, β Crown	28	11	0	0	390	100.0%
3	Pyrat	13	11	0	0	240	61.5%
4	Nnv	1	0	0	1	-140	0%

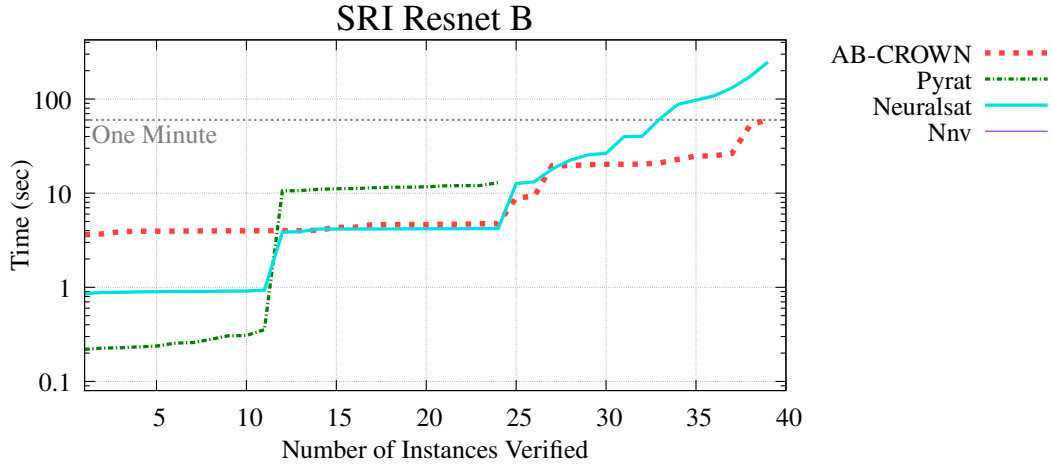


Figure 27: Cactus Plot for SRI Resnet B.

Table 28: Benchmark 2022-t11verifybench

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	Neuralsat	11	21	0	0	320	100.0%
2	Fastbatltnn	11	21	0	0	320	100.0%
3	α, β Crown	11	21	0	0	320	100.0%
4	Pyrat	9	17	0	0	260	81.2%
5	Nnenum	1	21	0	0	220	68.8%
6	Nnv	0	21	0	0	210	65.6%

Table 29: Benchmark 2022-vggnet16-2022

#	Tool	Verified	Falsified	Fastest	Penalty	Score	Percent
1	α, β Crown	14	1	0	0	150	100.0%
2	Nnenum	11	1	0	0	120	80.0%
3	Pyrat	9	1	0	0	100	66.7%
4	Neuralsat	5	1	0	0	60	40.0%

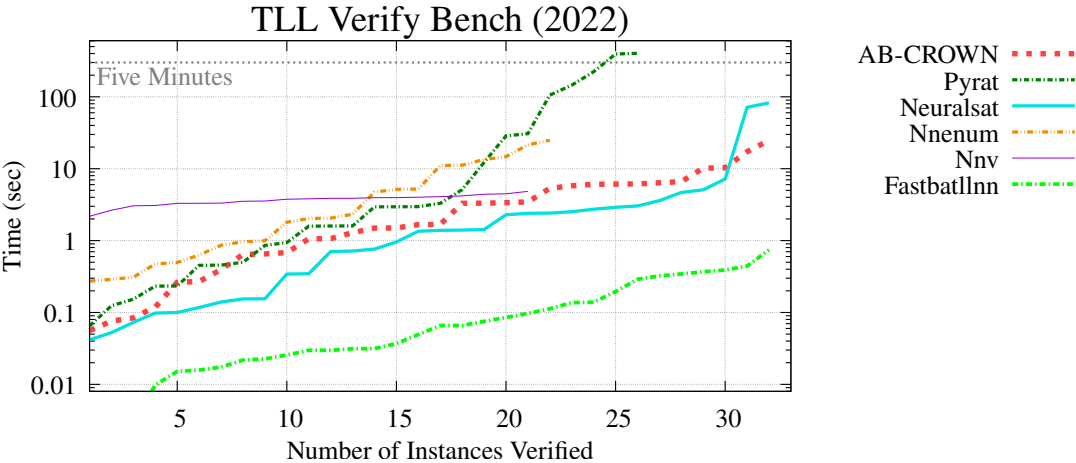


Figure 28: Cactus Plot for TLL Verify Bench (2022).

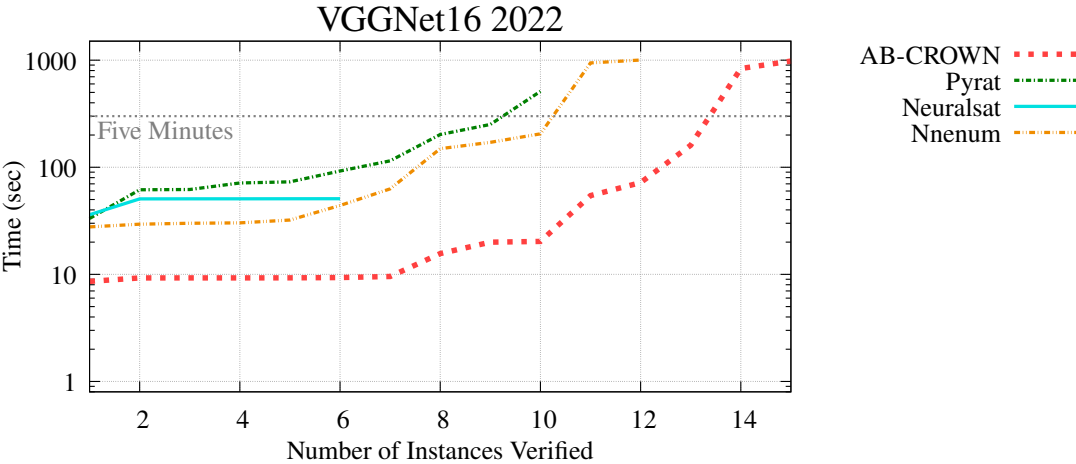


Figure 29: Cactus Plot for VGGNet16 2022.

4 Stats

Table 30: Overhead

#	Tool	Seconds
1	Fastbatllnn	0.3
2	Nnenum	0.9
3	Marabou	1.1
4	Pyrat	3.4
5	Neuralsat	3.6
6	α, β Crown	5.7
7	Nnv	15.1

Table 31: Num Benchmarks Participated

#	Tool	Count
1	α, β Crown	17
2	Pyrat	14
3	Neuralsat	11
4	Nnv	9
5	Marabou	9
6	Nnenum	8
7	Fastbatllnn	1

Table 32: Num Instances Verified

#	Tool	Count
1	α, β Crown	1106
2	Neuralsat	678
3	Marabou	593
4	Pyrat	571
5	Nnenum	341
6	Nnv	196
7	Fastbatllnn	32

Table 33: Num SAT

#	Tool	Count
1	α, β Crown	193
2	Neuralsat	148
3	Marabou	128
4	Pyrat	119
5	Nnenum	102
6	Nnv	97
7	Fastbatllnn	17

Table 34: Num UNSAT

#	Tool	Count
1	α, β Crown	913
2	Neuralsat	530
3	Marabou	465
4	Pyrat	452
5	Nnenum	239
6	Nnv	99
7	Fastbatllnn	15

Table 35: Incorrect Results (or Missing CE)

#	Tool	Count
1	Nnv	49
2	Pyrat	4
3	Nnenum	4
4	Neuralsat	4
5	α, β Crown	4
6	Marabou	1

5 Detailed Results

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (✗).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2022 Nn4sys	0	UNSAT	0.05	0.09	1.62	-	0.11	-	-
2022 Nn4sys	1	UNSAT	0.03	0.14	1.54	-	0.10	-	-
2022 Nn4sys	2	SAT	✗	✗	✗	-	✗	0.05	-
2022 Nn4sys	3	SAT	✗	✗	✗	-	✗	<0.01	-
2022 Nn4sys	4	UNSAT	0.23	23.6	1.07	-	0.80	✗	-
2022 Nn4sys	5	UNSAT	0.25	30.2	2.20	-	0.88	✗	-
2022 Nn4sys	6	UNSAT	0.17	35.7	2.03	-	1.32	✗	-
2022 Nn4sys	7	UNSAT	0.21	44.9	2.43	-	1.32	✗	-
2022 Nn4sys	8	UNSAT	0.21	47.5	1.36	-	1.56	✗	-
2022 Nn4sys	9	UNSAT	0.25	59.6	2.52	-	1.73	✗	-
2022 Nn4sys	10	UNSAT	0.21	59.4	1.99	-	1.93	✗	-
2022 Nn4sys	11	UNSAT	0.24	75.1	2.77	-	2.20	✗	-
2022 Nn4sys	12	UNSAT	0.36	-	4.16	-	5.77	-	-
2022 Nn4sys	13	UNSAT	0.39	-	4.83	-	6.43	-	-
2022 Nn4sys	14	UNSAT	0.46	-	6.48	-	9.66	-	-
2022 Nn4sys	15	UNSAT	0.48	-	7.15	-	10.6	-	-
2022 Nn4sys	16	UNSAT	0.54	-	8.57	-	13.5	-	-
2022 Nn4sys	17	UNSAT	0.58	-	9.40	-	15.5	-	-
2022 Nn4sys	18	UNSAT	0.76	-	10.4	-	17.4	-	-
2022 Nn4sys	19	UNSAT	0.73	-	11.9	-	19.8	-	-
2022 Nn4sys	20	UNSAT	0.75	-	11.9	-	19.5	-	-
2022 Nn4sys	21	UNSAT	0.76	-	13.2	-	22.2	-	-
2022 Nn4sys	22	UNSAT	3.93	-	-	-	-	-	-
2022 Nn4sys	23	UNSAT	4.07	-	-	-	-	-	-
2022 Nn4sys	24	UNSAT	1.97	0.36	3.86	-	-	-	-
2022 Nn4sys	25	UNSAT	2.57	-	4.37	-	-	-	-
2022 Nn4sys	26	UNSAT	2.62	-	5.04	-	-	-	-
2022 Nn4sys	27	UNSAT	2.39	-	5.76	-	-	-	-
2022 Nn4sys	28	UNSAT	2.74	-	6.48	-	-	-	-
2022 Nn4sys	29	UNSAT	2.72	-	7.29	-	-	-	-
2022 Nn4sys	30	UNSAT	3.17	-	8.45	-	-	-	-
2022 Nn4sys	31	UNSAT	3.22	-	9.56	-	-	-	-
2022 Nn4sys	32	UNSAT	3.33	-	-	-	-	-	-
2022 Nn4sys	33	UNSAT	3.34	-	11.0	-	-	-	-
2022 Nn4sys	34	UNSAT	3.42	-	11.7	-	-	-	-
2022 Nn4sys	35	UNSAT	3.71	-	14.8	-	-	-	-
2022 Nn4sys	36	UNSAT	4.61	-	17.6	-	-	-	-
2022 Nn4sys	37	UNSAT	4.68	-	19.9	-	-	-	-
2022 Nn4sys	38	UNSAT	5.39	-	23.2	-	-	-	-
2022 Nn4sys	39	UNSAT	5.48	-	25.2	-	-	-	-
2022 Nn4sys	40	UNSAT	6.18	-	28.2	-	-	-	-
2022 Nn4sys	41	UNSAT	6.81	-	31.6	-	-	-	-
2022 Nn4sys	42	UNSAT	6.94	-	33.8	-	-	-	-
2022 Nn4sys	43	UNSAT	7.61	-	-	-	-	-	-
2022 Nn4sys	44	UNSAT	2.60	4.13	5.33	-	-	-	-
2022 Nn4sys	45	UNSAT	3.11	-	7.63	-	-	-	-
2022 Nn4sys	46	UNSAT	3.58	-	9.47	-	-	-	-
2022 Nn4sys	47	UNSAT	3.57	-	9.17	-	-	-	-
2022 Nn4sys	48	UNSAT	3.63	-	10.2	-	-	-	-
2022 Nn4sys	49	UNSAT	3.63	-	10.8	-	-	-	-
2022 Nn4sys	50	UNSAT	3.74	-	12.6	-	-	-	-
2022 Nn4sys	51	UNSAT	3.64	-	12.3	-	-	-	-
2022 Nn4sys	52	UNSAT	3.81	-	14.5	-	-	-	-
2022 Nn4sys	53	UNSAT	3.94	-	15.4	-	-	-	-
2022 Nn4sys	54	UNSAT	3.87	-	15.1	-	-	-	-
2022 Nn4sys	55	UNSAT	4.30	-	17.8	-	-	-	-
2022 Nn4sys	56	UNSAT	4.24	-	19.0	-	-	-	-
2022 Nn4sys	57	UNSAT	4.19	-	20.0	-	-	-	-
2022 Nn4sys	58	UNSAT	4.09	-	20.5	-	-	-	-
2022 Nn4sys	59	UNSAT	4.25	-	21.5	-	-	-	-
2022 Nn4sys	60	UNSAT	6.15	-	31.8	-	-	-	-
2022 Nn4sys	61	UNSAT	6.80	-	38.7	-	-	-	-
2022 Nn4sys	62	UNSAT	8.95	-	49.4	-	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	N Nen	NNV	FastBaT
2022 Nn4sys	63	UNSAT	8.89	-	52.7	-	-	-	-
2022 Nn4sys	64	UNSAT	9.14	-	59.1	-	-	-	-
2022 Nn4sys	65	UNSAT	11.5	-	70.2	-	-	-	-
2022 Nn4sys	66	UNSAT	12.1	-	77.2	-	-	-	-
2022 Nn4sys	67	UNSAT	14.5	-	89.7	-	-	-	-
2022 Nn4sys	68	UNSAT	14.3	-	89.4	-	-	-	-
2022 Nn4sys	69	UNSAT	14.8	-	100	-	-	-	-
2022 Nn4sys	70	UNSAT	17.5	-	132	-	-	-	-
2022 Nn4sys	71	UNSAT	17.6	-	131	-	-	-	-
2022 Nn4sys	72	UNSAT	19.7	-	127	-	-	-	-
2022 Nn4sys	73	UNSAT	20.4	-	135	-	-	-	-
2022 Nn4sys	74	UNSAT	20.0	-	136	-	-	-	-
2022 Nn4sys	75	UNSAT	22.3	-	-	-	-	-	-
2022 Nn4sys	76	UNSAT	22.8	-	155	-	-	-	-
2022 Nn4sys	77	UNSAT	24.8	-	166	-	-	-	-
2022 Nn4sys	78	UNSAT	25.4	-	174	-	-	-	-
2022 Nn4sys	79	UNSAT	25.4	-	176	-	-	-	-
2022 Nn4sys	80	UNSAT	27.6	-	-	-	-	-	-
2022 Nn4sys	81	UNSAT	27.8	-	192	-	-	-	-
2022 Nn4sys	82	UNSAT	30.0	-	-	-	-	-	-
2022 Nn4sys	83	UNSAT	30.2	-	-	-	-	-	-
2022 Nn4sys	84	UNSAT	30.5	-	-	-	-	-	-
2022 Nn4sys	85	UNSAT	3.68	-	6.22	-	-	-	-
2022 Nn4sys	86	UNSAT	3.78	-	-	-	-	-	-
2022 Nn4sys	87	UNSAT	4.47	-	-	-	-	-	-
2022 Nn4sys	88	UNSAT	4.74	-	-	-	-	-	-
2022 Nn4sys	89	UNSAT	5.52	-	-	-	-	-	-
2022 Nn4sys	90	UNSAT	6.19	-	-	-	-	-	-
2022 Nn4sys	91	UNSAT	7.71	-	-	-	-	-	-
2022 Nn4sys	92	UNSAT	8.36	-	-	-	-	-	-
2022 Nn4sys	93	UNSAT	8.98	-	-	-	-	-	-
2022 Nn4sys	94	UNSAT	9.47	-	-	-	-	-	-
2022 Nn4sys	95	UNSAT	9.95	-	-	-	-	-	-
2022 Nn4sys	96	UNSAT	12.9	-	-	-	-	-	-
2022 Nn4sys	97	UNSAT	15.5	-	-	-	-	-	-
2022 Nn4sys	98	UNSAT	18.2	-	-	-	-	-	-
2022 Nn4sys	99	UNSAT	20.8	-	-	-	-	-	-
2022 Nn4sys	100	UNSAT	22.5	-	-	-	-	-	-
2022 Nn4sys	101	UNSAT	25.8	-	-	-	-	-	-
2022 Nn4sys	102	UNSAT	27.8	-	-	-	-	-	-
2022 Nn4sys	103	UNSAT	29.0	-	-	-	-	-	-
2022 Nn4sys	104	UNSAT	32.7	-	-	-	-	-	-
2022 Nn4sys	105	UNSAT	34.4	-	-	-	-	-	-
2022 Nn4sys	106	UNSAT	36.8	-	-	-	-	-	-
2022 Nn4sys	107	UNSAT	39.9	-	-	-	-	-	-
2022 Nn4sys	108	UNSAT	41.8	-	-	-	-	-	-
2022 Nn4sys	109	UNSAT	44.0	-	-	-	-	-	-
2022 Nn4sys	110	UNSAT	46.4	-	-	-	-	-	-
2022 Nn4sys	111	UNSAT	4.04	-	8.82	-	-	-	-
2022 Nn4sys	112	UNSAT	5.15	-	-	-	-	-	-
2022 Nn4sys	113	UNSAT	5.71	-	-	-	-	-	-
2022 Nn4sys	114	UNSAT	6.57	-	-	-	-	-	-
2022 Nn4sys	115	UNSAT	7.31	-	-	-	-	-	-
2022 Nn4sys	116	UNSAT	8.46	-	-	-	-	-	-
2022 Nn4sys	117	UNSAT	9.09	-	-	-	-	-	-
2022 Nn4sys	118	UNSAT	9.88	-	-	-	-	-	-
2022 Nn4sys	119	UNSAT	10.8	-	-	-	-	-	-
2022 Nn4sys	120	UNSAT	12.1	-	-	-	-	-	-
2022 Nn4sys	121	UNSAT	12.0	-	-	-	-	-	-
2022 Nn4sys	122	UNSAT	14.3	-	-	-	-	-	-
2022 Nn4sys	123	UNSAT	16.2	-	-	-	-	-	-
2022 Nn4sys	124	UNSAT	15.2	-	-	-	-	-	-
2022 Nn4sys	125	UNSAT	16.4	-	-	-	-	-	-
2022 Nn4sys	126	UNSAT	18.2	-	-	-	-	-	-
2022 Nn4sys	127	UNSAT	26.2	-	-	-	-	-	-
2022 Nn4sys	128	UNSAT	31.7	-	-	-	-	-	-
2022 Nn4sys	129	UNSAT	40.6	-	-	-	-	-	-
2022 Nn4sys	130	UNSAT	44.2	-	-	-	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2022 Nn4sys	131	UNSAT	51.8	-	-	-	-	-	-
2022 Nn4sys	132	UNSAT	60.4	-	-	-	-	-	-
2022 Nn4sys	133	UNSAT	64.7	-	-	-	-	-	-
2022 Nn4sys	134	UNSAT	74.0	-	-	-	-	-	-
2022 Nn4sys	135	UNSAT	78.6	-	-	-	-	-	-
2022 Nn4sys	136	UNSAT	84.6	-	-	-	-	-	-
2022 Nn4sys	137	UNSAT	90.4	-	-	-	-	-	-
2022 Nn4sys	138	UNSAT	99.8	-	-	-	-	-	-
2022 Nn4sys	139	UNSAT	108	-	-	-	-	-	-
2022 Nn4sys	140	UNSAT	114	-	-	-	-	-	-
2022 Nn4sys	141	UNSAT	117	-	-	-	-	-	-
2022 Nn4sys	142	UNSAT	127	-	-	-	-	-	-
2022 Nn4sys	143	UNSAT	131	-	-	-	-	-	-
2022 Nn4sys	144	UNSAT	139	-	-	-	-	-	-
2022 Nn4sys	145	UNSAT	145	-	-	-	-	-	-
2022 Nn4sys	146	UNSAT	155	-	-	-	-	-	-
2022 Nn4sys	147	UNSAT	157	-	-	-	-	-	-
2022 Nn4sys	148	UNSAT	165	-	-	-	-	-	-
2022 Nn4sys	149	UNSAT	171	-	-	-	-	-	-
2022 Nn4sys	150	UNSAT	180	-	-	-	-	-	-
2022 Nn4sys	151	UNSAT	188	-	-	-	-	-	-
2022 Oval21	0	UNSAT	10.5	-	14.5	-	-	-	-
2022 Oval21	1	UNSAT	14.0	-	24.2	-	-	-	-
2022 Oval21	2	UNSAT	7.39	-	11.0	-	-	-	-
2022 Oval21	3	?	-	-	-	-	-	-	-
2022 Oval21	4	UNSAT	6.81	-	8.21	-	-	-	-
2022 Oval21	5	UNSAT	8.52	-	12.9	-	-	-	-
2022 Oval21	6	UNSAT	14.2	-	21.1	-	-	-	-
2022 Oval21	7	UNSAT	7.48	-	9.03	-	-	-	-
2022 Oval21	8	UNSAT	17.1	-	23.6	-	-	-	-
2022 Oval21	9	UNSAT	20.9	-	34.3	-	-	-	-
2022 Oval21	10	UNSAT	-	-	-	-	-	23.5	-
2022 Oval21	11	UNSAT	-	-	-	-	-	22.0	-
2022 Oval21	12	UNSAT	19.3	-	22.3	-	-	-	-
2022 Oval21	13	UNSAT	503	-	-	-	-	-	-
2022 Oval21	14	SAT	2.69	0.24	0.80	-	14.7	-	-
2022 Oval21	15	?	-	-	-	-	-	-	-
2022 Oval21	16	UNSAT	339	-	-	-	-	-	-
2022 Oval21	17	UNSAT	9.53	-	13.7	-	-	-	-
2022 Oval21	18	UNSAT	2.21	2.39	2.36	-	4.71	6.22	-
2022 Oval21	19	UNSAT	68.3	-	-	-	-	-	-
2022 Oval21	20	UNSAT	88.2	-	-	-	-	-	-
2022 Oval21	21	UNSAT	11.8	-	16.4	-	-	-	-
2022 Oval21	22	UNSAT	46.6	-	-	-	-	-	-
2022 Oval21	23	UNSAT	11.0	-	18.6	-	-	-	-
2022 Oval21	24	UNSAT	23.0	-	48.6	-	-	-	-
2022 Oval21	25	UNSAT	8.89	-	10.1	-	-	-	-
2022 Oval21	26	UNSAT	73.2	-	-	-	-	-	-
2022 Oval21	27	UNSAT	6.06	-	7.74	-	60.2	-	-
2022 Oval21	28	UNSAT	5.78	-	6.37	-	20.4	21.6	-
2022 Oval21	29	UNSAT	16.0	-	27.8	-	-	-	-
2023 Acasxu	0	UNSAT	2.47	1.40	3.23	7.02	0.43	-	-
2023 Acasxu	1	UNSAT	2.40	1.60	3.16	7.02	0.42	-	-
2023 Acasxu	2	UNSAT	2.46	2.33	3.23	7.02	0.60	-	-
2023 Acasxu	3	UNSAT	2.45	1.83	3.16	7.02	0.62	-	-
2023 Acasxu	4	UNSAT	2.36	1.30	3.15	7.02	0.49	-	-
2023 Acasxu	5	UNSAT	2.42	1.58	3.15	7.02	0.76	-	-
2023 Acasxu	6	UNSAT	2.29	1.39	3.18	7.02	0.50	-	-
2023 Acasxu	7	UNSAT	2.21	1.14	3.14	7.02	0.58	-	-
2023 Acasxu	8	UNSAT	2.14	0.92	3.13	7.02	0.50	-	-
2023 Acasxu	9	UNSAT	2.43	1.94	3.15	7.02	0.74	-	-
2023 Acasxu	10	UNSAT	2.55	2.56	3.29	8.03	0.94	-	-
2023 Acasxu	11	UNSAT	2.42	2.07	3.16	7.02	0.71	-	-
2023 Acasxu	12	UNSAT	2.45	1.86	3.20	7.02	0.63	-	-
2023 Acasxu	13	UNSAT	2.79	3.36	3.35	9.03	0.92	-	-
2023 Acasxu	14	UNSAT	2.61	2.96	3.37	8.03	0.81	-	-
2023 Acasxu	15	UNSAT	2.96	5.93	3.40	26.1	1.41	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Acasxu	16	UNSAT	3.03	5.89	3.43	18.1	1.22	-	-
2023 Acasxu	17	UNSAT	3.16	7.45	3.41	24.1	61.4	-	-
2023 Acasxu	18	UNSAT	2.43	2.08	3.16	7.02	0.64	-	-
2023 Acasxu	19	UNSAT	2.49	2.17	3.16	8.02	0.59	-	-
2023 Acasxu	20	UNSAT	2.39	2.07	3.21	7.02	0.72	-	-
2023 Acasxu	21	UNSAT	2.45	1.70	3.23	7.02	0.60	-	-
2023 Acasxu	22	UNSAT	2.59	2.76	3.35	8.03	0.84	-	-
2023 Acasxu	23	UNSAT	2.74	4.89	3.39	12.0	1.58	-	-
2023 Acasxu	24	UNSAT	2.83	5.11	3.40	19.1	1.30	-	-
2023 Acasxu	25	UNSAT	2.83	4.49	3.44	16.1	1.08	-	-
2023 Acasxu	26	UNSAT	3.59	6.42	3.56	39.2	0.98	-	-
2023 Acasxu	27	UNSAT	2.59	3.02	3.35	9.03	1.02	-	-
2023 Acasxu	28	UNSAT	2.37	2.21	3.17	7.02	0.76	-	-
2023 Acasxu	29	UNSAT	2.46	2.01	3.17	7.02	0.65	-	-
2023 Acasxu	30	UNSAT	2.43	1.98	3.23	8.03	0.59	-	-
2023 Acasxu	31	UNSAT	2.54	3.01	3.34	8.03	0.94	-	-
2023 Acasxu	32	UNSAT	2.99	6.48	3.48	23.1	1.86	-	-
2023 Acasxu	33	UNSAT	3.21	10.6	3.47	32.2	1.38	-	-
2023 Acasxu	34	UNSAT	3.04	5.55	3.43	23.1	1.16	-	-
2023 Acasxu	35	UNSAT	3.30	9.30	3.48	43.2	2.39	-	-
2023 Acasxu	36	UNSAT	2.43	1.93	3.17	7.02	0.60	-	-
2023 Acasxu	37	UNSAT	2.45	2.19	3.21	8.02	0.79	-	-
2023 Acasxu	38	UNSAT	2.46	1.64	3.18	7.02	0.67	-	-
2023 Acasxu	39	UNSAT	2.43	1.70	3.19	7.02	0.73	-	-
2023 Acasxu	40	UNSAT	2.61	2.59	3.29	8.02	0.82	-	-
2023 Acasxu	41	UNSAT	2.79	4.23	3.37	13.1	1.05	-	-
2023 Acasxu	42	UNSAT	2.81	4.29	3.37	11.0	1.03	-	-
2023 Acasxu	43	UNSAT	3.12	7.50	3.45	24.1	1.17	-	-
2023 Acasxu	44	UNSAT	2.86	6.23	3.36	16.1	1.37	-	-
2023 Acasxu	45	UNSAT	4.52	3.68	3.61	15.1	0.72	-	-
2023 Acasxu	46	SAT	0.06	0.97	4.42	<0.01	0.29	-	-
2023 Acasxu	47	SAT	1.96	10.1	4.71	3.02	0.67	-	-
2023 Acasxu	48	SAT	0.04	0.44	4.14	<0.01	0.34	-	-
2023 Acasxu	49	SAT	7.04	23.6	5.45	-	0.29	-	-
2023 Acasxu	50	SAT	4.15	8.46	4.12	<0.01	0.86	-	-
2023 Acasxu	51	UNSAT	2.86	4.35	3.36	18.1	0.79	-	-
2023 Acasxu	52	UNSAT	2.84	4.79	3.35	25.1	1.27	-	-
2023 Acasxu	53	UNSAT	3.03	4.32	3.36	21.1	0.90	-	-
2023 Acasxu	54	SAT	0.04	0.54	0.07	<0.01	0.24	-	-
2023 Acasxu	55	SAT	0.06	0.46	0.05	<0.01	0.22	4.01	-
2023 Acasxu	56	SAT	0.03	0.54	0.05	<0.01	0.22	2.82	-
2023 Acasxu	57	SAT	0.01	0.19	0.10	<0.01	0.22	-	-
2023 Acasxu	58	SAT	0.06	0.50	0.08	<0.01	0.22	3.97	-
2023 Acasxu	59	SAT	0.06	0.37	0.07	<0.01	0.22	2.74	-
2023 Acasxu	60	SAT	0.04	0.49	0.06	<0.01	0.21	2.74	-
2023 Acasxu	61	SAT	0.04	0.44	0.06	<0.01	0.22	2.97	-
2023 Acasxu	62	SAT	0.05	0.56	0.08	<0.01	0.36	-	-
2023 Acasxu	63	SAT	0.05	0.46	0.06	<0.01	0.22	3.42	-
2023 Acasxu	64	SAT	1.61	2.26	4.13	<0.01	0.23	-	-
2023 Acasxu	65	UNSAT	59.0	-	-	-	4.38	-	-
2023 Acasxu	66	SAT	0.05	0.69	0.07	<0.01	0.21	3.76	-
2023 Acasxu	67	SAT	0.07	0.47	0.08	<0.01	0.22	2.84	-
2023 Acasxu	68	SAT	0.07	0.68	0.04	<0.01	0.23	2.56	-
2023 Acasxu	69	SAT	0.06	1.42	0.05	<0.01	0.35	-	-
2023 Acasxu	70	SAT	0.02	0.47	0.17	<0.01	0.23	-	-
2023 Acasxu	71	SAT	0.06	0.46	0.05	<0.01	0.22	4.10	-
2023 Acasxu	72	SAT	0.06	0.53	0.16	<0.01	0.23	-	-
2023 Acasxu	73	UNSAT	52.8	-	47.4	-	4.73	-	-
2023 Acasxu	74	SAT	0.01	0.48	0.05	<0.01	0.22	4.18	-
2023 Acasxu	75	SAT	0.07	0.64	0.05	<0.01	0.27	2.86	-
2023 Acasxu	76	SAT	0.06	0.19	0.08	<0.01	0.22	-	-
2023 Acasxu	77	SAT	0.06	0.52	0.05	<0.01	0.23	4.18	-
2023 Acasxu	78	SAT	0.02	0.41	0.04	<0.01	0.22	2.50	-
2023 Acasxu	79	SAT	0.09	0.46	0.04	<0.01	0.22	2.92	-
2023 Acasxu	80	SAT	0.07	0.66	4.12	<0.01	0.23	-	-
2023 Acasxu	81	SAT	0.03	0.43	0.06	<0.01	0.22	-	-
2023 Acasxu	82	SAT	0.06	0.62	0.03	<0.01	0.22	-	-
2023 Acasxu	83	SAT	24.2	-	-	83.5	0.83	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Acasxu	84	SAT	<0.01	0.56	0.10	<0.01	0.22	-	-
2023 Acasxu	85	SAT	0.06	0.48	0.05	<0.01	0.21	3.92	-
2023 Acasxu	86	SAT	0.06	0.44	0.03	<0.01	0.23	2.67	-
2023 Acasxu	87	SAT	0.04	0.45	0.05	<0.01	0.22	2.23	-
2023 Acasxu	88	SAT	0.06	0.55	0.16	<0.01	0.22	2.63	-
2023 Acasxu	89	SAT	0.07	0.27	0.04	<0.01	0.22	2.35	-
2023 Acasxu	90	UNSAT	13.7	75.5	7.88	17.3	0.57	-	-
2023 Acasxu	91	UNSAT	2.18	3.29	3.26	9.03	0.55	-	-
2023 Acasxu	92	UNSAT	3.03	5.11	3.50	14.1	0.44	-	-
2023 Acasxu	93	UNSAT	1.49	0.72	3.01	7.02	0.24	7.54	-
2023 Acasxu	94	UNSAT	1.26	1.05	2.29	7.02	0.28	6.03	-
2023 Acasxu	95	UNSAT	0.69	0.21	1.73	6.01	0.20	5.65	-
2023 Acasxu	96	SAT	0.06	0.16	0.06	<0.01	0.21	2.66	-
2023 Acasxu	97	SAT	0.05	0.18	0.04	<0.01	0.22	2.77	-
2023 Acasxu	98	SAT	0.08	0.17	<0.01	<0.01	0.21	2.89	-
2023 Acasxu	99	UNSAT	2.40	2.47	3.25	8.03	0.43	-	-
2023 Acasxu	100	UNSAT	2.29	2.89	3.23	8.02	0.36	-	-
2023 Acasxu	101	UNSAT	2.12	2.45	3.15	8.02	0.42	-	-
2023 Acasxu	102	UNSAT	0.62	0.18	1.75	6.01	0.02	6.91	-
2023 Acasxu	103	UNSAT	1.53	0.62	2.51	7.02	0.22	6.21	-
2023 Acasxu	104	UNSAT	0.65	0.17	1.74	6.02	0.22	6.04	-
2023 Acasxu	105	UNSAT	0.64	0.23	1.80	6.01	0.22	6.42	-
2023 Acasxu	106	UNSAT	0.65	0.39	1.75	6.02	0.24	5.32	-
2023 Acasxu	107	UNSAT	0.66	0.18	1.78	6.01	0.01	4.71	-
2023 Acasxu	108	UNSAT	1.52	0.86	2.99	7.02	0.22	6.14	-
2023 Acasxu	109	UNSAT	1.63	1.45	3.12	8.03	0.51	-	-
2023 Acasxu	110	UNSAT	1.53	1.37	3.08	7.02	0.38	7.75	-
2023 Acasxu	111	UNSAT	1.99	0.74	3.00	7.02	0.26	100	-
2023 Acasxu	112	UNSAT	1.24	0.56	2.26	7.02	0.23	6.72	-
2023 Acasxu	113	UNSAT	1.57	0.82	2.99	7.02	0.24	92.6	-
2023 Acasxu	114	UNSAT	0.63	0.19	1.76	7.02	0.20	5.84	-
2023 Acasxu	115	UNSAT	1.19	0.54	2.29	7.02	0.22	6.08	-
2023 Acasxu	116	UNSAT	1.32	0.81	2.30	7.02	0.21	5.47	-
2023 Acasxu	117	UNSAT	2.10	2.10	2.79	8.04	0.24	95.4	-
2023 Acasxu	118	UNSAT	2.17	3.01	3.23	10.0	0.51	-	-
2023 Acasxu	119	UNSAT	2.55	2.15	3.22	8.03	0.59	-	-
2023 Acasxu	120	UNSAT	1.51	0.66	2.96	7.02	0.22	7.57	-
2023 Acasxu	121	UNSAT	0.96	0.19	2.06	7.02	0.21	5.38	-
2023 Acasxu	122	UNSAT	1.53	0.77	3.03	7.02	0.22	7.97	-
2023 Acasxu	123	UNSAT	1.49	0.62	3.00	7.02	0.22	5.79	-
2023 Acasxu	124	UNSAT	0.63	0.22	1.75	7.02	0.27	5.86	-
2023 Acasxu	125	UNSAT	1.95	0.76	2.99	7.02	0.23	5.91	-
2023 Acasxu	126	UNSAT	2.58	3.53	3.30	9.04	0.42	-	-
2023 Acasxu	127	UNSAT	2.01	1.33	2.79	7.02	0.25	6.50	-
2023 Acasxu	128	UNSAT	1.49	0.90	2.56	7.03	0.25	5.83	-
2023 Acasxu	129	UNSAT	1.45	0.50	2.53	7.02	0.21	5.52	-
2023 Acasxu	130	UNSAT	1.54	0.65	2.98	7.02	0.21	6.01	-
2023 Acasxu	131	UNSAT	1.25	0.74	2.24	7.02	0.23	6.24	-
2023 Acasxu	132	UNSAT	0.94	0.20	2.05	7.02	<0.01	4.74	-
2023 Acasxu	133	UNSAT	1.22	0.66	2.22	7.02	0.23	5.36	-
2023 Acasxu	134	UNSAT	1.54	0.30	2.97	7.02	<0.01	4.20	-
2023 Acasxu	135	UNSAT	3.32	10.7	3.54	8.03	0.44	-	-
2023 Acasxu	136	UNSAT	2.60	2.75	3.60	8.03	0.43	-	-
2023 Acasxu	137	UNSAT	2.08	3.27	3.34	8.03	0.36	-	-
2023 Acasxu	138	UNSAT	1.54	0.92	3.09	7.02	0.22	77.3	-
2023 Acasxu	139	UNSAT	1.32	1.15	2.37	7.02	0.35	-	-
2023 Acasxu	140	UNSAT	1.23	0.96	2.32	7.03	0.29	6.61	-
2023 Acasxu	141	SAT	0.06	0.16	0.06	<0.01	0.22	2.69	-
2023 Acasxu	142	SAT	0.05	0.19	0.06	<0.01	0.20	2.14	-
2023 Acasxu	143	SAT	0.08	0.22	0.01	<0.01	0.20	2.27	-
2023 Acasxu	144	UNSAT	1.54	0.89	3.01	7.02	0.27	-	-
2023 Acasxu	145	UNSAT	1.51	0.92	2.60	7.02	0.30	-	-
2023 Acasxu	146	UNSAT	1.23	0.91	2.28	7.02	0.22	6.25	-
2023 Acasxu	147	UNSAT	1.53	0.62	2.96	7.02	0.21	5.60	-
2023 Acasxu	148	UNSAT	1.55	0.66	2.59	7.02	0.24	6.01	-
2023 Acasxu	149	UNSAT	1.54	0.69	2.55	7.02	0.22	6.96	-
2023 Acasxu	150	UNSAT	1.47	0.50	2.50	7.02	0.22	5.81	-
2023 Acasxu	151	UNSAT	1.96	0.76	3.04	7.02	0.27	96.2	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Acasxu	152	UNSAT	0.69	0.21	1.78	6.01	0.01	5.16	-
2023 Acasxu	153	UNSAT	1.50	1.13	3.03	7.02	0.24	6.00	-
2023 Acasxu	154	UNSAT	1.54	0.92	2.61	7.03	0.29	5.61	-
2023 Acasxu	155	UNSAT	0.94	0.20	2.05	7.02	0.21	5.01	-
2023 Acasxu	156	UNSAT	1.22	0.58	2.21	7.03	0.21	5.38	-
2023 Acasxu	157	UNSAT	1.53	0.68	3.00	8.03	0.25	6.32	-
2023 Acasxu	158	UNSAT	1.95	0.67	3.01	7.03	0.22	6.97	-
2023 Acasxu	159	UNSAT	1.50	0.54	2.50	7.02	0.23	5.30	-
2023 Acasxu	160	UNSAT	1.55	0.87	2.59	7.02	0.29	73.0	-
2023 Acasxu	161	UNSAT	1.53	0.69	2.99	7.02	0.33	6.74	-
2023 Acasxu	162	UNSAT	0.69	0.21	1.78	7.02	0.21	5.02	-
2023 Acasxu	163	UNSAT	1.95	0.64	2.98	7.03	0.23	6.13	-
2023 Acasxu	164	UNSAT	1.50	0.78	2.55	7.02	0.23	5.81	-
2023 Acasxu	165	UNSAT	1.51	0.65	3.00	7.02	0.24	81.7	-
2023 Acasxu	166	UNSAT	1.52	0.51	2.54	7.02	0.22	7.65	-
2023 Acasxu	167	UNSAT	1.52	0.50	2.52	7.02	0.21	5.86	-
2023 Acasxu	168	UNSAT	1.26	0.76	2.28	7.02	0.21	6.29	-
2023 Acasxu	169	UNSAT	1.52	0.64	2.99	7.03	0.22	6.41	-
2023 Acasxu	170	UNSAT	1.50	0.54	2.54	7.03	0.22	5.67	-
2023 Acasxu	171	UNSAT	1.49	0.54	3.01	7.02	0.22	5.84	-
2023 Acasxu	172	UNSAT	1.53	0.50	2.92	7.02	0.21	5.33	-
2023 Acasxu	173	UNSAT	1.52	0.65	2.96	7.02	0.23	5.48	-
2023 Acasxu	174	UNSAT	1.17	0.51	2.24	7.02	0.23	5.36	-
2023 Acasxu	175	UNSAT	1.60	0.60	2.98	7.02	0.22	6.19	-
2023 Acasxu	176	UNSAT	0.65	0.22	1.75	7.02	0.23	5.51	-
2023 Acasxu	177	UNSAT	0.95	0.21	2.06	7.02	0.22	5.86	-
2023 Acasxu	178	UNSAT	1.50	0.69	2.54	7.02	0.22	6.58	-
2023 Acasxu	179	UNSAT	1.23	0.56	2.25	7.02	0.22	5.84	-
2023 Acasxu	180	UNSAT	22.1	81.4	9.82	-	0.95	-	-
2023 Acasxu	181	UNSAT	14.3	30.2	3.34	-	3.74	-	-
2023 Acasxu	182	SAT	1.90	-	5.16	62.7	30.6	-	-
2023 Acasxu	183	SAT	0.06	3.30	4.46	<0.01	0.27	-	-
2023 Acasxu	184	UNSAT	6.63	16.6	4.55	106	2.05	-	-
2023 Acasxu	185	UNSAT	5.68	3.44	3.57	24.1	0.64	-	-
2023 Ctsdb Yolo	0	UNSAT	1.98	-	-	-	-	-	-
2023 Ctsdb Yolo	1	SAT	2.00	-	-	-	-	-	-
2023 Ctsdb Yolo	2	SAT	1.99	-	-	-	-	-	-
2023 Ctsdb Yolo	3	SAT	2.04	-	-	-	-	-	-
2023 Ctsdb Yolo	4	SAT	1.98	-	-	-	-	-	-
2023 Ctsdb Yolo	5	UNSAT	2.01	-	-	-	-	-	-
2023 Ctsdb Yolo	6	SAT	1.98	-	-	-	-	-	-
2023 Ctsdb Yolo	7	UNSAT	1.94	-	-	-	-	-	-
2023 Ctsdb Yolo	8	UNSAT	1.99	-	-	-	-	-	-
2023 Ctsdb Yolo	9	SAT	2.02	-	-	-	-	-	-
2023 Ctsdb Yolo	10	SAT	2.00	-	-	-	-	-	-
2023 Ctsdb Yolo	11	SAT	2.00	-	-	-	-	-	-
2023 Ctsdb Yolo	12	SAT	2.01	-	-	-	-	-	-
2023 Ctsdb Yolo	13	SAT	1.98	-	-	-	-	-	-
2023 Ctsdb Yolo	14	UNSAT	1.96	-	-	-	-	-	-
2023 Ctsdb Yolo	15	SAT	1.97	-	-	-	-	-	-
2023 Ctsdb Yolo	16	SAT	1.98	-	-	-	-	-	-
2023 Ctsdb Yolo	17	SAT	1.98	-	-	-	-	-	-
2023 Ctsdb Yolo	18	SAT	1.97	-	-	-	-	-	-
2023 Ctsdb Yolo	19	SAT	2.03	-	-	-	-	-	-
2023 Ctsdb Yolo	20	SAT	2.05	-	-	-	-	-	-
2023 Ctsdb Yolo	21	SAT	2.03	-	-	-	-	-	-
2023 Ctsdb Yolo	22	SAT	1.97	-	-	-	-	-	-
2023 Ctsdb Yolo	23	UNSAT	1.93	-	-	-	-	-	-
2023 Ctsdb Yolo	24	SAT	2.00	-	-	-	-	-	-
2023 Ctsdb Yolo	25	SAT	2.01	-	-	-	-	-	-
2023 Ctsdb Yolo	26	SAT	2.00	-	-	-	-	-	-
2023 Ctsdb Yolo	27	UNSAT	1.98	-	-	-	-	-	-
2023 Ctsdb Yolo	28	UNSAT	1.92	-	-	-	-	-	-
2023 Ctsdb Yolo	29	UNSAT	1.94	-	-	-	-	-	-
2023 Ctsdb Yolo	30	SAT	2.00	-	-	-	-	-	-
2023 Ctsdb Yolo	31	SAT	1.98	-	-	-	-	-	-
2023 Ctsdb Yolo	32	UNSAT	1.93	-	-	-	-	-	-
2023 Ctsdb Yolo	33	SAT	1.96	-	-	-	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (×).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Ctsdb Yolo	34	SAT	1.98	-	-	-	-	-	-
2023 Ctsdb Yolo	35	UNSAT	1.99	-	-	-	-	-	-
2023 Ctsdb Yolo	36	SAT	2.02	-	-	-	-	-	-
2023 Ctsdb Yolo	37	SAT	2.00	-	-	-	-	-	-
2023 Ctsdb Yolo	38	SAT	1.98	-	-	-	-	-	-
2023 Cgan	0	SAT	1.73	2.75	0.52	<0.01	9.98	3.21	-
2023 Cgan	1	SAT	1.70	0.35	0.47	<0.01	31.1	3.27	-
2023 Cgan	2	SAT	1.72	2.29	0.46	<0.01	13.7	2.98	-
2023 Cgan	3	UNSAT	5.68	10.6	16.4	-	24.9	-	-
2023 Cgan	4	SAT	1.72	1.76	0.45	<0.01	10.2	2.98	-
2023 Cgan	5	UNSAT	8.02	13.1	810	-	53.8	-	-
2023 Cgan	6	SAT	1.70	0.21	0.42	<0.01	0.94	3.31	-
2023 Cgan	7	SAT	1.75	0.31	0.45	<0.01	14.7	2.93	-
2023 Cgan	8	UNSAT	13.6	71.6	-	-	159	-	-
2023 Cgan	9	UNSAT	8.80	21.4	-	-	39.4	98.9	-
2023 Cgan	10	SAT	1.69	0.27	0.46	0.01	0.95	3.31	-
2023 Cgan	11	SAT	1.74	0.23	0.44	<0.01	0.87	3.49	-
2023 Cgan	12	UNSAT	9.95	19.5	-	-	30.0	28.9	-
2023 Cgan	13	UNSAT	9.56	48.2	-	-	57.1	138	-
2023 Cgan	14	SAT	1.72	0.24	0.47	<0.01	1.30	3.00	-
2023 Cgan	15	SAT	1.75	0.27	0.48	<0.01	55.6	3.18	-
2023 Cgan	16	UNSAT	5.89	10.5	22.3	-	-	-	-
2023 Cgan	17	SAT	1.73	0.25	0.43	<0.01	7.89	2.99	-
2023 Cgan	18	UNSAT	5.07	9.25	-	-	-	-	-
2023 Cgan	19	SAT	9.44	-	-	1.01	-	-	-
2023 Cgan	20	SAT	9.39	-	-	1.01	-	-	-
2023 Collins Rul Cnn	0	SAT	1.50	0.43	0.47	0.01	0.71	4.67	-
2023 Collins Rul Cnn	1	SAT	1.53	0.46	3.34	<0.01	0.75	1.67	-
2023 Collins Rul Cnn	2	UNSAT	3.13	0.81	1.78	8.02	0.68	3.09	-
2023 Collins Rul Cnn	3	UNSAT	3.10	0.81	1.75	7.02	0.76	2.62	-
2023 Collins Rul Cnn	4	SAT	1.54	0.46	3.32	<0.01	0.68	1.42	-
2023 Collins Rul Cnn	5	UNSAT	3.14	0.81	1.96	9.13	0.75	3.32	-
2023 Collins Rul Cnn	6	SAT	1.50	0.44	3.36	<0.01	0.87	1.65	-
2023 Collins Rul Cnn	7	UNSAT	3.25	0.83	1.93	10.1	0.70	3.29	-
2023 Collins Rul Cnn	8	UNSAT	3.09	0.82	1.76	8.03	0.77	3.03	-
2023 Collins Rul Cnn	9	UNSAT	3.11	0.81	1.76	7.02	0.75	2.96	-
2023 Collins Rul Cnn	10	SAT	1.52	0.45	0.44	<0.01	0.69	1.47	-
2023 Collins Rul Cnn	11	SAT	1.54	0.47	0.42	<0.01	0.73	1.65	-
2023 Collins Rul Cnn	12	UNSAT	3.08	0.83	1.75	10.1	0.74	3.67	-
2023 Collins Rul Cnn	13	UNSAT	3.12	0.82	1.78	9.04	0.76	4.07	-
2023 Collins Rul Cnn	14	UNSAT	3.27	0.85	1.91	10.2	0.70	4.21	-
2023 Collins Rul Cnn	15	UNSAT	3.15	0.84	1.95	9.11	0.74	4.20	-
2023 Collins Rul Cnn	16	UNSAT	3.15	0.91	1.76	7.02	0.73	4.14	-
2023 Collins Rul Cnn	17	SAT	1.52	0.52	4.55	<0.01	0.71	2.17	-
2023 Collins Rul Cnn	18	UNSAT	3.09	0.82	1.77	7.02	0.70	2.84	-
2023 Collins Rul Cnn	19	SAT	1.57	0.46	0.42	<0.01	7.39	1.87	-
2023 Collins Rul Cnn	20	SAT	1.53	0.44	0.44	<0.01	0.77	1.49	-
2023 Collins Rul Cnn	21	SAT	1.53	0.45	0.48	<0.01	0.76	1.75	-
2023 Collins Rul Cnn	22	SAT	1.56	0.44	0.45	<0.01	0.73	2.06	-
2023 Collins Rul Cnn	23	SAT	1.55	0.46	4.20	<0.01	0.79	1.80	-
2023 Collins Rul Cnn	24	UNSAT	3.09	0.84	1.81	10.0	0.72	3.20	-
2023 Collins Rul Cnn	25	UNSAT	3.22	0.85	1.77	10.0	0.68	3.41	-
2023 Collins Rul Cnn	26	UNSAT	3.25	0.86	1.96	14.1	0.78	3.29	-
2023 Collins Rul Cnn	27	UNSAT	3.16	0.94	1.94	10.0	0.75	3.48	-
2023 Collins Rul Cnn	28	SAT	1.53	0.44	3.73	<0.01	0.73	1.53	-
2023 Collins Rul Cnn	29	SAT	1.55	0.47	0.42	<0.01	0.72	1.66	-
2023 Collins Rul Cnn	30	UNSAT	3.24	0.87	1.78	10.0	0.77	3.73	-
2023 Collins Rul Cnn	31	UNSAT	3.09	0.86	1.82	10.0	0.79	3.68	-
2023 Collins Rul Cnn	32	SAT	1.54	0.44	0.42	<0.01	0.83	2.44	-
2023 Collins Rul Cnn	33	SAT	1.57	0.45	0.43	<0.01	0.78	2.25	-
2023 Collins Rul Cnn	34	SAT	1.57	0.53	3.32	<0.01	0.73	2.14	-
2023 Collins Rul Cnn	35	UNSAT	3.12	0.86	1.82	14.3	0.70	3.73	-
2023 Collins Rul Cnn	36	UNSAT	3.28	0.88	1.92	15.2	0.93	3.66	-
2023 Collins Rul Cnn	37	UNSAT	3.14	0.86	1.96	15.2	0.73	3.92	-
2023 Collins Rul Cnn	38	UNSAT	3.07	0.93	1.77	10.0	0.68	3.15	-
2023 Collins Rul Cnn	39	SAT	1.57	0.46	4.53	<0.01	0.78	1.48	-
2023 Collins Rul Cnn	40	UNSAT	3.14	0.89	1.77	10.0	0.70	3.40	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (×).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Collins Rul Cnn	41	SAT	1.54	0.45	0.42	<0.01	0.78	1.66	-
2023 Collins Rul Cnn	42	SAT	1.55	0.45	0.41	<0.01	0.70	1.56	-
2023 Collins Rul Cnn	43	UNSAT	3.44	1.52	1.97	48.8	0.82	-	-
2023 Collins Rul Cnn	44	SAT	1.56	0.44	0.42	<0.01	1.09	1.67	-
2023 Collins Rul Cnn	45	UNSAT	3.47	1.52	1.79	51.9	0.74	-	-
2023 Collins Rul Cnn	46	SAT	1.57	0.49	0.44	<0.01	0.79	1.80	-
2023 Collins Rul Cnn	47	UNSAT	3.48	1.50	1.94	47.0	0.95	-	-
2023 Collins Rul Cnn	48	UNSAT	3.62	1.53	1.92	48.9	0.85	-	-
2023 Collins Rul Cnn	49	UNSAT	3.48	1.48	1.98	49.8	0.72	-	-
2023 Collins Rul Cnn	50	SAT	1.52	0.46	0.47	<0.01	0.75	1.97	-
2023 Collins Rul Cnn	51	SAT	1.55	0.45	0.45	<0.01	0.74	1.69	-
2023 Collins Rul Cnn	52	UNSAT	3.50	1.55	1.84	49.9	0.76	-	-
2023 Collins Rul Cnn	53	UNSAT	3.66	1.59	1.95	46.9	0.93	-	-
2023 Collins Rul Cnn	54	SAT	1.61	0.46	0.45	<0.01	3.51	1.77	-
2023 Collins Rul Cnn	55	UNSAT	3.50	1.58	1.93	52.9	0.81	-	-
2023 Collins Rul Cnn	56	UNSAT	3.55	1.58	1.96	50.8	1.03	-	-
2023 Collins Rul Cnn	57	SAT	1.54	0.47	0.42	<0.01	0.74	1.70	-
2023 Collins Rul Cnn	58	SAT	1.58	0.46	0.44	<0.01	0.88	1.76	-
2023 Collins Rul Cnn	59	UNSAT	3.49	-	1.93	47.8	0.90	-	-
2023 Collins Rul Cnn	60	UNSAT	3.50	-	1.96	50.0	1.14	-	-
2023 Collins Rul Cnn	61	UNSAT	3.52	1.62	1.95	46.7	0.79	-	-
2023 Collins Yolo Robustness	0	SAT	6.82	9.61	-	-	-	-	-
2023 Collins Yolo Robustness	1	SAT	6.95	9.45	-	-	-	-	-
2023 Collins Yolo Robustness	2	SAT	6.88	9.81	-	-	-	-	-
2023 Collins Yolo Robustness	3	SAT	6.98	9.91	-	-	-	-	-
2023 Collins Yolo Robustness	4	SAT	6.95	9.48	-	-	-	-	-
2023 Collins Yolo Robustness	5	SAT	6.80	9.79	-	-	-	-	-
2023 Dist Shift	0	UNSAT	0.93	0.73	1.85	10.0	-	-	-
2023 Dist Shift	1	UNSAT	1.50	0.75	2.25	-	-	-	-
2023 Dist Shift	2	UNSAT	0.97	0.73	1.61	13.1	-	-	-
2023 Dist Shift	3	UNSAT	1.01	6.86	1.68	63.4	-	-	-
2023 Dist Shift	4	UNSAT	3.07	3.48	2.34	78.6	-	-	-
2023 Dist Shift	5	UNSAT	0.98	0.72	1.67	8.03	-	-	-
2023 Dist Shift	6	UNSAT	4.73	9.34	2.47	-	-	-	-
2023 Dist Shift	7	SAT	0.06	0.51	0.02	<0.01	-	1.93	-
2023 Dist Shift	8	UNSAT	3.03	1.65	2.27	-	-	-	-
2023 Dist Shift	9	UNSAT	3.03	4.99	2.31	-	-	-	-
2023 Dist Shift	10	UNSAT	1.02	0.71	1.66	13.1	-	-	-
2023 Dist Shift	11	UNSAT	0.97	0.71	1.63	8.03	-	-	-
2023 Dist Shift	12	UNSAT	1.58	0.71	2.29	102	-	-	-
2023 Dist Shift	13	UNSAT	0.96	0.68	1.69	8.03	-	-	-
2023 Dist Shift	14	UNSAT	3.05	1.26	2.33	8.03	-	-	-
2023 Dist Shift	15	UNSAT	1.47	1.69	2.30	9.04	-	-	-
2023 Dist Shift	16	UNSAT	0.96	0.72	1.64	8.02	-	-	-
2023 Dist Shift	17	UNSAT	0.97	0.71	1.61	8.03	-	-	-
2023 Dist Shift	18	UNSAT	0.99	0.74	1.64	8.02	-	-	-
2023 Dist Shift	19	UNSAT	0.98	0.72	1.66	8.03	-	-	-
2023 Dist Shift	20	UNSAT	1.59	1.31	2.26	117	-	-	-
2023 Dist Shift	21	UNSAT	0.94	0.70	1.63	8.03	-	-	-
2023 Dist Shift	22	SAT	0.01	1.22	<0.01	<0.01	-	2.10	-
2023 Dist Shift	23	UNSAT	0.96	0.78	1.63	8.02	-	-	-
2023 Dist Shift	24	UNSAT	1.00	0.70	1.65	8.03	-	-	-
2023 Dist Shift	25	UNSAT	0.96	0.74	1.66	8.03	-	-	-
2023 Dist Shift	26	UNSAT	3.93	1.64	2.32	-	-	-	-
2023 Dist Shift	27	UNSAT	12.4	-	-	-	-	-	-
2023 Dist Shift	28	UNSAT	0.96	0.70	1.61	8.03	-	-	-
2023 Dist Shift	29	UNSAT	1.71	0.72	2.25	105	-	-	-
2023 Dist Shift	30	UNSAT	3.03	7.07	2.33	-	-	-	-
2023 Dist Shift	31	UNSAT	1.61	2.07	2.29	42.3	-	-	-
2023 Dist Shift	32	UNSAT	2.97	1.37	2.28	-	-	-	-
2023 Dist Shift	33	UNSAT	3.05	1.69	2.30	121	-	-	-
2023 Dist Shift	34	UNSAT	0.96	0.70	1.67	10.0	-	-	-
2023 Dist Shift	35	UNSAT	1.50	0.74	2.30	80.5	-	-	-
2023 Dist Shift	36	UNSAT	3.03	2.74	2.31	134	-	-	-
2023 Dist Shift	37	UNSAT	3.05	1.40	2.28	9.03	-	-	-
2023 Dist Shift	38	UNSAT	0.98	0.70	1.64	8.03	-	-	-
2023 Dist Shift	39	UNSAT	0.97	0.75	1.66	9.04	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Dist Shift	40	UNSAT	0.96	1.88	1.67	9.03	-	-	-
2023 Dist Shift	41	UNSAT	0.99	0.77	1.63	8.03	-	-	-
2023 Dist Shift	42	UNSAT	0.97	0.72	1.68	8.03	-	-	-
2023 Dist Shift	43	SAT	0.03	0.52	0.04	<0.01	-	1.78	-
2023 Dist Shift	44	SAT	0.09	0.51	0.03	<0.01	-	1.90	-
2023 Dist Shift	45	UNSAT	3.06	0.72	2.28	-	-	-	-
2023 Dist Shift	46	UNSAT	0.94	0.73	1.66	8.03	-	-	-
2023 Dist Shift	47	UNSAT	1.72	0.72	2.29	8.03	-	-	-
2023 Dist Shift	48	UNSAT	0.94	0.70	1.65	8.03	-	-	-
2023 Dist Shift	49	UNSAT	1.74	0.70	2.26	159	-	-	-
2023 Dist Shift	50	UNSAT	1.00	0.77	1.67	8.03	-	-	-
2023 Dist Shift	51	UNSAT	0.98	0.70	1.62	8.03	-	-	-
2023 Dist Shift	52	UNSAT	0.95	0.72	1.64	8.03	-	-	-
2023 Dist Shift	53	UNSAT	0.99	0.69	1.64	8.03	-	-	-
2023 Dist Shift	54	SAT	0.08	142	0.39	2.02	-	-	-
2023 Dist Shift	55	UNSAT	0.97	0.71	1.66	8.03	-	-	-
2023 Dist Shift	56	UNSAT	4.05	4.42	2.36	-	-	-	-
2023 Dist Shift	57	UNSAT	1.48	1.34	2.27	14.1	-	-	-
2023 Dist Shift	58	UNSAT	0.95	0.70	1.64	8.03	-	-	-
2023 Dist Shift	59	UNSAT	0.99	0.72	1.64	8.03	-	-	-
2023 Dist Shift	60	UNSAT	0.97	0.71	1.68	8.03	-	-	-
2023 Dist Shift	61	UNSAT	0.99	0.70	1.65	8.03	-	-	-
2023 Dist Shift	62	UNSAT	1.45	0.71	2.31	46.3	-	-	-
2023 Dist Shift	63	UNSAT	1.51	0.73	2.28	16.1	-	-	-
2023 Dist Shift	64	UNSAT	1.60	10.2	2.31	16.1	-	-	-
2023 Dist Shift	65	UNSAT	1.86	2.82	3.19	13.1	-	-	-
2023 Dist Shift	66	UNSAT	9.61	23.5	3.46	-	-	-	-
2023 Dist Shift	67	UNSAT	0.97	0.72	1.65	8.03	-	-	-
2023 Dist Shift	68	UNSAT	0.95	0.69	1.68	11.0	-	-	-
2023 Dist Shift	69	UNSAT	5.35	38.2	3.41	-	-	-	-
2023 Dist Shift	70	UNSAT	0.92	0.70	1.64	8.02	-	-	-
2023 Dist Shift	71	UNSAT	1.42	0.72	2.29	12.1	-	-	-
2023 Metaroom	0	UNSAT	2.56	1.58	4.17	-	-	-	-
2023 Metaroom	1	UNSAT	5.08	7.59	4.04	-	-	-	-
2023 Metaroom	2	UNSAT	2.71	1.81	4.27	-	-	-	-
2023 Metaroom	3	UNSAT	2.70	2.48	4.84	-	-	-	-
2023 Metaroom	4	UNSAT	2.69	2.09	6.06	-	-	-	-
2023 Metaroom	5	UNSAT	2.19	1.58	4.42	-	-	-	-
2023 Metaroom	6	UNSAT	2.25	1.46	3.73	-	-	-	-
2023 Metaroom	7	UNSAT	2.36	0.34	2.71	-	-	-	-
2023 Metaroom	8	?	-	-	-	-	-	-	-
2023 Metaroom	9	UNSAT	2.49	1.64	3.87	-	-	-	-
2023 Metaroom	10	UNSAT	2.05	0.36	2.55	-	-	-	-
2023 Metaroom	11	UNSAT	2.72	2.05	6.52	-	-	-	-
2023 Metaroom	12	UNSAT	2.05	0.34	2.53	-	-	-	-
2023 Metaroom	13	UNSAT	2.26	1.43	4.11	-	-	-	-
2023 Metaroom	14	UNSAT	2.47	1.74	4.80	-	-	-	-
2023 Metaroom	15	UNSAT	1.99	0.33	2.56	-	-	-	-
2023 Metaroom	16	UNSAT	2.07	0.34	2.55	-	-	-	-
2023 Metaroom	17	UNSAT	2.04	0.34	2.54	-	-	-	-
2023 Metaroom	18	UNSAT	2.05	0.33	2.53	-	-	-	-
2023 Metaroom	19	UNSAT	2.53	1.74	3.90	-	-	-	-
2023 Metaroom	20	UNSAT	2.54	1.55	4.10	-	-	-	-
2023 Metaroom	21	UNSAT	2.29	0.35	2.72	-	-	-	-
2023 Metaroom	22	UNSAT	2.24	1.47	3.94	-	-	-	-
2023 Metaroom	23	UNSAT	2.04	0.32	2.55	-	-	-	-
2023 Metaroom	24	UNSAT	2.02	0.32	2.52	-	-	-	-
2023 Metaroom	25	SAT	3.11	-	1.74	-	-	-	-
2023 Metaroom	26	UNSAT	2.03	0.31	2.54	-	-	-	-
2023 Metaroom	27	UNSAT	2.03	0.32	2.55	-	-	-	-
2023 Metaroom	28	UNSAT	2.04	0.32	2.53	-	-	-	-
2023 Metaroom	29	UNSAT	2.04	0.35	2.55	-	-	-	-
2023 Metaroom	30	UNSAT	2.54	1.55	4.07	-	-	-	-
2023 Metaroom	31	UNSAT	2.03	0.36	2.54	-	-	-	-
2023 Metaroom	32	UNSAT	2.07	0.32	2.55	-	-	-	-
2023 Metaroom	33	UNSAT	2.62	0.33	3.01	-	-	-	-
2023 Metaroom	34	UNSAT	2.02	0.34	2.54	-	-	-	-
2023 Metaroom	35	SAT	3.05	5.83	1.72	-	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Metaroom	36	UNSAT	2.67	1.96	4.99	-	-	-	-
2023 Metaroom	37	UNSAT	2.05	0.31	2.57	-	-	-	-
2023 Metaroom	38	UNSAT	2.26	1.78	3.92	-	-	-	-
2023 Metaroom	39	UNSAT	2.04	0.33	2.57	-	-	-	-
2023 Metaroom	40	UNSAT	2.58	1.57	4.71	-	-	-	-
2023 Metaroom	41	UNSAT	2.73	1.86	4.26	-	-	-	-
2023 Metaroom	42	UNSAT	2.74	1.91	4.06	-	-	-	-
2023 Metaroom	43	UNSAT	2.29	1.59	3.71	-	-	-	-
2023 Metaroom	44	UNSAT	2.11	0.64	2.52	-	-	-	-
2023 Metaroom	45	UNSAT	2.71	1.82	4.19	-	-	-	-
2023 Metaroom	46	UNSAT	2.89	1.62	4.37	-	-	-	-
2023 Metaroom	47	UNSAT	2.30	1.48	4.25	-	-	-	-
2023 Metaroom	48	UNSAT	2.73	1.98	4.04	-	-	-	-
2023 Metaroom	49	UNSAT	2.23	1.46	4.82	-	-	-	-
2023 Metaroom	50	SAT	2.80	-	1.18	-	-	-	-
2023 Metaroom	51	UNSAT	2.26	1.39	3.89	-	-	-	-
2023 Metaroom	52	SAT	2.81	226	1.18	-	-	-	-
2023 Metaroom	53	UNSAT	2.41	0.37	2.71	-	-	-	-
2023 Metaroom	54	UNSAT	2.20	1.35	3.92	-	-	-	-
2023 Metaroom	55	SAT	3.09	-	2.14	-	-	-	-
2023 Metaroom	56	UNSAT	2.01	0.37	2.51	-	-	-	-
2023 Metaroom	57	UNSAT	2.25	1.78	3.71	-	-	-	-
2023 Metaroom	58	UNSAT	2.21	1.50	3.93	-	-	-	-
2023 Metaroom	59	UNSAT	2.23	1.45	4.10	-	-	-	-
2023 Metaroom	60	UNSAT	2.70	0.36	2.98	-	-	-	-
2023 Metaroom	61	UNSAT	2.19	1.86	4.70	-	-	-	-
2023 Metaroom	62	UNSAT	2.55	1.52	3.90	-	-	-	-
2023 Metaroom	63	UNSAT	2.16	1.57	3.77	-	-	-	-
2023 Metaroom	64	UNSAT	2.24	1.46	4.13	-	-	-	-
2023 Metaroom	65	UNSAT	2.74	2.21	4.06	-	-	-	-
2023 Metaroom	66	UNSAT	2.72	2.23	5.45	-	-	-	-
2023 Metaroom	67	UNSAT	2.74	2.03	4.46	-	-	-	-
2023 Metaroom	68	UNSAT	2.08	0.34	2.54	-	-	-	-
2023 Metaroom	69	UNSAT	2.11	0.62	2.53	-	-	-	-
2023 Metaroom	70	UNSAT	2.08	0.33	2.53	-	-	-	-
2023 Metaroom	71	UNSAT	2.26	1.69	4.29	-	-	-	-
2023 Metaroom	72	UNSAT	2.23	1.47	4.08	-	-	-	-
2023 Metaroom	73	UNSAT	2.04	0.32	2.49	-	-	-	-
2023 Metaroom	74	UNSAT	2.07	0.34	2.49	-	-	-	-
2023 Metaroom	75	UNSAT	2.08	0.58	2.50	-	-	-	-
2023 Metaroom	76	UNSAT	2.91	1.85	-	-	-	-	-
2023 Metaroom	77	UNSAT	2.38	0.33	2.69	-	-	-	-
2023 Metaroom	78	UNSAT	2.54	0.33	2.82	-	-	-	-
2023 Metaroom	79	UNSAT	2.37	0.34	2.68	-	-	-	-
2023 Metaroom	80	UNSAT	2.07	0.33	2.51	-	-	-	-
2023 Metaroom	81	UNSAT	2.53	1.67	3.86	-	-	-	-
2023 Metaroom	82	UNSAT	2.64	0.36	2.99	-	-	-	-
2023 Metaroom	83	UNSAT	2.57	0.37	2.83	-	-	-	-
2023 Metaroom	84	UNSAT	2.68	0.34	2.97	-	-	-	-
2023 Metaroom	85	UNSAT	2.22	1.37	3.68	-	-	-	-
2023 Metaroom	86	UNSAT	2.28	1.43	3.71	-	-	-	-
2023 Metaroom	87	UNSAT	2.25	1.60	4.40	-	-	-	-
2023 Metaroom	88	UNSAT	2.38	0.34	2.65	-	-	-	-
2023 Metaroom	89	UNSAT	2.72	1.94	4.24	-	-	-	-
2023 Metaroom	90	UNSAT	2.08	0.37	2.51	-	-	-	-
2023 Metaroom	91	UNSAT	2.25	1.36	4.28	-	-	-	-
2023 Metaroom	92	UNSAT	2.02	0.32	2.53	-	-	-	-
2023 Metaroom	93	UNSAT	1.97	0.33	2.54	-	-	-	-
2023 Metaroom	94	UNSAT	2.51	1.78	3.86	-	-	-	-
2023 Metaroom	95	UNSAT	6.78	-	-	-	-	-	-
2023 Metaroom	96	UNSAT	2.04	0.35	2.51	-	-	-	-
2023 Metaroom	97	UNSAT	2.49	1.55	3.87	-	-	-	-
2023 Metaroom	98	UNSAT	2.26	1.46	4.08	-	-	-	-
2023 Metaroom	99	UNSAT	2.68	2.22	4.04	-	-	-	-
2023 MI4acopf	0	UNSAT	29.0	-	-	-	-	-	-
2023 MI4acopf	1	?	-	-	-	-	-	-	-
2023 MI4acopf	2	?	-	-	-	-	-	-	-
2023 MI4acopf	3	UNSAT	2.22	-	-	-	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Ml4acopf	4	UNSAT	2.30	-	-	-	-	-	-
2023 Ml4acopf	5	UNSAT	2.15	-	-	-	-	-	-
2023 Ml4acopf	6	UNSAT	2.17	-	-	-	-	-	-
2023 Ml4acopf	7	UNSAT	2.60	-	-	-	-	-	-
2023 Ml4acopf	8	UNSAT	2.12	-	-	-	-	-	-
2023 Ml4acopf	9	UNSAT	2.18	-	-	-	-	-	-
2023 Ml4acopf	10	UNSAT	2.12	-	-	-	-	-	-
2023 Ml4acopf	11	UNSAT	2.21	-	-	-	-	-	-
2023 Ml4acopf	12	UNSAT	2.18	-	-	-	-	-	-
2023 Ml4acopf	13	UNSAT	2.11	-	-	-	-	-	-
2023 Ml4acopf	14	UNSAT	2.19	-	-	-	-	-	-
2023 Ml4acopf	15	UNSAT	7.92	-	-	-	-	-	-
2023 Ml4acopf	16	UNSAT	2.19	-	-	-	-	-	-
2023 Ml4acopf	17	UNSAT	2.14	-	-	-	-	-	-
2023 Ml4acopf	18	UNSAT	2.10	-	-	-	-	-	-
2023 Ml4acopf	19	?	-	-	-	-	-	-	-
2023 Ml4acopf	20	UNSAT	2.48	-	-	-	-	-	-
2023 Ml4acopf	21	SAT	0.66	-	-	-	-	-	-
2023 Ml4acopf	22	?	-	-	-	-	-	-	-
2023 Nn4sys	0	UNSAT	2.36	0.19	4.36	7.02	-	-	-
2023 Nn4sys	1	UNSAT	2.34	0.35	3.55	7.02	-	-	-
2023 Nn4sys	2	UNSAT	0.81	0.29	3.10	7.02	-	-	-
2023 Nn4sys	3	UNSAT	2.42	0.24	3.55	7.02	-	-	-
2023 Nn4sys	4	UNSAT	0.82	0.19	3.10	7.02	-	-	-
2023 Nn4sys	5	UNSAT	1.90	-	4.83	-	-	-	-
2023 Nn4sys	6	UNSAT	3.88	-	-	-	-	-	-
2023 Nn4sys	7	UNSAT	2.37	0.27	3.62	7.02	-	-	-
2023 Nn4sys	8	UNSAT	3.92	-	-	-	-	-	-
2023 Nn4sys	9	UNSAT	0.82	0.23	3.10	7.02	-	-	-
2023 Nn4sys	10	UNSAT	3.92	-	-	-	-	-	-
2023 Nn4sys	11	UNSAT	2.37	0.25	3.59	7.02	-	-	-
2023 Nn4sys	12	UNSAT	0.83	0.15	3.10	7.02	-	-	-
2023 Nn4sys	13	UNSAT	0.84	0.16	3.05	7.02	-	-	-
2023 Nn4sys	14	UNSAT	3.87	-	5.54	-	-	-	-
2023 Nn4sys	15	UNSAT	0.83	0.15	3.08	7.02	-	-	-
2023 Nn4sys	16	UNSAT	3.91	-	-	-	-	-	-
2023 Nn4sys	17	UNSAT	2.34	0.27	3.60	7.02	-	-	-
2023 Nn4sys	18	UNSAT	0.84	0.21	3.08	7.02	-	-	-
2023 Nn4sys	19	UNSAT	0.82	0.24	3.09	7.02	-	-	-
2023 Nn4sys	20	UNSAT	0.83	0.23	3.06	7.02	-	-	-
2023 Nn4sys	21	UNSAT	2.36	0.24	3.83	8.03	-	-	-
2023 Nn4sys	22	UNSAT	0.85	0.15	3.09	7.02	-	-	-
2023 Nn4sys	23	UNSAT	3.92	-	-	-	-	-	-
2023 Nn4sys	24	UNSAT	1.91	-	4.81	-	-	-	-
2023 Nn4sys	25	UNSAT	2.37	0.17	3.57	7.02	-	-	-
2023 Nn4sys	26	UNSAT	3.93	-	5.57	-	-	-	-
2023 Nn4sys	27	UNSAT	2.33	0.17	3.55	7.02	-	-	-
2023 Nn4sys	28	UNSAT	1.89	-	4.85	-	-	-	-
2023 Nn4sys	29	UNSAT	0.82	0.18	3.09	7.02	-	-	-
2023 Nn4sys	30	UNSAT	0.86	0.16	3.07	7.02	-	-	-
2023 Nn4sys	31	UNSAT	2.45	0.25	3.58	7.02	-	-	-
2023 Nn4sys	32	UNSAT	2.40	0.25	3.88	8.03	-	-	-
2023 Nn4sys	33	UNSAT	2.44	0.32	3.83	8.03	-	-	-
2023 Nn4sys	34	UNSAT	2.40	0.21	3.83	8.03	-	-	-
2023 Nn4sys	35	UNSAT	6.28	-	-	-	-	-	-
2023 Nn4sys	36	UNSAT	6.11	-	-	-	-	-	-
2023 Nn4sys	37	UNSAT	6.34	-	-	-	-	-	-
2023 Nn4sys	38	UNSAT	6.27	-	-	-	-	-	-
2023 Nn4sys	39	UNSAT	6.70	-	-	-	-	-	-
2023 Nn4sys	40	UNSAT	6.46	-	-	-	-	-	-
2023 Nn4sys	41	UNSAT	5.99	-	-	-	-	-	-
2023 Nn4sys	42	UNSAT	6.40	-	-	-	-	-	-
2023 Nn4sys	43	UNSAT	6.74	-	-	-	-	-	-
2023 Nn4sys	44	UNSAT	6.32	-	-	-	-	-	-
2023 Nn4sys	45	UNSAT	6.35	-	-	-	-	-	-
2023 Nn4sys	46	UNSAT	6.28	-	-	-	-	-	-
2023 Nn4sys	47	UNSAT	6.53	-	-	-	-	-	-
2023 Nn4sys	48	UNSAT	6.25	-	-	-	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Nn4sys	49	UNSAT	6.36	-	-	-	-	-	-
2023 Nn4sys	50	UNSAT	6.53	-	-	-	-	-	-
2023 Nn4sys	51	UNSAT	6.67	-	-	-	-	-	-
2023 Nn4sys	52	UNSAT	6.22	-	-	-	-	-	-
2023 Nn4sys	53	UNSAT	6.44	-	-	-	-	-	-
2023 Nn4sys	54	UNSAT	6.68	-	-	-	-	-	-
2023 Nn4sys	55	UNSAT	6.25	-	-	-	-	-	-
2023 Nn4sys	56	UNSAT	7.01	-	-	-	-	-	-
2023 Nn4sys	57	UNSAT	6.16	-	-	-	-	-	-
2023 Nn4sys	58	UNSAT	6.18	-	-	-	-	-	-
2023 Nn4sys	59	UNSAT	6.25	-	-	-	-	-	-
2023 Nn4sys	60	UNSAT	6.19	-	-	-	-	-	-
2023 Nn4sys	61	UNSAT	6.45	-	-	-	-	-	-
2023 Nn4sys	62	UNSAT	6.47	-	-	-	-	-	-
2023 Nn4sys	63	UNSAT	6.59	-	-	-	-	-	-
2023 Nn4sys	64	UNSAT	6.06	-	-	-	-	-	-
2023 Nn4sys	65	UNSAT	6.43	-	-	-	-	-	-
2023 Nn4sys	66	UNSAT	6.12	-	-	-	-	-	-
2023 Nn4sys	67	UNSAT	6.45	-	-	-	-	-	-
2023 Nn4sys	68	UNSAT	6.43	-	-	-	-	-	-
2023 Nn4sys	69	UNSAT	6.40	-	-	-	-	-	-
2023 Nn4sys	70	UNSAT	6.47	-	-	-	-	-	-
2023 Nn4sys	71	UNSAT	6.77	-	-	-	-	-	-
2023 Nn4sys	72	UNSAT	6.78	-	-	-	-	-	-
2023 Nn4sys	73	UNSAT	6.79	-	-	-	-	-	-
2023 Nn4sys	74	UNSAT	6.48	-	-	-	-	-	-
2023 Nn4sys	75	UNSAT	6.69	-	-	-	-	-	-
2023 Nn4sys	76	UNSAT	6.97	-	-	-	-	-	-
2023 Nn4sys	77	UNSAT	6.72	-	-	-	-	-	-
2023 Nn4sys	78	UNSAT	6.73	-	-	-	-	-	-
2023 Nn4sys	79	UNSAT	7.31	-	-	-	-	-	-
2023 Nn4sys	80	UNSAT	6.69	-	-	-	-	-	-
2023 Nn4sys	81	UNSAT	6.72	-	-	-	-	-	-
2023 Nn4sys	82	UNSAT	6.47	-	-	-	-	-	-
2023 Nn4sys	83	UNSAT	6.94	-	-	-	-	-	-
2023 Nn4sys	84	UNSAT	6.75	-	-	-	-	-	-
2023 Nn4sys	85	UNSAT	6.77	-	-	-	-	-	-
2023 Nn4sys	86	UNSAT	6.71	-	-	-	-	-	-
2023 Nn4sys	87	UNSAT	6.65	-	-	-	-	-	-
2023 Nn4sys	88	UNSAT	6.37	-	-	-	-	-	-
2023 Nn4sys	89	UNSAT	6.64	-	-	-	-	-	-
2023 Nn4sys	90	UNSAT	6.61	-	-	-	-	-	-
2023 Nn4sys	91	UNSAT	7.23	-	-	-	-	-	-
2023 Nn4sys	92	UNSAT	6.41	-	-	-	-	-	-
2023 Nn4sys	93	UNSAT	6.64	-	-	-	-	-	-
2023 Nn4sys	94	UNSAT	6.37	-	-	-	-	-	-
2023 Nn4sys	95	UNSAT	6.42	-	-	-	-	-	-
2023 Nn4sys	96	UNSAT	6.60	-	-	-	-	-	-
2023 Nn4sys	97	UNSAT	6.38	-	-	-	-	-	-
2023 Nn4sys	98	UNSAT	6.49	-	-	-	-	-	-
2023 Nn4sys	99	UNSAT	6.54	-	-	-	-	-	-
2023 Nn4sys	100	UNSAT	6.63	-	-	-	-	-	-
2023 Nn4sys	101	UNSAT	6.39	-	-	-	-	-	-
2023 Nn4sys	102	UNSAT	6.77	-	-	-	-	-	-
2023 Nn4sys	103	UNSAT	6.57	-	-	-	-	-	-
2023 Nn4sys	104	UNSAT	6.76	-	-	-	-	-	-
2023 Nn4sys	105	UNSAT	0.09	0.36	1.55	6.02	0.02	-	-
2023 Nn4sys	106	UNSAT	0.09	0.35	1.58	7.02	0.03	-	-
2023 Nn4sys	107	UNSAT	0.29	13.3	1.07	21.1	0.43	X	-
2023 Nn4sys	108	UNSAT	0.22	16.2	1.56	44.3	0.52	X	-
2023 Nn4sys	109	UNSAT	0.24	24.8	1.47	36.2	0.83	X	-
2023 Nn4sys	110	UNSAT	0.24	31.1	1.69	81.5	0.93	X	-
2023 Nn4sys	111	UNSAT	0.22	39.1	2.42	50.3	1.22	X	-
2023 Nn4sys	112	UNSAT	0.28	48.3	2.34	-	1.37	X	-
2023 Nn4sys	113	UNSAT	0.22	51.4	1.78	65.4	1.61	X	-
2023 Nn4sys	114	UNSAT	0.29	63.0	2.67	-	1.78	X	-
2023 Nn4sys	115	SAT	X	X	X	X	X	4.92	-
2023 Nn4sys	116	SAT	X	X	X	-	X	4.99	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	N Nen	NNV	FastBaT
2023 Nn4sys	117	UNSAT	0.43	-	4.27	-	5.96	-	-
2023 Nn4sys	118	UNSAT	0.43	-	4.52	-	6.93	-	-
2023 Nn4sys	119	UNSAT	0.50	-	6.64	-	9.88	-	-
2023 Nn4sys	120	UNSAT	0.52	-	7.23	-	11.0	-	-
2023 Nn4sys	121	UNSAT	0.62	-	8.74	-	13.9	-	-
2023 Nn4sys	122	UNSAT	0.59	-	9.58	-	15.4	-	-
2023 Nn4sys	123	UNSAT	0.77	-	10.8	-	17.7	-	-
2023 Nn4sys	124	UNSAT	0.81	-	12.2	-	20.0	-	-
2023 Nn4sys	125	UNSAT	0.75	-	12.1	-	20.3	-	-
2023 Nn4sys	126	UNSAT	0.80	-	13.3	-	21.8	-	-
2023 Nn4sys	127	UNSAT	3.93	-	-	-	-	-	-
2023 Nn4sys	128	UNSAT	4.08	-	-	-	-	-	-
2023 Nn4sys	129	UNSAT	1.98	0.43	3.77	-	-	-	-
2023 Nn4sys	130	UNSAT	2.46	-	7.43	-	-	-	-
2023 Nn4sys	131	UNSAT	3.01	-	9.98	-	-	-	-
2023 Nn4sys	132	UNSAT	3.46	-	11.8	-	-	-	-
2023 Nn4sys	133	UNSAT	5.35	-	22.1	-	-	-	-
2023 Nn4sys	134	UNSAT	6.07	-	27.4	-	-	-	-
2023 Nn4sys	135	UNSAT	6.89	-	32.5	-	-	-	-
2023 Nn4sys	136	UNSAT	7.49	-	37.4	-	-	-	-
2023 Nn4sys	137	UNSAT	2.70	3.57	5.57	-	-	-	-
2023 Nn4sys	138	UNSAT	3.96	-	12.0	-	-	-	-
2023 Nn4sys	139	UNSAT	4.03	-	12.7	-	-	-	-
2023 Nn4sys	140	UNSAT	3.82	-	14.9	-	-	-	-
2023 Nn4sys	141	UNSAT	4.08	-	17.2	-	-	-	-
2023 Nn4sys	142	UNSAT	4.21	-	19.0	-	-	-	-
2023 Nn4sys	143	UNSAT	4.28	-	20.1	-	-	-	-
2023 Nn4sys	144	UNSAT	4.26	-	23.7	-	-	-	-
2023 Nn4sys	145	UNSAT	8.56	-	47.5	-	-	-	-
2023 Nn4sys	146	UNSAT	9.49	-	59.3	-	-	-	-
2023 Nn4sys	147	UNSAT	12.0	-	74.0	-	-	-	-
2023 Nn4sys	148	UNSAT	14.0	-	97.3	-	-	-	-
2023 Nn4sys	149	UNSAT	15.3	-	96.8	-	-	-	-
2023 Nn4sys	150	UNSAT	16.9	-	110	-	-	-	-
2023 Nn4sys	151	UNSAT	19.3	-	127	-	-	-	-
2023 Nn4sys	152	UNSAT	20.2	-	157	-	-	-	-
2023 Nn4sys	153	UNSAT	21.8	-	142	-	-	-	-
2023 Nn4sys	154	UNSAT	22.4	-	154	-	-	-	-
2023 Nn4sys	155	UNSAT	25.2	-	171	-	-	-	-
2023 Nn4sys	156	UNSAT	27.1	-	-	-	-	-	-
2023 Nn4sys	157	UNSAT	28.5	-	198	-	-	-	-
2023 Nn4sys	158	UNSAT	30.3	-	-	-	-	-	-
2023 Nn4sys	159	UNSAT	33.1	-	259	-	-	-	-
2023 Nn4sys	160	UNSAT	3.75	35.9	6.32	-	-	-	-
2023 Nn4sys	161	UNSAT	5.98	-	-	-	-	-	-
2023 Nn4sys	162	UNSAT	8.72	-	-	-	-	-	-
2023 Nn4sys	163	UNSAT	9.94	-	-	-	-	-	-
2023 Nn4sys	164	UNSAT	19.8	-	-	-	-	-	-
2023 Nn4sys	165	UNSAT	24.5	-	-	-	-	-	-
2023 Nn4sys	166	UNSAT	28.9	-	-	-	-	-	-
2023 Nn4sys	167	UNSAT	33.3	-	-	-	-	-	-
2023 Nn4sys	168	UNSAT	38.0	-	-	-	-	-	-
2023 Nn4sys	169	UNSAT	42.6	-	-	-	-	-	-
2023 Nn4sys	170	UNSAT	46.8	-	-	-	-	-	-
2023 Nn4sys	171	UNSAT	3.98	-	8.69	-	-	-	-
2023 Nn4sys	172	UNSAT	7.58	-	-	-	-	-	-
2023 Nn4sys	173	UNSAT	8.89	-	-	-	-	-	-
2023 Nn4sys	174	UNSAT	10.8	-	-	-	-	-	-
2023 Nn4sys	175	UNSAT	12.2	-	-	-	-	-	-
2023 Nn4sys	176	UNSAT	15.3	-	-	-	-	-	-
2023 Nn4sys	177	UNSAT	16.9	-	-	-	-	-	-
2023 Nn4sys	178	UNSAT	17.9	-	-	-	-	-	-
2023 Nn4sys	179	UNSAT	40.2	-	-	-	-	-	-
2023 Nn4sys	180	UNSAT	50.0	-	-	-	-	-	-
2023 Nn4sys	181	UNSAT	59.0	-	-	-	-	-	-
2023 Nn4sys	182	UNSAT	71.7	-	-	-	-	-	-
2023 Nn4sys	183	UNSAT	80.6	-	-	-	-	-	-
2023 Nn4sys	184	UNSAT	93.7	-	-	-	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (×).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Nn4sys	185	UNSAT	105	-	-	-	-	-	-
2023 Nn4sys	186	UNSAT	115	-	-	-	-	-	-
2023 Nn4sys	187	UNSAT	127	-	-	-	-	-	-
2023 Nn4sys	188	UNSAT	134	-	-	-	-	-	-
2023 Nn4sys	189	UNSAT	144	-	-	-	-	-	-
2023 Nn4sys	190	UNSAT	157	-	-	-	-	-	-
2023 Nn4sys	191	UNSAT	166	-	-	-	-	-	-
2023 Nn4sys	192	UNSAT	176	-	-	-	-	-	-
2023 Nn4sys	193	UNSAT	188	-	-	-	-	-	-
2023 Test	0	UNSAT	0.11	-	-	-	-	-	-
2023 Test	1	SAT	0.02	0.22	-	-	-	-	-
2023 Test	2	UNSAT	0.64	-	-	-	-	-	-
2023 Tllverifybench	0	UNSAT	0.97	13.5	2.43	8.03	-	400	0.01
2023 Tllverifybench	1	UNSAT	1.04	7.69	2.46	7.03	1.51	-	0.15
2023 Tllverifybench	2	SAT	0.06	0.26	0.02	<0.01	0.49	2.07	<0.01
2023 Tllverifybench	3	UNSAT	0.97	6.49	2.43	7.02	1.52	-	0.11
2023 Tllverifybench	4	SAT	0.11	0.33	0.06	<0.01	0.71	1.56	0.04
2023 Tllverifybench	5	SAT	0.37	-	0.19	<0.01	0.96	1.06	0.19
2023 Tllverifybench	6	SAT	0.07	0.35	0.05	<0.01	0.64	0.85	0.08
2023 Tllverifybench	7	SAT	0.09	0.33	0.03	<0.01	0.80	0.94	0.07
2023 Tllverifybench	8	SAT	0.26	0.41	0.09	<0.01	0.53	1.25	0.01
2023 Tllverifybench	9	UNSAT	1.82	26.7	2.93	-	-	-	0.08
2023 Tllverifybench	10	UNSAT	1.47	9.50	2.96	29.3	-	-	0.06
2023 Tllverifybench	11	UNSAT	3.24	181	3.14	-	-	-	0.01
2023 Tllverifybench	12	SAT	0.66	-	0.23	<0.01	1.71	2.35	0.22
2023 Tllverifybench	13	UNSAT	2.34	149	3.16	-	-	-	0.01
2023 Tllverifybench	14	UNSAT	1.87	48.0	3.09	-	-	-	0.16
2023 Tllverifybench	15	SAT	0.66	0.64	0.12	<0.01	1.00	1.36	0.07
2023 Tllverifybench	16	SAT	1.64	1.11	0.36	<0.01	3.34	1.78	0.09
2023 Tllverifybench	17	UNSAT	4.87	94.4	5.11	185	-	-	0.08
2023 Tllverifybench	18	UNSAT	10.9	-	5.50	-	-	-	0.02
2023 Tllverifybench	19	UNSAT	5.62	250	5.32	-	-	-	0.41
2023 Tllverifybench	20	SAT	3.28	-	0.73	<0.01	7.47	1.58	0.45
2023 Tllverifybench	21	SAT	3.26	2.60	0.72	<0.01	7.49	1.50	0.20
2023 Tllverifybench	22	UNSAT	9.03	-	7.03	-	-	-	<0.01
2023 Tllverifybench	23	SAT	3.24	1.81	0.74	<0.01	5.21	1.96	0.02
2023 Tllverifybench	24	UNSAT	18.9	-	44.9	-	-	-	0.03
2023 Tllverifybench	25	SAT	6.07	4.07	1.40	<0.01	11.1	2.01	0.03
2023 Tllverifybench	26	SAT	6.22	3.68	1.40	<0.01	11.3	1.80	0.03
2023 Tllverifybench	27	SAT	6.05	3.64	1.43	0.01	12.3	2.15	0.10
2023 Tllverifybench	28	UNSAT	16.6	-	70.0	-	-	-	0.27
2023 Tllverifybench	29	SAT	10.6	-	2.38	1.01	-	-	0.01
2023 Tllverifybench	30	SAT	10.2	-	2.39	1.02	25.1	2.84	0.54
2023 Tllverifybench	31	UNSAT	16.9	-	72.8	-	-	-	0.63
2023 Traffic Signs Recognition 0	SAT	1.90	1.02	-	0.01	-	-	-	-
2023 Traffic Signs Recognition 1	SAT	1.91	1.02	-	<0.01	-	-	-	-
2023 Traffic Signs Recognition 2	SAT	1.91	0.96	-	<0.01	-	-	-	-
2023 Traffic Signs Recognition 3	SAT	1.90	1.03	-	<0.01	-	-	-	-
2023 Traffic Signs Recognition 4	SAT	1.91	0.94	-	0.01	-	-	-	-
2023 Traffic Signs Recognition 5	?	-	-	-	-	-	-	-	-
2023 Traffic Signs Recognition 6	?	-	-	-	-	-	-	-	-
2023 Traffic Signs Recognition 7	SAT	2.55	-	-	-	-	-	-	-
2023 Traffic Signs Recognition 8	SAT	2.28	-	-	-	-	-	-	-
2023 Traffic Signs Recognition 9	SAT	2.18	-	-	-	-	-	-	-
2023 Traffic Signs Recognition 10	SAT	2.24	-	0.83	-	-	-	-	-
2023 Traffic Signs Recognition 11	SAT	2.31	-	0.84	47.3	-	-	-	-
2023 Traffic Signs Recognition 12	SAT	2.22	-	0.86	7.06	-	-	-	-
2023 Traffic Signs Recognition 13	SAT	1.92	-	0.83	<0.01	-	-	-	-
2023 Traffic Signs Recognition 14	SAT	1.94	-	0.84	<0.01	-	-	-	-
2023 Traffic Signs Recognition 15	SAT	2.83	-	1.48	-	-	-	-	-
2023 Traffic Signs Recognition 16	SAT	2.42	-	1.47	-	-	-	-	-
2023 Traffic Signs Recognition 17	SAT	2.34	-	1.47	-	-	-	-	-
2023 Traffic Signs Recognition 18	SAT	2.35	-	1.47	-	-	-	-	-
2023 Traffic Signs Recognition 19	SAT	2.36	-	1.46	276	-	-	-	-
2023 Traffic Signs Recognition 20	SAT	2.50	-	1.42	-	-	-	-	-
2023 Traffic Signs Recognition 21	SAT	2.33	-	1.46	-	-	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Traffic Signs Recognition 22	SAT	2.30	-	1.45	-	-	-	-	-
2023 Traffic Signs Recognition 23	SAT	2.33	-	1.46	-	-	-	-	-
2023 Traffic Signs Recognition 24	SAT	2.33	-	1.48	-	-	-	-	-
2023 Traffic Signs Recognition 25	SAT	2.03	-	1.46	<0.01	-	-	-	-
2023 Traffic Signs Recognition 26	SAT	2.04	3.67	1.46	<0.01	-	-	-	-
2023 Traffic Signs Recognition 27	SAT	2.05	-	1.45	<0.01	-	-	-	-
2023 Traffic Signs Recognition 28	SAT	1.99	3.66	1.47	<0.01	-	-	-	-
2023 Traffic Signs Recognition 29	SAT	1.99	3.64	1.44	<0.01	-	-	-	-
2023 Traffic Signs Recognition 30	SAT	2.63	-	2.45	-	-	-	-	-
2023 Traffic Signs Recognition 31	SAT	2.60	-	2.47	-	-	-	-	-
2023 Traffic Signs Recognition 32	SAT	2.59	-	2.33	-	-	-	-	-
2023 Traffic Signs Recognition 33	SAT	2.54	-	2.25	-	-	-	-	-
2023 Traffic Signs Recognition 34	SAT	2.56	-	2.22	9.07	-	-	-	-
2023 Traffic Signs Recognition 35	SAT	-	-	2.17	-	-	-	-	-
2023 Traffic Signs Recognition 36	SAT	3.39	-	2.17	-	-	-	-	-
2023 Traffic Signs Recognition 37	SAT	3.04	-	2.16	-	-	-	-	-
2023 Traffic Signs Recognition 38	SAT	2.80	-	2.16	-	-	-	-	-
2023 Traffic Signs Recognition 39	SAT	2.63	-	2.18	-	-	-	-	-
2023 Traffic Signs Recognition 40	SAT	2.57	-	2.20	-	-	-	-	-
2023 Traffic Signs Recognition 41	SAT	2.62	-	2.21	-	-	-	-	-
2023 Traffic Signs Recognition 42	SAT	2.59	-	2.18	121	-	-	-	-
2023 Traffic Signs Recognition 43	SAT	2.58	-	2.20	21.1	-	-	-	-
2023 Traffic Signs Recognition 44	SAT	2.21	-	2.18	1.01	-	-	-	-
2023 Vggnet16	0	UNSAT	9.46	63.2	50.9	30.5	33.2	-	-
2023 Vggnet16	1	UNSAT	9.41	63.1	51.0	211	29.7	-	-
2023 Vggnet16	2	UNSAT	9.40	68.2	-	-	33.0	-	-
2023 Vggnet16	3	UNSAT	9.27	69.7	50.9	-	30.9	-	-
2023 Vggnet16	4	UNSAT	9.28	73.3	-	-	37.0	-	-
2023 Vggnet16	5	UNSAT	9.36	85.5	-	-	52.7	-	-
2023 Vggnet16	6	UNSAT	9.30	75.8	50.8	-	32.0	-	-
2023 Vggnet16	7	UNSAT	9.41	77.1	-	-	42.4	-	-
2023 Vggnet16	8	UNSAT	11.1	228	-	-	121	-	-
2023 Vggnet16	9	UNSAT	9.45	88.2	51.2	-	36.8	-	-
2023 Vggnet16	10	UNSAT	9.50	101	-	-	60.8	-	-
2023 Vggnet16	11	UNSAT	9.43	115	-	-	68.3	-	-
2023 Vggnet16	12	UNSAT	783	-	-	-	-	-	-
2023 Vggnet16	13	UNSAT	20.7	287	-	-	229	-	-
2023 Vggnet16	14	UNSAT	41.8	-	-	-	632	-	-
2023 Vggnet16	15	SAT	-	33.8	36.1	3.03	-	-	-
2023 Vggnet16	16	?	-	-	-	-	-	-	-
2023 Vggnet16	17	?	-	-	-	-	-	-	-
2023 Vit	0	UNSAT	-	-	-	12.2	-	-	-
2023 Vit	1	UNSAT	-	-	-	12.2	-	-	-
2023 Vit	2	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	3	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	4	UNSAT	-	-	-	13.1	-	-	-
2023 Vit	5	UNSAT	9.08	-	-	14.2	-	-	-
2023 Vit	6	UNSAT	7.86	-	-	13.1	-	-	-
2023 Vit	7	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	8	UNSAT	-	-	-	14.3	-	-	-
2023 Vit	9	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	10	UNSAT	8.23	-	-	13.3	-	-	-
2023 Vit	11	UNSAT	7.80	-	-	13.1	-	-	-
2023 Vit	12	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	13	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	14	UNSAT	-	-	-	14.1	-	-	-
2023 Vit	15	UNSAT	11.3	-	-	13.3	-	-	-
2023 Vit	16	UNSAT	7.40	-	-	13.3	-	-	-
2023 Vit	17	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	18	UNSAT	17.8	-	-	13.2	-	-	-
2023 Vit	19	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	20	UNSAT	-	-	-	13.3	-	-	-
2023 Vit	21	UNSAT	-	-	-	13.1	-	-	-
2023 Vit	22	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	23	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	24	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	25	UNSAT	9.17	-	-	13.2	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Vit	26	UNSAT	19.7	-	-	13.2	-	-	-
2023 Vit	27	UNSAT	-	-	-	14.3	-	-	-
2023 Vit	28	UNSAT	-	-	-	13.3	-	-	-
2023 Vit	29	UNSAT	-	-	-	14.3	-	-	-
2023 Vit	30	UNSAT	-	-	-	14.3	-	-	-
2023 Vit	31	UNSAT	-	-	-	12.2	-	-	-
2023 Vit	32	UNSAT	7.42	-	-	14.2	-	-	-
2023 Vit	33	UNSAT	9.54	-	-	13.2	-	-	-
2023 Vit	34	UNSAT	-	-	-	14.2	-	-	-
2023 Vit	35	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	36	UNSAT	9.99	-	-	13.2	-	-	-
2023 Vit	37	UNSAT	-	-	-	13.3	-	-	-
2023 Vit	38	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	39	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	40	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	41	UNSAT	-	-	-	14.2	-	-	-
2023 Vit	42	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	43	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	44	UNSAT	-	-	-	14.2	-	-	-
2023 Vit	45	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	46	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	47	UNSAT	-	-	-	13.3	-	-	-
2023 Vit	48	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	49	UNSAT	6.94	-	-	13.2	-	-	-
2023 Vit	50	UNSAT	20.8	-	-	13.2	-	-	-
2023 Vit	51	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	52	UNSAT	11.7	-	-	13.3	-	-	-
2023 Vit	53	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	54	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	55	UNSAT	14.0	-	-	14.2	-	-	-
2023 Vit	56	UNSAT	8.19	-	-	13.2	-	-	-
2023 Vit	57	UNSAT	11.3	-	-	14.2	-	-	-
2023 Vit	58	UNSAT	-	-	-	14.2	-	-	-
2023 Vit	59	UNSAT	9.13	-	-	13.2	-	-	-
2023 Vit	60	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	61	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	62	UNSAT	18.7	-	-	13.1	-	-	-
2023 Vit	63	UNSAT	9.56	-	-	14.2	-	-	-
2023 Vit	64	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	65	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	66	UNSAT	9.13	-	-	14.2	-	-	-
2023 Vit	67	UNSAT	10.4	-	-	13.2	-	-	-
2023 Vit	68	UNSAT	-	-	-	13.3	-	-	-
2023 Vit	69	UNSAT	28.4	-	-	13.2	-	-	-
2023 Vit	70	UNSAT	7.04	-	-	14.2	-	-	-
2023 Vit	71	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	72	UNSAT	10.5	-	-	13.2	-	-	-
2023 Vit	73	UNSAT	7.00	-	-	13.2	-	-	-
2023 Vit	74	UNSAT	-	-	-	13.3	-	-	-
2023 Vit	75	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	76	UNSAT	19.3	-	-	13.1	-	-	-
2023 Vit	77	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	78	UNSAT	8.31	-	-	13.2	-	-	-
2023 Vit	79	UNSAT	7.46	-	-	14.2	-	-	-
2023 Vit	80	UNSAT	10.4	-	-	13.2	-	-	-
2023 Vit	81	UNSAT	9.62	-	-	13.3	-	-	-
2023 Vit	82	UNSAT	10.5	-	-	12.2	-	-	-
2023 Vit	83	UNSAT	8.64	-	-	13.3	-	-	-
2023 Vit	84	UNSAT	6.98	-	-	13.1	-	-	-
2023 Vit	85	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	86	UNSAT	9.52	-	-	13.2	-	-	-
2023 Vit	87	UNSAT	7.83	-	-	13.2	-	-	-
2023 Vit	88	UNSAT	9.07	-	-	14.2	-	-	-
2023 Vit	89	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	90	UNSAT	9.12	-	-	13.2	-	-	-
2023 Vit	91	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	92	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	93	UNSAT	-	-	-	13.2	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Vit	94	UNSAT	-	-	-	14.3	-	-	-
2023 Vit	95	UNSAT	-	-	-	14.2	-	-	-
2023 Vit	96	UNSAT	20.3	-	-	14.2	-	-	-
2023 Vit	97	UNSAT	8.69	-	-	13.2	-	-	-
2023 Vit	98	UNSAT	-	-	-	13.2	-	-	-
2023 Vit	99	UNSAT	8.68	-	-	13.2	-	-	-
2023 Vit	100	UNSAT	-	-	-	60.2	-	-	-
2023 Vit	101	UNSAT	-	-	-	60.2	-	-	-
2023 Vit	102	UNSAT	-	-	-	58.1	-	-	-
2023 Vit	103	UNSAT	43.0	-	-	60.2	-	-	-
2023 Vit	104	UNSAT	35.7	-	-	58.1	-	-	-
2023 Vit	105	UNSAT	33.2	-	-	59.9	-	-	-
2023 Vit	106	UNSAT	-	-	-	58.0	-	-	-
2023 Vit	107	UNSAT	15.2	-	-	59.1	-	-	-
2023 Vit	108	UNSAT	-	-	-	61.1	-	-	-
2023 Vit	109	UNSAT	39.1	-	-	58.0	-	-	-
2023 Vit	110	UNSAT	-	-	-	53.9	-	-	-
2023 Vit	111	UNSAT	31.8	-	-	60.1	-	-	-
2023 Vit	112	UNSAT	12.2	-	-	59.2	-	-	-
2023 Vit	113	UNSAT	-	-	-	57.1	-	-	-
2023 Vit	114	UNSAT	-	-	-	58.0	-	-	-
2023 Vit	115	UNSAT	-	-	-	60.0	-	-	-
2023 Vit	116	UNSAT	-	-	-	58.0	-	-	-
2023 Vit	117	UNSAT	-	-	-	59.0	-	-	-
2023 Vit	118	UNSAT	-	-	-	61.1	-	-	-
2023 Vit	119	UNSAT	10.1	-	-	61.1	-	-	-
2023 Vit	120	UNSAT	68.2	-	-	59.1	-	-	-
2023 Vit	121	UNSAT	-	-	-	60.0	-	-	-
2023 Vit	122	UNSAT	30.3	-	-	59.0	-	-	-
2023 Vit	123	UNSAT	31.7	-	-	58.0	-	-	-
2023 Vit	124	UNSAT	10.0	-	-	58.2	-	-	-
2023 Vit	125	UNSAT	-	-	-	58.3	-	-	-
2023 Vit	126	UNSAT	-	-	-	54.9	-	-	-
2023 Vit	127	UNSAT	21.3	-	-	59.2	-	-	-
2023 Vit	128	UNSAT	-	-	-	58.1	-	-	-
2023 Vit	129	UNSAT	-	-	-	57.1	-	-	-
2023 Vit	130	UNSAT	-	-	-	59.0	-	-	-
2023 Vit	131	UNSAT	-	-	-	54.9	-	-	-
2023 Vit	132	UNSAT	-	-	-	59.2	-	-	-
2023 Vit	133	UNSAT	35.8	-	-	58.2	-	-	-
2023 Vit	134	UNSAT	-	-	-	59.0	-	-	-
2023 Vit	135	UNSAT	53.9	-	-	56.9	-	-	-
2023 Vit	136	UNSAT	9.04	-	-	56.0	-	-	-
2023 Vit	137	UNSAT	-	-	-	60.0	-	-	-
2023 Vit	138	UNSAT	-	-	-	59.2	-	-	-
2023 Vit	139	UNSAT	-	-	-	57.9	-	-	-
2023 Vit	140	UNSAT	34.7	-	-	58.0	-	-	-
2023 Vit	141	UNSAT	-	-	-	57.0	-	-	-
2023 Vit	142	UNSAT	15.2	-	-	58.2	-	-	-
2023 Vit	143	UNSAT	-	-	-	57.9	-	-	-
2023 Vit	144	UNSAT	-	-	-	59.1	-	-	-
2023 Vit	145	UNSAT	-	-	-	57.2	-	-	-
2023 Vit	146	UNSAT	11.1	-	-	58.0	-	-	-
2023 Vit	147	UNSAT	-	-	-	54.9	-	-	-
2023 Vit	148	UNSAT	-	-	-	61.3	-	-	-
2023 Vit	149	UNSAT	34.0	-	-	59.0	-	-	-
2023 Vit	150	UNSAT	-	-	-	55.9	-	-	-
2023 Vit	151	UNSAT	-	-	-	59.1	-	-	-
2023 Vit	152	UNSAT	-	-	-	56.1	-	-	-
2023 Vit	153	UNSAT	14.2	-	-	57.9	-	-	-
2023 Vit	154	UNSAT	-	-	-	62.0	-	-	-
2023 Vit	155	UNSAT	12.2	-	-	61.3	-	-	-
2023 Vit	156	UNSAT	34.1	-	-	59.0	-	-	-
2023 Vit	157	UNSAT	34.8	-	-	59.9	-	-	-
2023 Vit	158	UNSAT	-	-	-	58.8	-	-	-
2023 Vit	159	UNSAT	-	-	-	57.0	-	-	-
2023 Vit	160	UNSAT	40.6	-	-	58.0	-	-	-
2023 Vit	161	UNSAT	-	-	-	59.2	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Vit	162	UNSAT	12.3	-	-	60.1	-	-	-
2023 Vit	163	UNSAT	-	-	-	58.1	-	-	-
2023 Vit	164	UNSAT	-	-	-	60.1	-	-	-
2023 Vit	165	UNSAT	31.8	-	-	55.9	-	-	-
2023 Vit	166	UNSAT	-	-	-	57.1	-	-	-
2023 Vit	167	UNSAT	-	-	-	60.0	-	-	-
2023 Vit	168	UNSAT	-	-	-	61.0	-	-	-
2023 Vit	169	UNSAT	-	-	-	61.1	-	-	-
2023 Vit	170	UNSAT	-	-	-	57.0	-	-	-
2023 Vit	171	UNSAT	-	-	-	60.1	-	-	-
2023 Vit	172	UNSAT	18.3	-	-	59.1	-	-	-
2023 Vit	173	UNSAT	-	-	-	60.2	-	-	-
2023 Vit	174	UNSAT	-	-	-	57.9	-	-	-
2023 Vit	175	UNSAT	14.3	-	-	56.8	-	-	-
2023 Vit	176	UNSAT	14.2	-	-	57.8	-	-	-
2023 Vit	177	UNSAT	-	-	-	57.1	-	-	-
2023 Vit	178	UNSAT	9.13	-	-	59.1	-	-	-
2023 Vit	179	UNSAT	-	-	-	60.0	-	-	-
2023 Vit	180	UNSAT	-	-	-	60.1	-	-	-
2023 Vit	181	UNSAT	-	-	-	57.0	-	-	-
2023 Vit	182	UNSAT	-	-	-	62.1	-	-	-
2023 Vit	183	UNSAT	12.2	-	-	56.1	-	-	-
2023 Vit	184	UNSAT	33.3	-	-	59.0	-	-	-
2023 Vit	185	UNSAT	17.4	-	-	56.0	-	-	-
2023 Vit	186	UNSAT	-	-	-	59.1	-	-	-
2023 Vit	187	UNSAT	-	-	-	60.1	-	-	-
2023 Vit	188	UNSAT	-	-	-	58.0	-	-	-
2023 Vit	189	UNSAT	-	-	-	59.2	-	-	-
2023 Vit	190	UNSAT	15.3	-	-	56.9	-	-	-
2023 Vit	191	UNSAT	-	-	-	59.1	-	-	-
2023 Vit	192	UNSAT	-	-	-	56.9	-	-	-
2023 Vit	193	UNSAT	11.2	-	-	61.3	-	-	-
2023 Vit	194	UNSAT	-	-	-	57.0	-	-	-
2023 Vit	195	UNSAT	-	-	-	56.9	-	-	-
2023 Vit	196	UNSAT	-	-	-	60.1	-	-	-
2023 Vit	197	UNSAT	-	-	-	59.2	-	-	-
2023 Vit	198	UNSAT	-	-	-	53.8	-	-	-
2023 Vit	199	UNSAT	34.2	-	-	56.0	-	-	-
2023 Yolo	0	UNSAT	3.38	127	-	-	-	-	-
2023 Yolo	1	SAT	-	-	-	-	-	4.82	-
2023 Yolo	2	UNSAT	3.48	-	-	-	-	-	-
2023 Yolo	3	UNSAT	3.36	-	-	-	-	-	-
2023 Yolo	4	UNSAT	5.31	-	-	-	-	X	-
2023 Yolo	5	UNSAT	3.36	135	-	-	-	-	-
2023 Yolo	6	UNSAT	3.37	-	-	-	-	X	-
2023 Yolo	7	UNSAT	6.34	-	-	-	-	X	-
2023 Yolo	8	UNSAT	3.35	116	-	-	-	-	-
2023 Yolo	9	SAT	-	-	-	-	-	5.23	-
2023 Yolo	10	UNSAT	3.35	137	-	-	-	-	-
2023 Yolo	11	SAT	-	-	-	-	-	6.06	-
2023 Yolo	12	UNSAT	3.33	118	-	-	-	-	-
2023 Yolo	13	UNSAT	3.34	-	-	-	-	X	-
2023 Yolo	14	UNSAT	3.37	98.1	-	-	-	-	-
2023 Yolo	15	?	-	-	-	-	-	-	-
2023 Yolo	16	UNSAT	3.34	119	-	-	-	X	-
2023 Yolo	17	UNSAT	3.43	111	-	-	-	X	-
2023 Yolo	18	UNSAT	3.35	101	-	-	-	-	-
2023 Yolo	19	UNSAT	3.34	121	-	-	-	-	-
2023 Yolo	20	UNSAT	73.3	-	-	-	-	X	-
2023 Yolo	21	UNSAT	3.34	113	-	-	-	-	-
2023 Yolo	22	UNSAT	3.34	111	-	-	-	-	-
2023 Yolo	23	UNSAT	3.31	115	-	-	-	-	-
2023 Yolo	24	UNSAT	3.35	-	-	-	-	X	-
2023 Yolo	25	UNSAT	3.35	-	-	-	-	X	-
2023 Yolo	26	UNSAT	3.31	108	-	-	-	-	-
2023 Yolo	27	UNSAT	3.36	133	-	-	-	-	-
2023 Yolo	28	UNSAT	3.34	110	-	-	-	X	-
2023 Yolo	29	UNSAT	3.40	111	-	-	-	-	-

Table 36: Instance Runtimes. Fastest times are blue. Second fastest are green. Penalties are red crosses (X).

Category	Id	Result	α, β -C	PyRat	NSAT	Marab	NNen	NNV	FastBaT
2023 Yolo	30	UNSAT	3.35	-	-	-	-	-	-
2023 Yolo	31	UNSAT	3.40	121	-	-	-	-	-
2023 Yolo	32	UNSAT	3.37	101	-	-	-	X	-
2023 Yolo	33	UNSAT	3.34	-	-	-	-	X	-
2023 Yolo	34	UNSAT	3.34	103	-	-	-	-	-
2023 Yolo	35	UNSAT	3.39	90.1	-	-	-	X	-
2023 Yolo	36	UNSAT	3.36	131	-	-	-	-	-
2023 Yolo	37	SAT	-	-	-	-	-	5.29	-
2023 Yolo	38	UNSAT	3.34	119	-	-	-	X	-
2023 Yolo	39	UNSAT	3.39	-	-	-	-	-	-
2023 Yolo	40	UNSAT	7.20	-	-	-	-	X	-
2023 Yolo	41	UNSAT	50.8	-	-	-	-	X	-
2023 Yolo	42	UNSAT	3.37	113	-	-	-	-	-
2023 Yolo	43	UNSAT	3.37	107	-	-	-	X	-
2023 Yolo	44	SAT	-	-	-	-	-	4.98	-
2023 Yolo	45	UNSAT	3.37	106	-	-	-	X	-
2023 Yolo	46	UNSAT	3.33	120	-	-	-	-	-
2023 Yolo	47	UNSAT	3.36	-	-	-	-	-	-
2023 Yolo	48	UNSAT	3.36	128	-	-	-	X	-
2023 Yolo	49	UNSAT	3.36	-	-	-	-	-	-
2023 Yolo	50	SAT	-	-	-	-	-	5.34	-
2023 Yolo	51	SAT	-	-	-	-	-	4.91	-
2023 Yolo	52	UNSAT	3.40	103	-	-	-	X	-
2023 Yolo	53	UNSAT	3.33	137	-	-	-	-	-
2023 Yolo	54	UNSAT	3.35	118	-	-	-	X	-
2023 Yolo	55	UNSAT	3.33	-	-	-	-	-	-
2023 Yolo	56	UNSAT	16.7	-	-	-	-	X	-
2023 Yolo	57	UNSAT	3.32	123	-	-	-	X	-
2023 Yolo	58	UNSAT	3.40	136	-	-	-	X	-
2023 Yolo	59	UNSAT	3.30	-	-	-	-	X	-
2023 Yolo	60	UNSAT	3.33	137	-	-	-	-	-
2023 Yolo	61	UNSAT	3.34	116	-	-	-	X	-
2023 Yolo	62	UNSAT	3.30	-	-	-	-	X	-
2023 Yolo	63	UNSAT	17.5	-	-	-	-	X	-
2023 Yolo	64	UNSAT	3.35	111	-	-	-	X	-
2023 Yolo	65	SAT	-	-	-	-	-	4.78	-
2023 Yolo	66	UNSAT	3.41	110	-	-	-	X	-
2023 Yolo	67	UNSAT	3.39	109	-	-	-	X	-
2023 Yolo	68	UNSAT	3.32	125	-	-	-	X	-
2023 Yolo	69	UNSAT	18.0	-	-	-	-	X	-
2023 Yolo	70	UNSAT	3.38	118	-	-	-	-	-
2023 Yolo	71	UNSAT	3.32	113	-	-	-	-	-