

Extension of Self-organizing Migrating Algorithm with Clustering-aided Migration and Adaptive PRT Parameter

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ABSTRACT

The paper presents detailed results comparing the following algorithms: SOMA-CL, SOMA-ATA, SOMA-ATO, SOMA-ATR, and SOMA-CLP on Bound Constrained Single Objective Numerical Optimization benchmark.

KEYWORDS

SOMA, SOMA-CLP, k-means, clustering, CEC 2021

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1 RESULTS

This extension includes detailed results in the form of tables required for Bound Constrained Single Objective Numerical Optimization benchmark [1]. The benchmark encompasses 10 test functions. Each test function can be further parametrized. This parametrization enables 8 possible configurations for each test function. The tested dimension sizes are 10 and 20. Maximum function evaluations are separate for each dimension size and are 2.00E+05 and 1.00E+06.

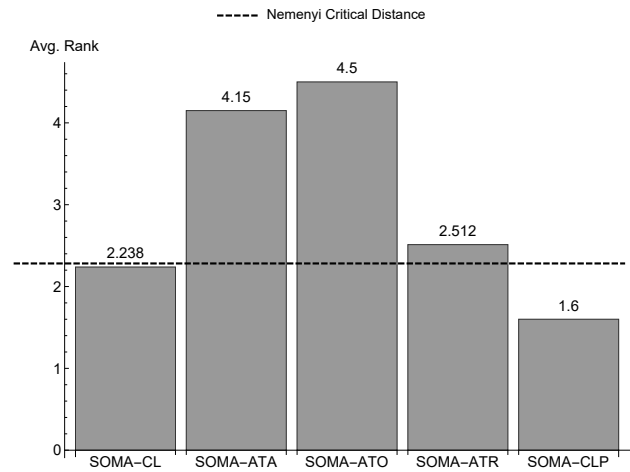


Figure 1: Friedman rank tests for 10D.

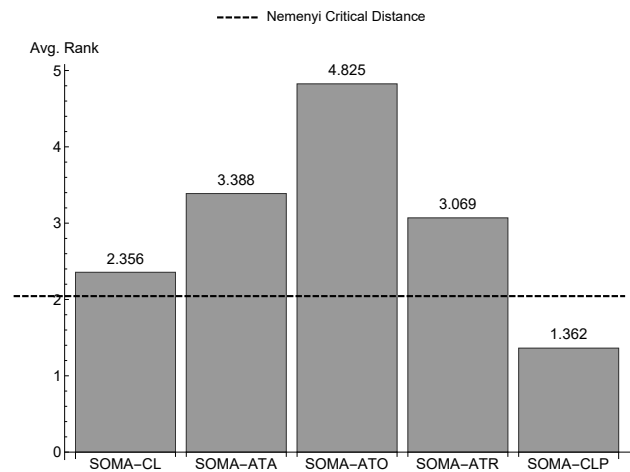


Figure 2: Friedman rank tests for 20D.

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Table 1: Results of the Wilcoxon rank-sum test.

Dimension	SOMA-CL	SOMA-ATA	SOMA-ATO	SOMA-ATR	SOMA-CLP	None
10	2	0	0	15	22	41
20	5	2	0	3	38	32
Sum of wins	7	2	0	18	60	73

Table 2: Results of SOMA-CL for 10D (Basic)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.00E+00	3.12E-01	1.25E-01	1.56E-01	8.40E-02
3	9.65E-03	1.10E+01	4.51E+00	5.19E+00	4.01E+00
4	3.16E-01	5.96E-01	4.22E-01	4.25E-01	7.03E-02
5	0.00E+00	2.08E-01	0.00E+00	1.39E-02	5.28E-02
6	9.51E-03	2.43E-01	3.51E-02	4.74E-02	4.74E-02
7	1.00E-06	8.31E-03	8.01E-04	1.52E-03	1.88E-03
8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	8.55E+00	4.83E+01	4.80E+01	4.51E+01	1.01E+01

Table 3: Results of SOMA-CL for 10D (Shift Operator)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.37E-06	3.12E-01	1.25E-01	1.35E-01	8.05E-02
3	2.88E-04	1.10E+01	3.60E+00	4.28E+00	4.01E+00
4	3.34E-01	5.44E-01	4.61E-01	4.54E-01	4.55E-02
5	0.00E+00	2.08E-01	0.00E+00	7.30E-03	3.80E-02
6	1.16E-02	3.45E-01	3.04E-02	5.56E-02	7.35E-02
7	1.49E-05	1.02E-01	1.55E-03	5.72E-03	1.85E-02
8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	2.23E+00	4.84E+01	4.80E+01	4.50E+01	1.14E+01

Table 4: Results of SOMA-CL for 10D (Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.00E+00	3.12E-01	1.26E-01	1.51E-01	7.77E-02
3	1.09E+01	1.11E+01	1.09E+01	1.09E+01	7.02E-02
4	3.34E-01	6.37E-01	4.62E-01	4.82E-01	7.70E-02
5	0.00E+00	2.08E-01	0.00E+00	1.91E-02	5.87E-02
6	4.86E-03	2.39E-01	2.39E-02	3.96E-02	4.75E-02
7	5.27E-05	2.18E-01	9.67E-04	9.17E-03	3.95E-02
8	3.42E-01	1.00E+02	1.64E+01	3.47E+01	3.89E+01
9	1.00E+02	3.20E+02	1.03E+02	1.24E+02	5.30E+01
10	4.00E+02	4.00E+02	4.00E+02	4.00E+02	0.00E+00

Table 5: Results of SOMA-CL for 10D (Translation)

Func.	Best	Worst	Median	Mean	Std
1	5.16E-08	3.40E-06	3.46E-07	6.06E-07	8.26E-07
2	5.24E-01	2.88E+01	6.75E+00	8.18E+00	6.12E+00
3	9.48E+00	1.93E+01	1.47E+01	1.46E+01	2.23E+00
4	6.82E-01	1.40E+00	9.58E-01	9.76E-01	1.56E-01
5	2.11E+00	2.09E+01	5.42E+00	6.90E+00	5.14E+00
6	1.13E-01	9.73E-01	4.62E-01	4.93E-01	1.94E-01
7	1.13E-02	6.33E-01	1.47E-01	1.97E-01	1.72E-01
8	7.58E-08	6.70E+00	4.34E-04	4.44E-01	1.67E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	5.23E+01	7.32E+01	6.27E+01	6.35E+01	8.29E+00

Table 6: Results of SOMA-CL for 10D (Shift and Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.00E+00	3.12E-01	1.25E-01	1.52E-01	7.09E-02
3	1.09E+01	1.10E+01	1.09E+01	1.09E+01	4.16E-02
4	3.28E-01	6.46E-01	4.80E-01	4.72E-01	7.40E-02
5	0.00E+00	2.08E-01	0.00E+00	6.94E-03	3.80E-02
6	2.00E-03	4.37E-02	2.72E-02	2.66E-02	1.04E-02
7	3.75E-05	7.19E-03	1.12E-03	1.83E-03	2.00E-03
8	1.55E-01	1.00E+02	2.37E+01	3.68E+01	3.75E+01
9	1.00E+02	3.28E+02	1.04E+02	1.29E+02	6.30E+01
10	4.00E+02	4.00E+02	4.00E+02	4.00E+02	0.00E+00

Table 7: Results of SOMA-CL for 10D (Shift and Translation)

Func.	Best	Worst	Median	Mean	Std
1	2.65E-08	3.73E-06	2.70E-07	5.24E-07	7.69E-07
2	6.08E-01	3.74E+01	6.59E+00	9.12E+00	8.83E+00
3	7.78E+00	1.83E+01	1.44E+01	1.42E+01	2.50E+00
4	7.07E-01	1.21E+00	9.34E-01	9.53E-01	1.37E-01
5	1.66E+00	1.24E+01	5.22E+00	5.78E+00	3.25E+00
6	1.74E-01	6.83E-01	4.84E-01	4.70E-01	1.35E-01
7	1.26E-02	5.64E-01	1.13E-01	1.66E-01	1.62E-01
8	4.51E-08	8.50E+00	8.61E-04	8.67E-01	2.23E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	5.27E+01	7.36E+01	5.83E+01	6.29E+01	9.03E+00

Table 8: Results of SOMA-CL for 10D (Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	7.80E-08	5.59E-06	7.63E-07	1.37E-06	1.44E-06
2	1.90E+00	9.59E+01	2.28E+01	2.44E+01	1.92E+01
3	1.18E+01	1.61E+01	1.35E+01	1.36E+01	1.04E+00
4	6.57E-02	1.07E+00	3.18E-01	3.74E-01	2.41E-01
5	4.30E+00	4.59E+01	1.89E+01	2.09E+01	1.01E+01
6	4.83E-02	5.93E-01	2.56E-01	2.39E-01	1.54E-01
7	1.58E-02	3.78E-01	6.49E-02	1.28E-01	1.29E-01
8	1.85E+01	1.01E+02	6.06E+01	6.63E+01	2.92E+01
9	9.38E+01	1.89E+02	1.12E+02	1.20E+02	2.10E+01
10	3.98E+02	4.44E+02	4.00E+02	4.03E+02	1.10E+01

Table 9: Results of SOMA-CL for 10D (Shift, Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	5.97E-08	1.19E-05	1.32E-06	2.23E-06	2.45E-06
2	4.01E+00	8.52E+01	1.59E+01	2.01E+01	1.59E+01
3	1.18E+01	1.53E+01	1.36E+01	1.37E+01	7.72E-01
4	2.71E-02	8.80E-01	5.01E-01	4.20E-01	2.33E-01
5	4.69E+00	3.15E+01	1.79E+01	1.82E+01	6.38E+00
6	3.88E-02	6.83E-01	2.43E-01	2.39E-01	1.70E-01
7	1.21E-02	3.81E-01	9.71E-02	1.22E-01	1.10E-01
8	1.44E+01	1.01E+02	7.82E+01	7.47E+01	2.71E+01
9	9.34E+01	2.40E+02	1.17E+02	1.29E+02	3.63E+01
10	3.98E+02	4.44E+02	4.00E+02	4.03E+02	1.11E+01

Table 10: Results of SOMA-CL for 20D (Basic)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.87E-01	1.96E+00	2.81E-01	4.68E-01	5.72E-01
3	0.00E+00	2.20E+01	9.95E-01	2.72E+00	4.55E+00
4	6.81E-01	1.63E+00	1.13E+00	1.13E+00	2.38E-01
5	0.00E+00	1.10E+00	1.04E-01	1.24E-01	2.01E-01
6	1.06E-01	2.44E+00	1.25E+00	1.24E+00	5.63E-01
7	9.76E-03	7.85E-01	1.06E-01	1.36E-01	1.52E-01
8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	4.88E+01	5.16E+01	4.89E+01	4.92E+01	6.16E-01

Table 11: Results of SOMA-CL for 20D (Shift Operator)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	9.37E-02	3.63E+00	2.50E-01	4.59E-01	7.33E-01
3	0.00E+00	2.08E+01	1.49E+00	5.16E+00	6.94E+00
4	6.96E-01	1.53E+00	1.12E+00	1.13E+00	2.33E-01
5	0.00E+00	9.95E-01	5.20E-02	1.16E-01	1.95E-01
6	1.64E-01	2.72E+00	1.17E+00	1.33E+00	7.23E-01
7	6.87E-03	3.75E-01	6.59E-02	1.06E-01	9.73E-02
8	0.00E+00	2.15E+01	0.00E+00	7.16E-01	3.92E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	4.88E+01	7.66E+01	4.91E+01	5.08E+01	6.50E+00

Table 12: Results of SOMA-CL for 20D (Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	9.37E-02	3.54E+00	1.07E+00	1.25E+00	1.19E+00
3	2.02E+01	2.14E+01	2.02E+01	2.04E+01	3.46E-01
4	6.30E-01	1.89E+00	1.06E+00	1.08E+00	2.46E-01
5	0.00E+00	6.79E+00	2.08E-01	1.69E+00	2.45E+00
6	6.53E-02	5.59E-01	2.62E-01	2.82E-01	1.31E-01
7	4.48E-02	4.44E-01	1.87E-01	2.12E-01	1.04E-01
8	1.00E+02	1.00E+02	1.00E+02	1.00E+02	0.00E+00
9	1.12E+02	4.02E+02	4.00E+02	3.89E+02	5.26E+01
10	4.00E+02	4.00E+02	4.00E+02	4.00E+02	0.00E+00

Table 13: Results of SOMA-CL for 20D (Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.87E-01	7.65E+00	1.89E+00	1.80E+00	1.67E+00
3	1.57E+00	2.39E+01	5.75E+00	7.86E+00	6.53E+00
4	1.43E+00	2.49E+00	2.02E+00	1.99E+00	2.17E-01
5	7.65E+01	1.18E+03	4.84E+02	4.88E+02	2.91E+02
6	6.39E-01	3.62E+00	2.03E+00	2.08E+00	7.58E-01
7	1.08E+00	4.80E+01	4.55E+00	1.07E+01	1.27E+01
8	0.00E+00	8.76E+01	0.00E+00	1.30E+01	2.39E+01
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	6.39E+01	7.61E+01	6.73E+01	6.82E+01	2.91E+00

Table 14: Results of SOMA-CL for 20D (Shift and Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.56E-01	7.81E+00	1.82E+00	1.85E+00	1.81E+00
3	2.02E+01	2.17E+01	2.02E+01	2.04E+01	4.56E-01
4	6.80E-01	1.56E+00	1.11E+00	1.11E+00	1.96E-01
5	0.00E+00	1.19E+02	2.08E-01	5.73E+00	2.16E+01
6	9.63E-02	6.58E-01	2.81E-01	3.06E-01	1.46E-01
7	2.68E-02	1.19E+02	2.04E-01	4.17E+00	2.16E+01
8	1.00E+02	1.00E+02	1.00E+02	1.00E+02	0.00E+00
9	2.50E+02	4.01E+02	4.00E+02	3.90E+02	3.21E+01
10	4.00E+02	4.00E+02	4.00E+02	4.00E+02	0.00E+00

Table 15: Results of SOMA-CL for 20D (Shift and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.56E-01	5.22E+00	1.86E+00	1.43E+00	1.25E+00
3	0.00E+00	2.41E+01	5.27E+00	6.80E+00	5.69E+00
4	1.33E+00	2.36E+00	1.89E+00	1.91E+00	2.62E-01
5	1.18E+02	2.21E+03	4.75E+02	5.56E+02	4.23E+02
6	2.99E-01	3.51E+00	2.03E+00	2.04E+00	8.22E-01
7	8.63E-01	2.58E+01	3.05E+00	6.15E+00	6.75E+00
8	0.00E+00	9.45E+01	6.73E-04	1.51E+01	2.60E+01
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	6.48E+01	7.69E+01	6.86E+01	6.91E+01	3.24E+00

Table 16: Results of SOMA-CL for 20D (Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.87E-01	1.22E+02	3.54E+00	7.47E+00	2.19E+01
3	2.04E+01	2.24E+01	2.12E+01	2.12E+01	5.06E-01
4	1.14E+00	2.56E+00	1.98E+00	1.98E+00	3.62E-01
5	1.25E+03	1.67E+04	5.25E+03	6.58E+03	3.83E+03
6	1.71E-01	1.55E+00	4.82E-01	6.39E-01	3.88E-01
7	1.38E+01	3.15E+02	7.29E+01	9.36E+01	7.17E+01
8	1.00E+02	1.00E+02	1.00E+02	1.00E+02	0.00E+00
9	3.47E+02	4.23E+02	4.15E+02	4.12E+02	1.36E+01
10	4.14E+02	4.95E+02	4.92E+02	4.65E+02	3.59E+01

Table 17: Results of SOMA-CL for 20D (Shift, Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.25E-01	1.09E+01	3.56E+00	3.49E+00	2.88E+00
3	2.04E+01	2.26E+01	2.13E+01	2.14E+01	6.25E-01
4	1.49E+00	2.83E+00	2.00E+00	2.07E+00	3.26E-01
5	1.24E+03	2.76E+04	4.79E+03	6.59E+03	5.90E+03
6	2.20E-01	1.65E+00	5.64E-01	7.18E-01	4.30E-01
7	1.19E+01	4.92E+02	5.64E+01	8.62E+01	9.19E+01
8	1.00E+02	1.00E+02	1.00E+02	1.00E+02	0.00E+00
9	4.04E+02	4.24E+02	4.15E+02	4.15E+02	4.70E+00
10	4.14E+02	4.94E+02	4.92E+02	4.76E+02	2.82E+01

Table 18: Results of SOMA-ATA for 10D (Basic)

Func.	Best	Worst	Median	Mean	Std
1	4.79E+04	4.52E+05	1.66E+05	2.02E+05	1.24E+05
2	4.43E+00	1.86E+01	8.93E+00	9.50E+00	3.18E+00
3	3.45E+00	1.54E+01	1.25E+01	1.17E+01	2.77E+00
4	6.22E-01	1.28E+00	9.02E-01	9.13E-01	1.64E-01
5	1.18E+01	3.33E+01	1.80E+01	1.94E+01	5.52E+00
6	6.97E-01	1.83E+00	1.16E+00	1.19E+00	3.08E-01
7	1.10E+00	3.24E+00	1.90E+00	2.02E+00	5.66E-01
8	3.61E+00	1.30E+01	6.24E+00	7.01E+00	2.31E+00
9	2.73E+00	8.96E+00	6.48E+00	6.45E+00	1.32E+00
10	4.87E+01	5.06E+01	4.96E+01	4.96E+01	4.59E-01

Table 19: Results of SOMA-ATA for 10D (Shift Operator)

Func.	Best	Worst	Median	Mean	Std
1	4.79E+04	4.52E+05	1.66E+05	2.02E+05	1.24E+05
2	4.43E+00	1.86E+01	8.93E+00	9.50E+00	3.18E+00
3	3.45E+00	1.54E+01	1.25E+01	1.17E+01	2.77E+00
4	6.22E-01	1.28E+00	9.02E-01	9.13E-01	1.64E-01
5	1.18E+01	3.33E+01	1.80E+01	1.94E+01	5.52E+00
6	6.97E-01	1.83E+00	1.16E+00	1.19E+00	3.08E-01
7	1.10E+00	3.24E+00	1.90E+00	2.02E+00	5.66E-01
8	3.61E+00	1.30E+01	6.24E+00	7.01E+00	2.31E+00
9	2.73E+00	8.96E+00	6.48E+00	6.45E+00	1.32E+00
10	4.87E+01	5.06E+01	4.96E+01	4.96E+01	4.59E-01

Table 20: Results of SOMA-ATA for 10D (Rotation)

Func.	Best	Worst	Median	Mean	Std
1	1.04E+05	5.42E+05	2.94E+05	3.11E+05	1.27E+05
2	6.44E+00	2.45E+01	1.42E+01	1.43E+01	5.09E+00
3	8.68E+00	1.69E+01	1.36E+01	1.39E+01	1.54E+00
4	6.00E-01	1.31E+00	1.01E+00	1.02E+00	1.61E-01
5	1.33E+01	5.07E+01	2.80E+01	2.98E+01	9.07E+00
6	4.46E-01	1.89E+00	1.26E+00	1.24E+00	3.71E-01
7	1.63E+00	4.75E+00	2.67E+00	2.90E+00	8.13E-01
8	3.18E+00	1.06E+02	2.04E+01	3.40E+01	3.27E+01
9	1.11E+02	3.34E+02	2.11E+02	2.27E+02	8.06E+01
10	4.04E+02	4.35E+02	4.10E+02	4.12E+02	6.97E+00

Table 21: Results of SOMA-ATA for 10D (Translation)

Func.	Best	Worst	Median	Mean	Std
1	3.35E+05	1.92E+06	9.15E+05	9.59E+05	4.20E+05
2	8.28E+01	3.80E+02	1.74E+02	1.87E+02	7.33E+01
3	1.31E+01	2.76E+01	2.12E+01	2.12E+01	3.79E+00
4	1.24E+00	2.07E+00	1.66E+00	1.63E+00	2.49E-01
5	1.53E+02	1.28E+03	3.66E+02	4.17E+02	2.52E+02
6	1.28E+00	1.26E+01	2.90E+00	3.31E+00	2.08E+00
7	5.48E+00	4.79E+01	1.93E+01	2.14E+01	1.12E+01
8	8.22E+01	4.20E+02	1.79E+02	1.91E+02	8.16E+01
9	6.82E+00	1.13E+01	9.36E+00	9.49E+00	1.04E+00
10	5.57E+01	7.54E+01	6.48E+01	6.54E+01	7.10E+00

Table 22: Results of SOMA-ATA for 10D (Shift and Rotation)

Func.	Best	Worst	Median	Mean	Std
1	1.04E+05	5.42E+05	2.94E+05	3.11E+05	1.27E+05
2	6.44E+00	2.45E+01	1.42E+01	1.43E+01	5.09E+00
3	8.68E+00	1.69E+01	1.36E+01	1.39E+01	1.54E+00
4	6.00E-01	1.31E+00	1.01E+00	1.02E+00	1.61E-01
5	1.33E+01	5.07E+01	2.80E+01	2.98E+01	9.07E+00
6	4.46E-01	1.89E+00	1.26E+00	1.24E+00	3.71E-01
7	1.63E+00	4.75E+00	2.67E+00	2.90E+00	8.13E-01
8	3.18E+00	1.06E+02	2.04E+01	3.40E+01	3.27E+01
9	1.11E+02	3.34E+02	2.11E+02	2.27E+02	8.06E+01
10	4.04E+02	4.35E+02	4.10E+02	4.12E+02	6.97E+00

Table 23: Results of SOMA-ATA for 10D (Shift and Translation)

Func.	Best	Worst	Median	Mean	Std
1	3.35E+05	1.92E+06	9.15E+05	9.59E+05	4.20E+05
2	8.28E+01	3.80E+02	1.74E+02	1.87E+02	7.33E+01
3	1.31E+01	2.76E+01	2.12E+01	2.12E+01	3.79E+00
4	1.24E+00	2.07E+00	1.66E+00	1.63E+00	2.49E-01
5	1.53E+02	1.28E+03	3.66E+02	4.17E+02	2.52E+02
6	1.28E+00	1.26E+01	2.90E+00	3.31E+00	2.08E+00
7	5.48E+00	4.79E+01	1.93E+01	2.14E+01	1.12E+01
8	8.22E+01	4.20E+02	1.79E+02	1.91E+02	8.16E+01
9	6.82E+00	1.13E+01	9.36E+00	9.49E+00	1.04E+00
10	5.57E+01	7.54E+01	6.48E+01	6.54E+01	7.10E+00

Table 24: Results of SOMA-ATA for 10D (Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	4.67E+05	3.24E+06	1.00E+06	1.09E+06	5.88E+05
2	7.16E+01	3.79E+02	2.07E+02	2.17E+02	9.55E+01
3	1.89E+01	2.91E+01	2.37E+01	2.34E+01	2.37E+00
4	9.10E-01	2.18E+00	1.66E+00	1.63E+00	3.55E-01
5	1.14E+02	1.43E+03	5.10E+02	5.99E+02	3.09E+02
6	1.31E+00	1.59E+01	2.40E+00	3.31E+00	2.88E+00
7	1.29E+01	1.41E+02	4.27E+01	4.47E+01	2.81E+01
8	2.44E+01	1.09E+02	5.11E+01	6.51E+01	2.90E+01
9	1.33E+02	3.45E+02	1.93E+02	2.09E+02	6.56E+01
10	4.00E+02	4.47E+02	4.06E+02	4.10E+02	1.10E+01

Table 25: Results of SOMA-ATA for 10D (Shift, Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	4.67E+05	3.24E+06	1.00E+06	1.09E+06	5.88E+05
2	7.16E+01	3.79E+02	2.07E+02	2.17E+02	9.55E+01
3	1.89E+01	2.91E+01	2.37E+01	2.34E+01	2.37E+00
4	9.10E-01	2.18E+00	1.66E+00	1.63E+00	3.55E-01
5	1.14E+02	1.43E+03	5.10E+02	5.99E+02	3.09E+02
6	1.31E+00	1.59E+01	2.40E+00	3.31E+00	2.88E+00
7	1.29E+01	1.41E+02	4.27E+01	4.47E+01	2.81E+01
8	2.44E+01	1.09E+02	5.11E+01	6.51E+01	2.90E+01
9	1.33E+02	3.45E+02	1.93E+02	2.09E+02	6.56E+01
10	4.00E+02	4.47E+02	4.06E+02	4.10E+02	1.10E+01

Table 26: Results of SOMA-ATA for 20D (Basic)

Func.	Best	Worst	Median	Mean	Std
1	3.57E-04	2.73E-03	1.02E-03	1.17E-03	6.30E-04
2	6.27E-02	2.02E+00	2.35E-01	5.44E-01	6.72E-01
3	2.02E-05	2.02E+01	2.98E+00	4.57E+00	5.09E+00
4	9.36E-01	1.98E+00	1.57E+00	1.54E+00	2.16E-01
5	2.18E-05	1.20E+00	1.04E-01	1.58E-01	2.14E-01
6	4.21E-01	2.41E+00	1.08E+00	1.16E+00	6.08E-01
7	7.82E-02	6.87E-01	2.71E-01	2.77E-01	1.45E-01
8	0.00E+00	1.04E+01	6.11E-08	3.46E-01	1.89E+00
9	3.72E-05	1.01E-04	6.10E-05	6.58E-05	1.58E-05
10	4.88E+01	5.07E+01	4.89E+01	4.91E+01	5.46E-01

Table 27: Results of SOMA-ATA for 20D (Shift Operator)

Func.	Best	Worst	Median	Mean	Std
1	3.57E-04	2.73E-03	1.02E-03	1.17E-03	6.30E-04
2	6.27E-02	2.02E+00	2.35E-01	5.44E-01	6.72E-01
3	2.02E-05	2.02E+01	2.98E+00	4.57E+00	5.09E+00
4	9.36E-01	1.98E+00	1.57E+00	1.54E+00	2.16E-01
5	2.18E-05	1.20E+00	1.04E-01	1.58E-01	2.14E-01
6	4.21E-01	2.41E+00	1.08E+00	1.16E+00	6.08E-01
7	7.82E-02	6.87E-01	2.71E-01	2.77E-01	1.45E-01
8	0.00E+00	1.04E+01	6.11E-08	3.46E-01	1.89E+00
9	3.72E-05	1.01E-04	6.10E-05	6.58E-05	1.58E-05
10	4.88E+01	5.07E+01	4.89E+01	4.91E+01	5.46E-01

Table 28: Results of SOMA-ATA for 20D (Rotation)

Func.	Best	Worst	Median	Mean	Std
1	1.09E-03	6.84E-03	2.39E-03	2.90E-03	1.60E-03
2	1.88E-01	7.75E+00	1.93E+00	2.36E+00	2.06E+00
3	2.02E+01	2.32E+01	2.08E+01	2.09E+01	8.74E-01
4	1.15E+00	2.02E+00	1.57E+00	1.58E+00	2.29E-01
5	7.77E-06	1.31E+00	2.08E-01	2.97E-01	3.24E-01
6	2.53E-01	7.41E-01	4.79E-01	5.09E-01	1.21E-01
7	5.86E-02	5.36E-01	2.55E-01	2.57E-01	1.25E-01
8	4.50E+01	1.00E+02	1.00E+02	9.82E+01	1.00E+01
9	4.01E+02	4.06E+02	4.02E+02	4.02E+02	9.94E-01
10	4.00E+02	4.86E+02	4.00E+02	4.09E+02	2.16E+01

Table 29: Results of SOMA-ATA for 20D (Translation)

Func.	Best	Worst	Median	Mean	Std
1	6.67E-02	8.14E+00	2.92E-01	6.70E-01	1.49E+00
2	2.92E-01	9.95E+01	3.86E+00	7.71E+00	1.77E+01
3	1.72E+00	2.35E+01	7.08E+00	1.01E+01	7.05E+00
4	1.90E+00	2.80E+00	2.43E+00	2.43E+00	2.20E-01
5	7.13E+03	7.87E+04	2.14E+04	2.66E+04	1.72E+04
6	9.56E-01	4.35E+00	1.84E+00	2.07E+00	8.74E-01
7	3.38E+01	2.26E+03	2.52E+02	4.03E+02	4.33E+02
8	1.37E+02	2.28E+03	4.35E+02	6.22E+02	5.45E+02
9	1.12E-04	3.90E-04	2.28E-04	2.53E-04	8.50E-05
10	6.43E+01	7.60E+01	6.84E+01	6.86E+01	2.92E+00

Table 30: Results of SOMA-ATA for 20D (Shift and Rotation)

Func.	Best	Worst	Median	Mean	Std
1	1.09E-03	6.84E-03	2.39E-03	2.90E-03	1.60E-03
2	1.88E-01	7.75E+00	1.93E+00	2.36E+00	2.06E+00
3	2.02E+01	2.32E+01	2.08E+01	2.09E+01	8.74E-01
4	1.15E+00	2.02E+00	1.57E+00	1.58E+00	2.29E-01
5	7.77E-06	1.31E+00	2.08E-01	2.97E-01	3.24E-01
6	2.53E-01	7.41E-01	4.79E-01	5.09E-01	1.21E-01
7	5.86E-02	5.36E-01	2.55E-01	2.57E-01	1.25E-01
8	4.50E+01	1.00E+02	1.00E+02	9.82E+01	1.00E+01
9	4.01E+02	4.06E+02	4.02E+02	4.02E+02	9.94E-01
10	4.00E+02	4.86E+02	4.00E+02	4.09E+02	2.16E+01

Table 31: Results of SOMA-ATA for 20D (Shift and Translation)

Func.	Best	Worst	Median	Mean	Std
1	6.67E-02	8.14E+00	2.92E-01	6.70E-01	1.49E+00
2	2.92E-01	9.95E+01	3.86E+00	7.71E+00	1.77E+01
3	1.72E+00	2.35E+01	7.08E+00	1.01E+01	7.05E+00
4	1.90E+00	2.80E+00	2.43E+00	2.43E+00	2.20E-01
5	7.13E+03	7.87E+04	2.14E+04	2.66E+04	1.72E+04
6	9.56E-01	4.35E+00	1.84E+00	2.07E+00	8.74E-01
7	3.38E+01	2.26E+03	2.52E+02	4.03E+02	4.33E+02
8	1.37E+02	2.28E+03	4.35E+02	6.22E+02	5.45E+02
9	1.12E-04	3.90E-04	2.28E-04	2.53E-04	8.50E-05
10	6.43E+01	7.60E+01	6.84E+01	6.86E+01	2.92E+00

Table 32: Results of SOMA-ATA for 20D (Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	9.51E-02	1.84E+01	4.26E-01	1.65E+00	3.53E+00
2	3.61E+00	3.02E+01	1.42E+01	1.46E+01	7.26E+00
3	2.05E+01	2.42E+01	2.20E+01	2.19E+01	7.64E-01
4	1.70E+00	3.13E+00	2.41E+00	2.35E+00	3.34E-01
5	1.31E+04	2.48E+05	4.33E+04	6.62E+04	5.52E+04
6	7.55E-01	6.48E+00	1.37E+00	1.86E+00	1.57E+00
7	1.56E+02	2.60E+03	5.28E+02	7.93E+02	6.17E+02
8	1.00E+02	1.12E+02	1.00E+02	1.00E+02	2.17E+00
9	2.55E+02	4.49E+02	4.38E+02	4.27E+02	3.92E+01
10	4.10E+02	4.19E+02	4.14E+02	4.14E+02	1.41E+00

Table 33: Results of SOMA-ATA for 20D (Shift, Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	9.51E-02	1.84E+01	4.26E-01	1.65E+00	3.53E+00
2	3.61E+00	3.02E+01	1.42E+01	1.46E+01	7.26E+00
3	2.05E+01	2.42E+01	2.20E+01	2.19E+01	7.64E-01
4	1.70E+00	3.13E+00	2.41E+00	2.35E+00	3.34E-01
5	1.31E+04	2.48E+05	4.33E+04	6.62E+04	5.52E+04
6	7.55E-01	6.48E+00	1.37E+00	1.86E+00	1.57E+00
7	1.56E+02	2.60E+03	5.28E+02	7.93E+02	6.17E+02
8	1.00E+02	1.12E+02	1.00E+02	1.00E+02	2.17E+00
9	2.55E+02	4.49E+02	4.38E+02	4.27E+02	3.92E+01
10	4.10E+02	4.19E+02	4.14E+02	4.14E+02	1.41E+00

Table 37: Results of SOMA-ATO for 10D (Translation)

Func.	Best	Worst	Median	Mean	Std
1	6.21E+08	8.30E+09	2.35E+09	2.80E+09	1.76E+09
2	2.70E-01	1.64E+02	2.19E+01	4.37E+01	5.28E+01
3	2.66E+00	1.72E+01	1.38E+01	1.23E+01	4.39E+00
4	5.44E-01	1.48E+00	8.62E-01	9.32E-01	2.39E-01
5	1.38E+00	1.08E+06	8.02E+03	2.18E+05	3.17E+05
6	1.10E+00	1.32E+02	3.16E+00	1.89E+01	3.45E+01
7	3.84E-01	2.48E+06	2.36E+04	1.94E+05	4.66E+05
8	8.40E-02	4.96E+02	5.95E+01	8.53E+01	1.16E+02
9	5.53E-02	2.41E-01	1.55E-01	1.49E-01	4.50E-02
10	5.15E+01	7.62E+01	7.29E+01	7.00E+01	8.03E+00

Table 38: Results of SOMA-ATO for 10D (Shift and Rotation)

Func.	Best	Worst	Median	Mean	Std
1	1.90E+08	1.52E+10	2.57E+09	3.83E+09	3.60E+09
2	3.08E-01	1.34E+02	1.38E+01	3.10E+01	4.52E+01
3	1.11E+01	1.44E+01	1.15E+01	1.18E+01	6.92E-01
4	3.14E-01	6.72E-01	4.36E-01	4.63E-01	9.56E-02
5	4.86E-02	4.69E+06	2.44E+05	7.27E+05	1.03E+06
6	1.49E-01	1.26E+01	1.39E+00	2.32E+00	3.40E+00
7	1.62E-01	1.22E+08	5.18E+04	5.67E+06	2.25E+07
8	1.02E-01	1.01E+02	1.00E+02	8.80E+01	3.27E+01
9	1.00E+02	3.40E+02	3.31E+02	3.16E+02	5.88E+01
10	4.00E+02	4.66E+02	4.00E+02	4.16E+02	2.80E+01

Table 39: Results of SOMA-ATO for 10D (Shift and Translation)

Func.	Best	Worst	Median	Mean	Std
1	6.21E+08	8.30E+09	2.35E+09	2.80E+09	1.76E+09
2	2.70E-01	1.64E+02	2.19E+01	4.37E+01	5.28E+01
3	2.66E+00	1.72E+01	1.38E+01	1.23E+01	4.39E+00
4	5.44E-01	1.48E+00	8.62E-01	9.32E-01	2.39E-01
5	1.38E+00	1.08E+06	8.02E+03	2.18E+05	3.17E+05
6	1.10E+00	1.32E+02	3.16E+00	1.89E+01	3.45E+01
7	3.84E-01	2.48E+06	2.36E+04	1.94E+05	4.66E+05
8	8.40E-02	4.96E+02	5.95E+01	8.53E+01	1.16E+02
9	5.53E-02	2.41E-01	1.55E-01	1.49E-01	4.50E-02
10	5.15E+01	7.62E+01	7.29E+01	7.00E+01	8.03E+00

Table 40: Results of SOMA-ATO for 10D (Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	7.36E+08	1.48E+10	2.67E+09	4.04E+09	3.19E+09
2	1.38E+01	3.12E+02	4.70E+01	9.77E+01	1.00E+02
3	1.14E+01	1.96E+01	1.45E+01	1.45E+01	1.87E+00
4	8.11E-01	1.12E+05	1.15E+00	3.77E+03	2.04E+04
5	1.82E+00	1.54E+06	1.11E+05	2.64E+05	4.02E+05
6	4.14E-01	1.46E+02	2.28E+00	3.81E+01	5.76E+01
7	4.28E-01	1.70E+06	5.01E+04	1.94E+05	4.02E+05
8	1.16E+01	1.04E+02	1.01E+02	8.98E+01	2.99E+01
9	1.00E+02	3.60E+02	3.49E+02	3.32E+02	6.33E+01
10	3.98E+02	4.52E+02	4.44E+02	4.26E+02	2.40E+01

Table 41: Results of SOMA-ATO for 10D (Shift, Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	7.36E+08	1.48E+10	2.67E+09	4.04E+09	3.19E+09
2	1.38E+01	3.12E+02	4.70E+01	9.77E+01	1.00E+02
3	1.14E+01	1.96E+01	1.45E+01	1.45E+01	1.87E+00
4	8.11E-01	1.12E+05	1.15E+00	3.77E+03	2.04E+04
5	1.82E+00	1.54E+06	1.11E+05	2.64E+05	4.02E+05
6	4.14E-01	1.46E+02	2.28E+00	3.81E+01	5.76E+01
7	4.28E-01	1.70E+06	5.01E+04	1.94E+05	4.02E+05
8	1.16E+01	1.04E+02	1.01E+02	8.98E+01	2.99E+01
9	1.00E+02	3.60E+02	3.49E+02	3.32E+02	6.33E+01
10	3.98E+02	4.52E+02	4.44E+02	4.26E+02	2.40E+01

Table 42: Results of SOMA-ATO for 20D (Basic)

Func.	Best	Worst	Median	Mean	Std
1	6.99E+09	1.92E+10	1.19E+10	1.19E+10	2.86E+09
2	3.73E+00	2.44E+02	1.22E+01	7.56E+01	8.60E+01
3	3.16E+00	3.93E+01	2.63E+01	2.26E+01	9.89E+00
4	6.05E-01	2.37E+00	1.34E+00	1.40E+00	3.46E-01
5	6.78E+00	3.75E+07	4.33E+06	6.71E+06	8.80E+06
6	2.34E+00	1.49E+01	6.23E+00	7.09E+00	3.21E+00
7	1.01E+00	2.32E+07	7.90E+05	3.99E+06	5.68E+06
8	1.14E+01	1.52E+02	4.33E+01	4.77E+01	2.97E+01
9	1.59E-01	2.58E+00	3.41E-01	4.21E-01	4.19E-01
10	4.93E+01	8.21E+01	5.32E+01	6.06E+01	1.31E+01

Table 43: Results of SOMA-ATO for 20D (Shift Operator)

Func.	Best	Worst	Median	Mean	Std
1	6.99E+09	1.92E+10	1.19E+10	1.19E+10	2.86E+09
2	3.73E+00	2.44E+02	1.22E+01	7.56E+01	8.60E+01
3	3.16E+00	3.93E+01	2.63E+01	2.26E+01	9.89E+00
4	6.05E-01	2.37E+00	1.34E+00	1.40E+00	3.46E-01
5	6.78E+00	3.75E+07	4.33E+06	6.71E+06	8.80E+06
6	2.34E+00	1.49E+01	6.23E+00	7.09E+00	3.21E+00
7	1.01E+00	2.32E+07	7.90E+05	3.99E+06	5.68E+06
8	1.14E+01	1.52E+02	4.33E+01	4.77E+01	2.97E+01
9	1.59E-01	2.58E+00	3.41E-01	4.21E-01	4.19E-01
10	4.93E+01	8.21E+01	5.32E+01	6.06E+01	1.31E+01

Table 47: Results of SOMA-ATO for 20D (Shift and Translation)

Func.	Best	Worst	Median	Mean	Std
1	6.85E+09	1.90E+10	1.27E+10	1.31E+10	3.51E+09
2	3.72E+00	3.17E+02	2.20E+01	9.05E+01	9.74E+01
3	3.79E+00	4.84E+01	2.76E+01	2.55E+01	9.78E+00
4	1.19E+00	2.47E+00	1.69E+00	1.81E+00	3.92E-01
5	1.02E+03	9.04E+06	7.35E+05	1.48E+06	2.02E+06
6	2.53E+00	1.28E+02	7.29E+00	1.20E+01	2.23E+01
7	4.20E+01	1.92E+06	4.22E+04	3.52E+05	4.96E+05
8	1.01E+02	2.00E+03	3.16E+02	5.01E+02	5.13E+02
9	2.46E-01	6.02E+00	4.11E-01	8.29E-01	1.32E+00
10	6.40E+01	1.11E+02	7.74E+01	8.00E+01	1.14E+01

Table 48: Results of SOMA-ATO for 20D (Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	9.35E+09	3.43E+10	2.12E+10	2.18E+10	5.81E+09
2	5.48E+00	5.19E+02	1.53E+02	1.86E+02	1.40E+02
3	2.35E+01	3.61E+01	2.85E+01	2.91E+01	3.21E+00
4	1.16E+00	5.25E+05	2.09E+00	3.78E+04	1.12E+05
5	9.83E+02	8.66E+06	4.56E+05	1.63E+06	2.37E+06
6	2.43E+00	1.53E+02	9.29E+00	1.94E+01	3.38E+01
7	9.72E+01	4.55E+06	3.04E+05	9.61E+05	1.30E+06
8	1.00E+02	1.55E+03	1.02E+02	3.51E+02	5.22E+02
9	4.20E+02	4.79E+02	4.39E+02	4.44E+02	1.39E+01
10	4.10E+02	5.03E+02	4.14E+02	4.40E+02	3.25E+01

Table 49: Results of SOMA-ATO for 20D (Shift, Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	9.35E+09	3.43E+10	2.12E+10	2.18E+10	5.81E+09
2	5.48E+00	5.19E+02	1.53E+02	1.86E+02	1.40E+02
3	2.35E+01	3.61E+01	2.85E+01	2.91E+01	3.21E+00
4	1.16E+00	5.25E+05	2.09E+00	3.78E+04	1.12E+05
5	9.83E+02	8.66E+06	4.56E+05	1.63E+06	2.37E+06
6	2.43E+00	1.53E+02	9.29E+00	1.94E+01	3.38E+01
7	9.72E+01	4.55E+06	3.04E+05	9.61E+05	1.30E+06
8	1.00E+02	1.55E+03	1.02E+02	3.51E+02	5.22E+02
9	4.20E+02	4.79E+02	4.39E+02	4.44E+02	1.39E+01
10	4.10E+02	5.03E+02	4.14E+02	4.40E+02	3.25E+01

Table 50: Results of SOMA-ATR for 10D (Basic)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.00E+00	3.12E-01	1.87E-01	1.66E-01	6.72E-02
3	0.00E+00	1.12E+01	1.09E+01	8.41E+00	3.95E+00
4	3.62E-02	4.55E-01	3.05E-01	2.86E-01	1.05E-01
5	0.00E+00	2.08E-01	0.00E+00	4.16E-02	8.47E-02
6	7.17E-04	2.20E-01	2.36E-02	4.67E-02	6.94E-02
7	1.31E-06	8.58E-03	8.41E-04	1.80E-03	2.28E-03
8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	2.50E-02	4.88E+01	4.80E+01	4.33E+01	1.46E+01

Table 51: Results of SOMA-ATR for 10D (Shift Operator)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	0.00E+00	3.12E-01	1.87E-01	1.66E-01	6.72E-02
3	0.00E+00	1.12E+01	1.09E+01	8.41E+00	3.95E+00
4	3.62E-02	4.55E-01	3.05E-01	2.86E-01	1.05E-01
5	0.00E+00	2.08E-01	0.00E+00	4.16E-02	8.47E-02
6	7.17E-04	2.20E-01	2.36E-02	4.67E-02	6.94E-02
7	1.31E-06	8.58E-03	8.41E-04	1.80E-03	2.28E-03
8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	2.50E-02	4.88E+01	4.80E+01	4.33E+01	1.46E+01

Table 52: Results of SOMA-ATR for 10D (Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	6.25E-02	1.18E+01	1.87E-01	8.96E-01	2.43E+00
3	7.05E+00	1.11E+01	1.09E+01	1.08E+01	7.12E-01
4	1.97E-01	4.27E-01	3.37E-01	3.27E-01	6.09E-02
5	0.00E+00	2.08E-01	0.00E+00	4.68E-02	8.68E-02
6	6.41E-04	3.32E+00	1.94E-02	1.33E-01	6.03E-01
7	6.95E-07	3.16E-01	4.31E-04	1.33E-02	5.78E-02
8	5.00E-08	1.00E+02	7.55E+01	5.69E+01	4.46E+01
9	1.20E+02	3.33E+02	3.28E+02	2.91E+02	7.20E+01
10	4.00E+02	4.00E+02	4.00E+02	4.00E+02	0.00E+00

Table 53: Results of SOMA-ATR for 10D (Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	3.66E+00	1.58E+02	4.02E+01	4.44E+01	2.86E+01
3	3.39E+00	1.73E+01	1.31E+01	1.24E+01	2.71E+00
4	5.78E-01	1.07E+00	8.51E-01	8.28E-01	1.34E-01
5	1.49E+00	2.68E+02	1.95E+01	3.08E+01	5.04E+01
6	3.69E-01	1.20E+01	7.36E-01	1.11E+00	2.08E+00
7	1.56E-03	9.89E-01	2.96E-02	2.12E-01	2.79E-01
8	4.82E-06	3.64E+02	4.48E+01	4.91E+01	6.45E+01
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	5.22E+01	7.34E+01	7.15E+01	6.75E+01	7.05E+00

Table 57: Results of SOMA-ATR for 10D (Shift, Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	8.00E+00	1.55E+02	3.35E+01	5.32E+01	4.28E+01
3	1.11E+01	1.55E+01	1.26E+01	1.28E+01	1.05E+00
4	5.26E-01	1.25E+00	9.05E-01	8.95E-01	1.84E-01
5	1.42E+00	1.35E+02	7.67E+00	1.69E+01	2.57E+01
6	2.11E-01	4.21E+00	5.20E-01	7.24E-01	7.45E-01
7	1.20E-04	1.71E+01	3.10E-01	8.59E-01	3.08E+00
8	2.27E+01	1.01E+02	1.00E+02	8.38E+01	2.62E+01
9	1.41E+02	3.47E+02	3.38E+02	2.95E+02	6.62E+01
10	3.98E+02	4.47E+02	4.01E+02	4.18E+02	2.21E+01

Table 58: Results of SOMA-ATR for 20D (Basic)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.25E-01	3.60E+00	1.85E+00	1.50E+00	1.29E+00
3	0.00E+00	2.08E+01	2.98E+00	5.85E+00	6.53E+00
4	3.64E-01	1.35E+00	9.49E-01	9.79E-01	2.26E-01
5	0.00E+00	1.31E+00	1.04E-01	2.13E-01	2.79E-01
6	3.99E-01	1.84E+00	9.28E-01	9.25E-01	3.29E-01
7	1.23E-02	4.08E+00	1.12E-01	4.88E-01	1.15E+00
8	0.00E+00	1.18E+01	0.00E+00	2.54E+00	4.70E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	4.88E+01	7.62E+01	4.93E+01	5.24E+01	7.66E+00

Table 59: Results of SOMA-ATR for 20D (Shift Operator)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.25E-01	3.60E+00	1.85E+00	1.50E+00	1.29E+00
3	0.00E+00	2.08E+01	2.98E+00	5.85E+00	6.53E+00
4	3.64E-01	1.35E+00	9.49E-01	9.79E-01	2.26E-01
5	0.00E+00	1.31E+00	1.04E-01	2.13E-01	2.79E-01
6	3.99E-01	1.84E+00	9.28E-01	9.25E-01	3.29E-01
7	1.23E-02	4.08E+00	1.12E-01	4.88E-01	1.15E+00
8	0.00E+00	1.18E+01	0.00E+00	2.54E+00	4.70E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	4.88E+01	7.62E+01	4.93E+01	5.24E+01	7.66E+00

Table 60: Results of SOMA-ATR for 20D (Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	2.81E-01	1.46E+02	7.76E+00	3.04E+01	4.25E+01
3	2.02E+01	2.29E+01	2.08E+01	2.09E+01	6.18E-01
4	4.94E-01	1.41E+00	1.13E+00	1.09E+00	1.82E-01
5	0.00E+00	6.58E+00	1.56E-01	4.35E-01	1.19E+00
6	1.38E-01	2.51E+01	3.22E+00	4.97E+00	6.55E+00
7	7.11E-03	5.07E-01	1.86E-01	1.88E-01	1.13E-01
8	6.07E+01	1.03E+02	1.00E+02	9.88E+01	7.23E+00
9	4.01E+02	4.07E+02	4.02E+02	4.03E+02	1.92E+00
10	4.00E+02	4.87E+02	4.00E+02	4.20E+02	3.69E+01

Table 54: Results of SOMA-ATR for 10D (Shift and Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	6.25E-02	1.18E+01	1.87E-01	8.96E-01	2.43E+00
3	7.05E+00	1.11E+01	1.09E+01	1.08E+01	7.12E-01
4	1.97E-01	4.27E-01	3.37E-01	3.27E-01	6.09E-02
5	0.00E+00	2.08E-01	0.00E+00	4.68E-02	8.68E-02
6	6.41E-04	3.32E+00	1.94E-02	1.33E-01	6.03E-01
7	6.95E-07	3.16E-01	4.31E-04	1.33E-02	5.78E-02
8	5.00E-08	1.00E+02	7.55E+01	5.69E+01	4.46E+01
9	1.20E+02	3.33E+02	3.28E+02	2.91E+02	7.20E+01
10	4.00E+02	4.00E+02	4.00E+02	4.00E+02	0.00E+00

Table 55: Results of SOMA-ATR for 10D (Shift and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	3.66E+00	1.58E+02	4.02E+01	4.44E+01	2.86E+01
3	3.39E+00	1.73E+01	1.31E+01	1.24E+01	2.71E+00
4	5.78E-01	1.07E+00	8.51E-01	8.28E-01	1.34E-01
5	1.49E+00	2.68E+02	1.95E+01	3.08E+01	5.04E+01
6	3.69E-01	1.20E+01	7.36E-01	1.11E+00	2.08E+00
7	1.56E-03	9.89E-01	2.96E-02	2.12E-01	2.79E-01
8	4.82E-06	3.64E+02	4.48E+01	4.91E+01	6.45E+01
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	5.22E+01	7.34E+01	7.15E+01	6.75E+01	7.05E+00

Table 56: Results of SOMA-ATR for 10D (Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	8.00E+00	1.55E+02	3.35E+01	5.32E+01	4.28E+01
3	1.11E+01	1.55E+01	1.26E+01	1.28E+01	1.05E+00
4	5.26E-01	1.25E+00	9.05E-01	8.95E-01	1.84E-01
5	1.42E+00	1.35E+02	7.67E+00	1.69E+01	2.57E+01
6	2.11E-01	4.21E+00	5.20E-01	7.24E-01	7.45E-01
7	1.20E-04	1.71E+01	3.10E-01	8.59E-01	3.08E+00
8	2.27E+01	1.01E+02	1.00E+02	8.38E+01	2.62E+01
9	1.41E+02	3.47E+02	3.38E+02	2.95E+02	6.62E+01
10	3.98E+02	4.47E+02	4.01E+02	4.18E+02	2.21E+01

Table 64: Results of SOMA-ATR for 20D (Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.86E+00	1.60E+02	1.44E+01	2.28E+01	3.58E+01
3	2.04E+01	2.27E+01	2.13E+01	2.15E+01	5.73E−01
4	9.64E−01	2.40E+00	1.68E+00	1.66E+00	2.82E−01
5	3.86E+03	1.20E+05	3.85E+04	4.14E+04	2.73E+04
6	6.21E−01	2.54E+01	1.28E+00	3.98E+00	5.77E+00
7	1.84E+01	2.49E+03	1.47E+02	2.78E+02	4.48E+02
8	1.00E+02	4.84E+02	1.00E+02	1.14E+02	7.02E+01
9	4.17E+02	4.40E+02	4.28E+02	4.28E+02	5.78E+00
10	4.14E+02	4.94E+02	4.14E+02	4.41E+02	3.21E+01

Table 65: Results of SOMA-ATR for 20D (Shift, Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.86E+00	1.60E+02	1.44E+01	2.28E+01	3.58E+01
3	2.04E+01	2.27E+01	2.13E+01	2.15E+01	5.73E−01
4	9.64E−01	2.40E+00	1.68E+00	1.66E+00	2.82E−01
5	3.86E+03	1.20E+05	3.85E+04	4.14E+04	2.73E+04
6	6.21E−01	2.54E+01	1.28E+00	3.98E+00	5.77E+00
7	1.84E+01	2.49E+03	1.47E+02	2.78E+02	4.48E+02
8	1.00E+02	4.84E+02	1.00E+02	1.14E+02	7.02E+01
9	4.17E+02	4.40E+02	4.28E+02	4.28E+02	5.78E+00
10	4.14E+02	4.94E+02	4.14E+02	4.41E+02	3.21E+01

Table 66: Results of SOMA-CLP for 10D (Basic)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	6.42E−05	1.96E−01	1.25E−01	1.04E−01	4.88E−02
3	9.96E−01	1.09E+01	4.11E+00	6.03E+00	3.86E+00
4	7.15E−02	5.18E−01	3.89E−01	3.60E−01	1.11E−01
5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	1.32E−02	6.40E−02	2.55E−02	3.11E−02	1.43E−02
7	2.10E−06	1.16E−02	8.69E−04	2.15E−03	2.64E−03
8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	4.34E−02	4.81E+01	4.80E+01	2.91E+01	2.36E+01

Table 67: Results of SOMA-CLP for 10D (Shift Operator)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	6.62E−07	3.12E−01	1.25E−01	1.19E−01	7.20E−02
3	7.00E−04	1.09E+01	4.00E+00	5.40E+00	3.76E+00
4	5.43E−02	5.40E−01	3.01E−01	3.08E−01	1.03E−01
5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	2.88E−03	5.22E−02	2.72E−02	2.84E−02	1.26E−02
7	1.66E−05	1.01E−02	1.80E−03	2.95E−03	3.02E−03
8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	2.78E−02	4.83E+01	4.80E+01	3.04E+01	2.29E+01

Table 61: Results of SOMA-ATR for 20D (Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	2.81E−01	1.45E+01	3.66E+00	4.50E+00	3.18E+00
3	0.00E+00	2.23E+01	2.96E+00	5.21E+00	6.02E+00
4	8.25E−01	2.22E+00	1.62E+00	1.59E+00	3.15E−01
5	1.72E+03	3.19E+04	8.31E+03	9.76E+03	7.02E+03
6	5.02E−01	4.66E+00	2.42E+00	2.37E+00	1.12E+00
7	3.80E+01	6.66E+02	1.65E+02	2.36E+02	1.75E+02
8	5.04E+01	1.52E+03	1.89E+02	2.98E+02	3.14E+02
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	6.48E+01	8.08E+01	7.01E+01	7.11E+01	4.60E+00

Table 62: Results of SOMA-ATR for 20D (Shift and Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	2.81E−01	1.46E+02	7.76E+00	3.04E+01	4.25E+01
3	2.02E+01	2.29E+01	2.08E+01	2.09E+01	6.18E−01
4	4.94E−01	1.41E+00	1.13E+00	1.09E+00	1.82E−01
5	0.00E+00	6.58E+00	1.56E−01	4.35E−01	1.19E+00
6	1.38E−01	2.51E+01	3.22E+00	4.97E+00	6.55E+00
7	7.11E−03	5.07E−01	1.86E−01	1.88E−01	1.13E−01
8	6.07E+01	1.03E+02	1.00E+02	9.88E+01	7.23E+00
9	4.01E+02	4.07E+02	4.02E+02	4.03E+02	1.92E+00
10	4.00E+02	4.87E+02	4.00E+02	4.20E+02	3.69E+01

Table 63: Results of SOMA-ATR for 20D (Shift and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	2.81E−01	1.45E+01	3.66E+00	4.50E+00	3.18E+00
3	0.00E+00	2.23E+01	2.96E+00	5.21E+00	6.02E+00
4	8.25E−01	2.22E+00	1.62E+00	1.59E+00	3.15E−01
5	1.72E+03	3.19E+04	8.31E+03	9.76E+03	7.02E+03
6	5.02E−01	4.66E+00	2.42E+00	2.37E+00	1.12E+00
7	3.80E+01	6.66E+02	1.65E+02	2.36E+02	1.75E+02
8	5.04E+01	1.52E+03	1.89E+02	2.98E+02	3.14E+02
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	6.48E+01	8.08E+01	7.01E+01	7.11E+01	4.60E+00

Table 71: Results of SOMA-CLP for 10D (Shift and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	6.91E-07	2.24E-08	7.06E-08	1.38E-07
2	3.02E-01	2.21E+01	5.23E+00	6.13E+00	5.27E+00
3	8.67E+00	1.83E+01	1.36E+01	1.37E+01	1.98E+00
4	2.58E-01	1.12E+00	6.61E-01	6.69E-01	1.81E-01
5	2.12E-01	9.33E+00	2.03E+00	2.77E+00	2.33E+00
6	7.12E-02	9.80E-01	4.54E-01	4.62E-01	2.21E-01
7	2.98E-03	8.11E-01	3.21E-01	3.07E-01	2.08E-01
8	3.94E-05	4.88E+01	3.44E+01	2.47E+01	1.82E+01
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	5.15E+01	5.32E+01	5.21E+01	5.21E+01	3.74E-01

Table 72: Results of SOMA-CLP for 10D (Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	2.10E-06	3.67E-08	2.11E-07	5.14E-07
2	3.67E+00	3.20E+01	1.37E+01	1.56E+01	9.40E+00
3	1.09E+01	1.87E+01	1.35E+01	1.38E+01	1.59E+00
4	9.92E-03	6.09E-01	1.81E-01	2.14E-01	1.73E-01
5	3.07E-01	2.39E+01	1.20E+01	1.03E+01	6.55E+00
6	3.83E-02	8.18E-01	2.62E-01	3.33E-01	1.91E-01
7	2.48E-03	6.31E-01	2.42E-01	1.96E-01	1.67E-01
8	9.77E-01	1.00E+02	2.81E+01	3.27E+01	2.22E+01
9	3.47E+00	1.00E+02	1.00E+02	9.20E+01	2.49E+01
10	3.98E+02	4.00E+02	4.00E+02	3.99E+02	7.97E-01

Table 73: Results of SOMA-CLP for 10D (Shift, Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	9.50E-07	2.94E-08	7.77E-08	1.79E-07
2	3.14E-01	5.03E+01	1.53E+01	1.52E+01	1.13E+01
3	1.15E+01	1.65E+01	1.35E+01	1.35E+01	1.30E+00
4	9.89E-03	7.51E-01	1.30E-01	2.00E-01	1.93E-01
5	3.66E-01	2.55E+01	1.10E+01	9.43E+00	7.02E+00
6	3.61E-02	7.34E-01	2.78E-01	2.73E-01	1.56E-01
7	2.88E-03	6.38E-01	1.22E-01	1.84E-01	1.69E-01
8	1.45E-01	1.00E+02	2.81E+01	2.81E+01	1.98E+01
9	3.70E+00	1.01E+02	1.00E+02	9.69E+01	1.76E+01
10	1.11E+02	4.00E+02	3.98E+02	3.89E+02	5.25E+01

Table 74: Results of SOMA-CLP for 20D (Basic)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	3.12E-02	3.12E-01	1.87E-01	1.73E-01	5.88E-02
3	0.00E+00	5.97E+00	1.99E+00	2.16E+00	1.63E+00
4	5.37E-01	1.04E+00	9.33E-01	8.88E-01	1.45E-01
5	0.00E+00	2.08E-01	0.00E+00	3.47E-02	5.69E-02
6	5.30E-02	6.01E-01	4.28E-01	3.92E-01	1.58E-01
7	1.60E-02	2.61E-01	6.64E-02	8.84E-02	5.52E-02
8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	4.88E+01	4.89E+01	4.88E+01	4.88E+01	4.59E-02

Table 75: Results of SOMA-CLP for 20D (Shift Operator)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	6.25E-02	2.50E-01	1.56E-01	1.67E-01	4.64E-02
3	0.00E+00	6.96E+00	1.99E+00	2.09E+00	1.74E+00
4	5.70E-01	1.17E+00	8.95E-01	8.78E-01	1.47E-01
5	0.00E+00	2.08E-01	0.00E+00	4.51E-02	5.92E-02
6	6.75E-02	6.42E-01	4.12E-01	3.89E-01	1.52E-01
7	2.77E-02	3.34E-01	6.58E-02	8.87E-02	6.97E-02
8	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	4.88E+01	4.90E+01	4.88E+01	4.88E+01	6.43E-02

Table 76: Results of SOMA-CLP for 20D (Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	6.25E-02	2.66E-01	1.58E-01	1.68E-01	5.73E-02
3	2.02E+01	2.02E+01	2.02E+01	2.02E+01	0.00E+00
4	6.49E-01	1.33E+00	9.69E-01	9.79E-01	1.87E-01
5	0.00E+00	2.08E-01	0.00E+00	3.82E-02	5.79E-02
6	5.14E-02	5.53E-01	2.70E-01	2.75E-01	1.08E-01
7	2.67E-02	2.15E-01	8.82E-02	9.61E-02	5.21E-02
8	1.09E-04	1.00E+02	1.00E+02	7.81E+01	3.68E+01
9	1.00E+02	4.00E+02	1.00E+02	1.63E+02	1.10E+02
10	4.00E+02	4.00E+02	4.00E+02	4.00E+02	0.00E+00

Table 77: Results of SOMA-CLP for 20D (Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.56E-01	4.49E+00	9.98E-01	1.44E+00	1.32E+00
3	5.42E+00	2.40E+01	1.41E+01	1.48E+01	5.50E+00
4	6.72E-01	1.55E+00	1.12E+00	1.12E+00	2.27E-01
5	1.97E+01	8.45E+02	1.53E+02	2.36E+02	2.26E+02
6	2.99E-01	1.06E+00	6.63E-01	6.47E-01	1.71E-01
7	7.03E-01	5.23E+01	4.21E+00	8.71E+00	1.05E+01
8	5.97E+01	3.04E+02	1.25E+02	1.42E+02	6.11E+01
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	6.31E+01	6.62E+01	6.46E+01	6.45E+01	7.58E-01

Table 81: Results of SOMA-CLP for 20D (Shift, Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	2.19E-01	1.34E+01	3.66E+00	4.50E+00	3.46E+00
3	2.04E+01	2.24E+01	2.12E+01	2.13E+01	6.40E-01
4	5.07E-01	1.73E+00	1.16E+00	1.17E+00	2.78E-01
5	1.67E+02	8.88E+03	7.78E+02	1.43E+03	1.74E+03
6	2.06E-01	1.69E+00	7.96E-01	9.00E-01	4.03E-01
7	3.11E+00	1.37E+02	2.77E+01	3.74E+01	2.90E+01
8	3.64E+01	1.01E+02	1.00E+02	9.53E+01	1.35E+01
9	1.00E+02	4.31E+02	1.00E+02	1.43E+02	1.00E+02
10	4.00E+02	4.14E+02	4.14E+02	4.13E+02	2.45E+00

Table 78: Results of SOMA-CLP for 20D (Shift and Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	3.13E-02	2.81E-01	1.56E-01	1.61E-01	5.59E-02
3	1.51E+01	2.02E+01	2.02E+01	1.99E+01	9.69E-01
4	5.66E-01	1.22E+00	8.59E-01	8.78E-01	1.80E-01
5	0.00E+00	2.08E-01	0.00E+00	3.82E-02	5.79E-02
6	1.02E-01	5.68E-01	3.05E-01	3.01E-01	1.02E-01
7	2.40E-02	3.36E-01	7.82E-02	1.04E-01	7.55E-02
8	1.38E-03	1.00E+02	1.00E+02	7.67E+01	4.04E+01
9	1.00E+02	4.00E+02	1.00E+02	1.60E+02	1.07E+02
10	4.00E+02	4.00E+02	4.00E+02	4.00E+02	0.00E+00

Table 79: Results of SOMA-CLP for 20D (Shift and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.87E-01	6.04E+00	1.94E+00	1.88E+00	1.51E+00
3	5.97E+00	2.35E+01	1.21E+01	1.33E+01	5.09E+00
4	6.69E-01	1.78E+00	1.13E+00	1.18E+00	2.23E-01
5	3.86E+00	1.33E+03	1.87E+02	2.04E+02	2.54E+02
6	2.73E-01	9.88E-01	6.30E-01	6.38E-01	1.79E-01
7	3.91E-01	6.12E+01	5.95E+00	1.11E+01	1.45E+01
8	5.24E+01	3.03E+02	1.33E+02	1.44E+02	5.45E+01
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	6.31E+01	6.79E+01	6.41E+01	6.44E+01	1.02E+00

Table 80: Results of SOMA-CLP for 20D (Rotation and Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	1.43E-01	9.63E+00	2.85E+00	3.74E+00	2.73E+00
3	2.04E+01	2.23E+01	2.11E+01	2.12E+01	6.14E-01
4	7.94E-01	1.85E+00	1.22E+00	1.25E+00	2.60E-01
5	1.37E+02	4.02E+03	9.81E+02	1.20E+03	9.49E+02
6	2.18E-01	1.63E+00	1.02E+00	9.69E-01	4.09E-01
7	9.26E+00	2.52E+02	2.94E+01	3.75E+01	4.44E+01
8	4.00E+01	1.02E+02	1.00E+02	9.03E+01	1.84E+01
9	1.00E+02	4.34E+02	1.00E+02	1.78E+02	1.38E+02
10	4.01E+02	4.14E+02	4.14E+02	4.13E+02	2.39E+00

Table 68: Results of SOMA-CLP for 10D (Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	2.81E-07	2.50E-01	6.87E-02	9.23E-02	6.53E-02
3	5.68E+00	1.09E+01	1.09E+01	1.06E+01	1.07E+00
4	1.98E-02	6.22E-01	3.70E-01	3.58E-01	1.35E-01
5	0.00E+00	2.37E-04	0.00E+00	7.92E-06	4.34E-05
6	1.45E-03	5.50E-02	2.52E-02	2.42E-02	1.06E-02
7	2.66E-06	1.11E-02	1.21E-03	2.65E-03	3.10E-03
8	8.45E-05	1.07E+01	2.20E-03	7.19E-01	2.71E+00
9	3.26E+00	1.00E+02	1.00E+02	9.15E+01	2.34E+01
10	2.25E+02	4.00E+02	4.00E+02	3.94E+02	3.19E+01

Table 69: Results of SOMA-CLP for 10D (Translation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	3.07E-07	2.40E-08	5.18E-08	7.52E-08
2	2.70E-01	2.30E+01	6.92E+00	7.50E+00	6.43E+00
3	4.68E+00	1.82E+01	1.40E+01	1.38E+01	2.28E+00
4	2.62E-01	1.06E+00	6.62E-01	6.45E-01	1.79E-01
5	1.62E-02	1.54E+01	1.60E+00	2.58E+00	3.20E+00
6	4.97E-02	9.53E-01	4.35E-01	4.52E-01	2.18E-01
7	6.91E-03	1.11E+00	2.51E-01	3.10E-01	2.76E-01
8	2.18E-08	5.47E+01	1.01E-01	1.60E+01	2.04E+01
9	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
10	5.15E+01	7.25E+01	5.20E+01	5.27E+01	3.76E+00

Table 70: Results of SOMA-CLP for 10D (Shift and Rotation)

Func.	Best	Worst	Median	Mean	Std
1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2	5.34E-05	1.91E-01	1.25E-01	1.06E-01	5.72E-02
3	3.12E+00	1.09E+01	1.09E+01	1.04E+01	1.81E+00
4	1.46E-06	5.04E-01	3.57E-01	3.48E-01	1.04E-01
5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
6	3.81E-03	5.03E-02	2.81E-02	2.94E-02	1.00E-02
7	1.32E-05	1.61E-02	9.66E-04	2.91E-03	4.23E-03
8	6.93E-05	3.07E-02	1.34E-03	3.42E-03	5.80E-03
9	3.08E+00	1.00E+02	1.00E+02	8.68E+01	3.06E+01
10	2.02E+02	4.00E+02	4.00E+02	3.87E+02	4.91E+01

Table 44: Results of SOMA-ATO for 20D (Rotation)

Func.	Best	Worst	Median	Mean	Std
1	6.16E+09	3.08E+10	1.84E+10	1.93E+10	6.30E+09
2	7.25E+00	4.35E+02	1.38E+02	1.58E+02	1.12E+02
3	2.27E+01	3.87E+01	2.85E+01	2.85E+01	4.09E+00
4	8.80E-01	2.08E+00	1.35E+00	1.38E+00	2.73E-01
5	9.23E+00	6.63E+07	2.50E+06	1.17E+07	1.76E+07
6	2.15E+00	2.54E+02	8.83E+00	2.81E+01	4.88E+01
7	2.12E+00	6.19E+07	5.08E+05	5.81E+06	1.26E+07
8	1.00E+02	1.02E+02	1.00E+02	1.01E+02	4.80E-01
9	4.03E+02	4.27E+02	4.13E+02	4.13E+02	6.87E+00
10	4.00E+02	5.07E+02	4.86E+02	4.62E+02	4.04E+01

Table 45: Results of SOMA-ATO for 20D (Translation)

Func.	Best	Worst	Median	Mean	Std
1	6.85E+09	1.90E+10	1.27E+10	1.31E+10	3.51E+09
2	3.72E+00	3.17E+02	2.20E+01	9.05E+01	9.74E+01
3	3.79E+00	4.84E+01	2.76E+01	2.55E+01	9.78E+00
4	1.19E+00	2.47E+00	1.69E+00	1.81E+00	3.92E-01
5	1.02E+03	9.04E+06	7.35E+05	1.48E+06	2.02E+06
6	2.53E+00	1.28E+02	7.29E+00	1.20E+01	2.23E+01
7	4.20E+01	1.92E+06	4.22E+04	3.52E+05	4.96E+05
8	1.01E+02	2.00E+03	3.16E+02	5.01E+02	5.13E+02
9	2.46E-01	6.02E+00	4.11E-01	8.29E-01	1.32E+00
10	6.40E+01	1.11E+02	7.74E+01	8.00E+01	1.14E+01

Table 46: Results of SOMA-ATO for 20D (Shift and Rotation)

Func.	Best	Worst	Median	Mean	Std
1	6.16E+09	3.08E+10	1.84E+10	1.93E+10	6.30E+09
2	7.25E+00	4.35E+02	1.38E+02	1.58E+02	1.12E+02
3	2.27E+01	3.87E+01	2.85E+01	2.85E+01	4.09E+00
4	8.80E-01	2.08E+00	1.35E+00	1.38E+00	2.73E-01
5	9.23E+00	6.63E+07	2.50E+06	1.17E+07	1.76E+07
6	2.15E+00	2.54E+02	8.83E+00	2.81E+01	4.88E+01
7	2.12E+00	6.19E+07	5.08E+05	5.81E+06	1.26E+07
8	1.00E+02	1.02E+02	1.00E+02	1.01E+02	4.80E-01
9	4.03E+02	4.27E+02	4.13E+02	4.13E+02	6.87E+00
10	4.00E+02	5.07E+02	4.86E+02	4.62E+02	4.04E+01

Table 34: Results of SOMA-ATO for 10D (Basic)

Func.	Best	Worst	Median	Mean	Std
1	4.00E+08	6.18E+09	2.27E+09	2.54E+09	1.43E+09
2	2.20E-01	1.05E+01	3.66E+00	4.12E+00	2.75E+00
3	2.07E-01	1.32E+01	1.15E+01	9.79E+00	4.06E+00
4	3.60E-01	6.50E-01	4.67E-01	4.75E-01	7.77E-02
5	8.13E-03	4.63E+06	2.74E+04	8.94E+05	1.48E+06
6	8.14E-02	1.25E+01	1.21E+00	1.66E+00	2.27E+00
7	8.83E-02	3.55E+06	9.17E+03	3.33E+05	7.38E+05
8	2.02E-02	2.79E+02	5.02E+00	1.60E+01	5.04E+01
9	6.57E-02	3.89E-01	1.57E-01	1.64E-01	5.94E-02
10	4.81E+01	5.00E+01	4.84E+01	4.84E+01	3.61E-01

Table 35: Results of SOMA-ATO for 10D (Shift Operator)

Func.	Best	Worst	Median	Mean	Std
1	4.00E+08	6.18E+09	2.27E+09	2.54E+09	1.43E+09
2	2.20E-01	1.05E+01	3.66E+00	4.12E+00	2.75E+00
3	2.07E-01	1.32E+01	1.15E+01	9.79E+00	4.06E+00
4	3.60E-01	6.50E-01	4.67E-01	4.75E-01	7.77E-02
5	8.13E-03	4.63E+06	2.74E+04	8.94E+05	1.48E+06
6	8.14E-02	1.25E+01	1.21E+00	1.66E+00	2.27E+00
7	8.83E-02	3.55E+06	9.17E+03	3.33E+05	7.38E+05
8	2.02E-02	2.79E+02	5.02E+00	1.60E+01	5.04E+01
9	6.57E-02	3.89E-01	1.57E-01	1.64E-01	5.94E-02
10	4.81E+01	5.00E+01	4.84E+01	4.84E+01	3.61E-01

Table 36: Results of SOMA-ATO for 10D (Rotation)

Func.	Best	Worst	Median	Mean	Std
1	1.90E+08	1.52E+10	2.57E+09	3.83E+09	3.60E+09
2	3.08E-01	1.34E+02	1.38E+01	3.10E+01	4.52E+01
3	1.11E+01	1.44E+01	1.15E+01	1.18E+01	6.92E-01
4	3.14E-01	6.72E-01	4.36E-01	4.63E-01	9.56E-02
5	4.86E-02	4.69E+06	2.44E+05	7.27E+05	1.03E+06
6	1.49E-01	1.26E+01	1.39E+00	2.32E+00	3.40E+00
7	1.62E-01	1.22E+08	5.18E+04	5.67E+06	2.25E+07
8	1.02E-01	1.01E+02	1.00E+02	8.80E+01	3.27E+01
9	1.00E+02	3.40E+02	3.31E+02	3.16E+02	5.88E+01
10	4.00E+02	4.66E+02	4.00E+02	4.16E+02	2.80E+01

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