



CENTRO DE CIENCIAS EXATAS E TECNOLOGICAS - CCE  
DEPARTAMENTO DE INFORMATICA

REPORT:

## **COMPARISON BETWEEN SS AND IDA\***

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# 1 Introduction

The new approach for selecting a subset of heuristics functions for domain-independent planning has two objectives: First, make a selection of heuristics from a large set of heuristics with the goal of reducing the running time of a search algorithm employing the subset functions. Second, find out if the prediction of Stratified Sampling (SS) might be helpful in selecting a subset of heuristics to guide the A\* search.

In order to achieve the first objective we present The Greedy Algorithm, which provides a good approximation to the optimal solution of the NP-hard optimization problem [Krause and Golovin, 2012].

In order to achieve the second objective we use the *relative unsigned error* to probe the accuracy of the predictions of SS with respect to IDA\*. We know that SS does not make even reasonable predictions for the number of nodes expanded by A\*. Nevertheless, even though SS produces poor predictions for the number of nodes expanded by A\*, we would like to verify whether these predictions can be helpful in selecting a subset of heuristics to guide the A\* search.

This report const of three sections, the first section is the introduction, the second is the experiment 1 which contains 4 tables showing the results of the *relative unsigned error*. and the last section in the conclusion.

## 2 Comparison of SS with IDA\*

Something here

Table 1: Experiment 1 - Comparison using hmax heuristic

	hmax											
	1		10		100		1000		5000			
Domain	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ida*	ida-time
barman-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
blocks	2.648	0.003	1.113	0.178	0.498	2.266	0.159	23.300	0.087	116.332	156474000.000	10770.900
elevators-opt08-strips	5.530	7.320	4.823	75.700	1.791	739.500	1.777	7571.860	1.551	37949.900	1604640.000	4358.740
elevators-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
floortile-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
nomystery-opt11-strips	9.204	0.043	2.465	0.363	0.735	3.707	0.369	36.847	0.130	183.897	2911010.000	289.453
openstacks-opt08-adl	—	—	—	—	—	—	—	—	—	—	—	—
openstacks-opt08-strips	0.192	0.668	0.141	6.636	0.128	67.228	0.141	679.132	0.146	3365.820	361346.000	786.512
openstacks-opt11-strips	0.000	0.860	0.000	8.300	0.000	80.400	0.000	798.200	0.000	4196.760	195.000	2.560
parcprinter-opt11-strips	0.000	0.003	0.000	0.035	0.000	0.392	0.000	3.344	0.000	17.286	1.000	0.000
parking-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
pegsol-opt11-strips	0.285	0.011	0.107	0.084	0.028	0.852	0.027	7.933	0.007	39.331	151280.000	10.998
scanalyzer-opt11-strips	0.961	0.080	0.177	0.120	0.118	0.880	0.026	8.080	0.019	39.920	101.000	0.160
sokoban-opt08-strips	0.114	0.035	0.308	0.351	0.286	3.518	0.023	30.990	0.015	155.113	5545.650	1.813
sokoban-opt11-strips	1.795	0.035	0.138	0.329	0.123	3.323	0.025	33.011	0.015	162.382	8245.920	2.622
tidybot-opt11-strips	3.754	5.727	1.582	29.967	0.608	287.373	0.269	2843.170	0.186	15769.200	2716460.000	17900.100
transport-opt08-strips	0.622	0.000	0.222	0.000	0.025	0.040	0.018	0.800	0.007	4.080	38.000	0.000
transport-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
visitall-opt11-strips	0.445	0.000	0.190	0.003	0.073	0.277	0.017	3.200	0.016	16.246	5363080.000	96.117
woodworking-opt08-strips	7.063	0.095	5.483	1.245	1.702	12.900	0.529	129.285	0.345	646.345	5190350.000	1023.720
woodworking-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—

### 3 Conclusions

Here goes the conclusions

### References

Andreas Krause and Daniel Golovin. Submodular function maximization. *Tractability: Practical Approaches to Hard Problems*, 3:19, 2012.

Table 2: Experiment 1 - Comparison using ipdb heuristic

	ipdb											
	1		10		100		1000		5000			
Domain	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ida*	ida-time
barman-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
blocks	4.789	0.002	3.543	0.013	1.678	0.134	0.742	1.366	0.485	6.909	2096930000.000	10018.200
elevators-opt08-strips	8.909	0.835	5.724	8.550	4.030	85.280	1.583	858.460	1.183	4287.430	95651000.000	20223.900
elevators-opt11-strips	13.495	1.130	9.043	11.380	3.898	117.380	2.846	1178.090	1.771	5904.640	154128000.000	36205.900
floortile-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
nomystery-opt11-strips	1429.530	0.003	1.759	0.011	1.065	0.114	0.475	1.103	0.167	5.536	360878000.000	2514.160
openstacks-opt08-adl	—	—	—	—	—	—	—	—	—	—	—	—
openstacks-opt08-strips	0.376	0.820	0.301	7.631	0.279	75.666	0.293	772.126	0.290	4522.480	2043600.000	15633.000
openstacks-opt11-strips	0.316	1.827	0.449	16.107	0.457	172.507	0.442	1678.330	0.437	9491.130	4166230.000	35539.000
parcprinter-opt11-strips	0.040	0.000	0.011	0.006	0.006	0.071	0.000	0.735	0.077	3.603	3065.690	337.491
parking-opt11-strips	3.584	0.028	1.488	0.200	0.399	2.116	0.135	20.748	0.288	103.608	306957000.000	7448.660
pegsol-opt11-strips	1.515	0.047	0.662	0.387	0.342	3.973	0.327	39.435	0.376	190.308	54945.300	1181.480
scanalyzer-opt11-strips	1.353	0.003	49.072	0.097	0.167	0.857	0.342	8.326	0.036	42.423	1071520000.000	8163.320
sokoban-opt08-strips	0.112	0.006	0.026	0.035	0.005	0.372	0.004	3.654	0.003	18.271	280429.000	9.525
sokoban-opt11-strips	0.073	0.007	0.001	0.049	0.004	0.482	0.002	4.869	0.001	24.387	404338.000	13.458
tidybot-opt11-strips	1.759	0.080	0.637	0.853	0.416	8.400	0.096	84.127	0.036	420.853	1131220.000	355.400
transport-opt08-strips	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.040	0.000	0.260	15.000	0.120
transport-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
visitall-opt11-strips	1.136	0.002	0.784	0.015	0.234	0.080	0.075	0.840	0.055	3.989	7604630.000	31.693
woodworking-opt08-strips	2.541	0.037	0.950	0.287	0.384	2.817	0.092	27.843	0.054	138.885	93740200.000	6484.690
woodworking-opt11-strips	3.093	0.060	1.808	0.573	0.354	5.913	0.248	59.680	0.116	295.787	249863000.000	16954.900

Table 3: Experiment 1 - Comparison using lmcut heuristic

	lmcut											
	1		10		100		1000		5000			
Domain	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ida*	ida-time
barman-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
blocks	3.266	0.164	2.120	1.667	0.708	15.701	0.290	157.335	0.174	801.386	9943800.000	9361.030
elevators-opt08-strips	5.720	70.105	3.457	691.590	0.911	6210.870	0.299	61445.500	0.242	323240.000	139417.000	1458.650
elevators-opt11-strips	6.570	117.520	4.427	1190.320	1.717	10650.500	0.642	107014.000	0.310	577514.000	220608.000	2573.950
floortile-opt11-strips	12.185	1.340	3.174	14.740	2.227	132.460	0.450	1311.420	0.256	7195.940	25413400.000	21021.000
nomystery-opt11-strips	4.515	1.262	1.490	14.763	0.675	124.755	0.204	1262.320	0.144	6858.100	647051.000	5214.300
openstacks-opt08-adl	—	—	—	—	—	—	—	—	—	—	—	—
openstacks-opt08-strips	0.092	0.544	0.157	5.972	0.148	58.472	0.140	576.712	0.147	3911.320	361346.000	677.368
openstacks-opt11-strips	0.000	1.060	0.000	10.300	0.000	66.780	0.000	672.900	0.000	3698.520	195.000	2.320
parcprinter-opt11-strips	0.005	0.038	0.006	0.362	0.000	3.558	0.000	36.046	0.000	182.945	3064.850	0.045
parking-opt11-strips	1.869	7.060	0.992	75.100	0.210	732.120	0.211	7424.720	0.177	38761.900	286812.000	4761.780
pegsol-opt11-strips	21.763	0.098	0.373	0.868	0.240	7.798	0.213	74.579	0.159	393.330	1130870.000	630.318
scanalyzer-opt11-strips	1.112	13.417	0.383	128.737	0.094	1176.560	0.039	11800.200	0.024	76516.400	7211710.000	12482.300
sokoban-opt08-strips	0.028	0.527	0.038	5.053	0.003	50.950	0.003	507.744	0.001	2915.320	232738.000	287.884
sokoban-opt11-strips	0.038	0.678	0.005	6.507	0.004	63.178	0.002	633.602	0.001	3260.390	295998.000	368.898
tidybot-opt11-strips	4.918	19.740	1.818	186.110	0.685	1788.940	0.280	17720.700	0.159	95541.000	1162760.000	17561.200
transport-opt08-strips	4.542	0.360	1.012	3.993	0.392	38.387	0.125	384.567	0.049	2069.430	712491.000	778.980
transport-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
visitall-opt11-strips	1.441	0.022	3.187	0.456	0.175	4.473	0.066	46.993	0.048	237.667	595466.000	91.538
woodworking-opt08-strips	1.123	0.211	0.266	1.854	0.148	18.497	0.019	188.931	0.029	1051.260	6048240.000	1859.450
woodworking-opt11-strips	0.789	0.320	0.131	3.490	0.228	32.830	0.063	322.000	0.013	1654.180	21020800.000	6462.270

Table 4: Experiment 1 - Comparison using merge\_and\_shrink heuristic

	merge_and_shrink											
	1		10		100		1000		5000			
Domain	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ss-err	ss-t	ida*	ida-time
barman-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
blocks	2.163	13.074	3.346	13.444	0.482	14.151	0.205	14.769	0.256	17.972	5807970.000	75.288
elevators-opt08-strips	2.479	4.690	1.968	7.370	1.293	34.820	0.970	292.250	0.924	1440.010	69178500.000	14434.600
elevators-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
floortile-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
nomystery-opt11-strips	0.766	0.861	0.453	0.866	0.289	1.027	0.194	1.374	0.212	3.366	800639000.000	3766.920
openstacks-opt08-adl	—	—	—	—	—	—	—	—	—	—	—	—
openstacks-opt08-strips	0.666	37.090	0.518	26.655	0.182	54.095	0.175	180.090	0.181	838.820	451632.000	358.620
openstacks-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
parcprinter-opt11-strips	0.055	16.812	0.008	17.260	0.005	16.925	0.001	17.323	0.000	17.846	3064.850	16.872
parking-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
pegsol-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
scanalyzer-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
sokoban-opt08-strips	0.039	59.195	0.011	56.500	0.000	75.720	0.000	67.545	0.000	116.690	4135.000	57.275
sokoban-opt11-strips	0.000	235.760	0.000	267.320	0.000	371.140	0.000	318.020	0.000	458.180	5.000	223.340
tidybot-opt11-strips	0.000	1211.100	1.000	0.000	0.000	1206.820	0.000	1592.380	0.000	1326.720	65.000	1823.720
transport-opt08-strips	0.139	0.016	0.025	0.020	0.004	0.044	0.003	0.172	0.004	0.804	1391.800	0.024
transport-opt11-strips	—	—	—	—	—	—	—	—	—	—	—	—
visitall-opt11-strips	0.533	0.818	0.416	0.902	0.180	0.907	0.036	1.058	0.019	2.318	2613370.000	9.673
woodworking-opt08-strips	0.707	9.966	0.400	11.906	0.137	11.640	0.041	17.886	0.025	47.763	10699200.000	303.166
woodworking-opt11-strips	1.686	32.360	1.761	35.480	0.221	43.670	0.062	58.410	0.690	113.240	36373700.000	1057.370