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Mathematical Models and Heuristic Algorithms for Pallet Building Problems with Practical Constraints

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1 Appendix

This appendix reports the individual average results for the algorithms proposed on paper *"Mathematical Models and Heuristic Algorithms for Pallet Building Problems with Practical Constraints"* to compare the performance among all strategies in a consistent way. The average results for the algorithms are summarized in Tables 1– 6.

By considering the deterministic algorithms EPMH, MEPMH and EPFULL, we present the Tables 1–3. In the first three columns the tables report, respectively, the instance identifier, the total number of pallets in the solution and the total number of layers created. In the six successive columns it reports the minimum, maximum and average pallet utilization and fill factor (2D space of all layers). Next, it reports the average number of single-item, single-family and residual layers. The last column reports the computational time (represented by minutes:seconds.milliseconds).

For what concerns the GRASP-based algorithms GREP, MGREP and GREP-FULL, we present the Tables 4–6. In these tables, we report the same information as the previous ones, including, respectively, the minimum, maximum and average values of the objective function, the total number of iterations, the total number of local searches and the ratio between the total number of local searches and the total number of iterations.

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Table 1: EPMH computational results (individual average).

Instance	N. of pallets	N. of layers	Pallet filling			2D fill factor			Single-item layers	Single-family layers	Residual layers (RL)	Time (min:sec.milli)
			Min	Max	Avg	Min	Max	Avg				
01	11.00	44.00	0.22	0.85	0.73	0.45	0.98	0.87	31.00	11.00	2.00	00:00.131
02	7.00	17.00	0.09	0.82	0.37	0.58	0.86	0.77	10.00	4.00	3.00	00:00.013
03	7.00	27.00	0.20	0.86	0.66	0.16	0.95	0.84	16.00	9.00	2.00	00:00.020
04	4.00	7.00	0.09	0.50	0.21	0.09	0.96	0.68	1.00	2.00	4.00	00:00.008
05	8.00	30.00	0.06	0.86	0.53	0.27	0.93	0.85	19.00	9.00	2.00	00:00.029
06	30.00	107.00	0.02	0.88	0.74	0.14	0.98	0.88	98.00	4.00	5.00	00:00.081
07	13.00	50.00	0.22	0.91	0.70	0.73	0.95	0.89	38.00	10.00	2.00	00:00.028
08	20.00	91.00	0.24	0.91	0.74	0.56	0.97	0.86	69.00	18.00	4.00	00:00.043
09	5.00	17.00	0.33	0.77	0.62	0.30	0.95	0.81	8.00	7.00	2.00	00:00.012
10	9.00	24.00	0.08	0.81	0.42	0.48	0.93	0.82	13.00	7.00	4.00	00:00.017
11	8.00	20.00	0.09	0.88	0.40	0.27	0.96	0.81	6.00	11.00	3.00	00:00.019
12	12.00	42.00	0.14	0.85	0.57	0.40	0.96	0.84	18.00	20.00	4.00	00:00.028
13	8.00	34.00	0.56	0.80	0.72	0.27	0.95	0.83	15.00	16.00	3.00	00:00.016
14	11.00	33.00	0.04	0.91	0.46	0.19	0.98	0.81	12.00	17.00	4.00	00:00.025
15	11.00	47.00	0.58	0.88	0.74	0.66	0.96	0.87	22.00	22.00	3.00	00:00.024
16	12.00	51.00	0.52	0.89	0.73	0.22	0.95	0.85	29.00	19.00	3.00	00:00.023
17	6.00	17.00	0.10	0.72	0.42	0.64	0.95	0.78	4.00	10.00	3.00	00:00.013
18	12.00	38.00	0.12	0.90	0.52	0.63	0.98	0.86	16.00	16.00	6.00	00:00.031
19	12.00	50.00	0.39	0.86	0.69	0.68	0.95	0.86	21.00	24.00	5.00	00:00.025
20	14.00	55.00	0.14	0.89	0.67	0.05	0.98	0.86	26.00	23.00	6.00	00:00.029
21	12.00	54.00	0.45	0.86	0.71	0.18	0.96	0.83	24.00	26.00	4.00	00:00.025
22	16.00	59.00	0.10	0.88	0.60	0.20	0.97	0.85	28.00	25.00	6.00	00:00.029
23	11.00	44.00	0.30	0.86	0.67	0.40	0.97	0.87	14.00	26.00	4.00	00:00.022
24	12.00	47.00	0.22	0.87	0.64	0.08	0.97	0.83	16.00	26.00	5.00	00:00.021
AVG	11.29	41.88	0.22	0.84	0.59	0.36	0.96	0.83	23.08	15.08	3.71	00:00.030

Table 2: MEPMH computational results (individual average).

Instance	N. of pallets	N. of layers	Pallet filling			2D fill factor			Single-item layers	Single-family layers	Residual layers (RL)	Time (min:sec.milli)
			Min	Max	Avg	Min	Max	Avg				
01	10.00	44.00	0.63	0.91	0.80	0.45	0.98	0.87	31.00	11.00	2.00	00:00.203
02	6.00	17.00	0.11	0.78	0.43	0.58	0.86	0.77	10.00	4.00	3.00	00:00.076
03	6.00	27.00	0.65	0.89	0.78	0.16	0.95	0.84	16.00	9.00	2.00	00:00.041
04	4.00	7.00	0.09	0.50	0.21	0.09	0.96	0.68	1.00	2.00	4.00	00:00.010
05	7.00	30.00	0.11	0.86	0.60	0.27	0.93	0.85	19.00	9.00	2.00	00:00.137
06	30.00	107.00	0.02	0.92	0.74	0.14	0.98	0.88	98.00	4.00	5.00	00:30.123
07	11.00	50.00	0.50	0.91	0.83	0.73	0.95	0.89	38.00	10.00	2.00	00:00.171
08	19.00	91.00	0.47	0.93	0.78	0.56	0.97	0.86	69.00	18.00	4.00	00:04.105
09	4.00	17.00	0.71	0.84	0.77	0.30	0.95	0.81	8.00	7.00	2.00	00:00.021
10	8.00	24.00	0.08	0.86	0.48	0.48	0.93	0.82	13.00	7.00	4.00	00:00.292
11	6.00	20.00	0.10	0.78	0.53	0.27	0.96	0.81	6.00	11.00	3.00	00:00.060
12	11.00	42.00	0.14	0.89	0.63	0.40	0.96	0.84	18.00	20.00	4.00	00:00.965
13	8.00	34.00	0.27	0.89	0.72	0.27	0.95	0.83	15.00	16.00	3.00	00:08.782
14	9.00	33.00	0.04	0.86	0.56	0.19	0.98	0.81	12.00	17.00	4.00	00:01.417
15	10.00	47.00	0.72	0.89	0.82	0.66	0.96	0.87	22.00	22.00	3.00	00:00.101
16	11.00	51.00	0.68	0.88	0.79	0.22	0.95	0.85	29.00	19.00	3.00	00:00.154
17	6.00	17.00	0.08	0.77	0.42	0.64	0.95	0.78	4.00	10.00	3.00	00:00.073
18	11.00	38.00	0.12	0.90	0.57	0.63	0.98	0.86	16.00	16.00	6.00	00:05.749
19	11.00	50.00	0.62	0.91	0.76	0.68	0.95	0.86	21.00	24.00	5.00	00:00.119
20	13.00	55.00	0.14	0.91	0.72	0.05	0.98	0.86	26.00	23.00	6.00	00:30.039
21	11.00	54.00	0.62	0.91	0.77	0.18	0.96	0.83	24.00	26.00	4.00	00:02.431
22	15.00	59.00	0.10	0.89	0.64	0.20	0.97	0.85	28.00	25.00	6.00	00:01.866
23	10.00	44.00	0.49	0.87	0.73	0.40	0.97	0.87	14.00	26.00	4.00	00:00.788
24	11.00	47.00	0.11	0.87	0.69	0.08	0.97	0.83	16.00	26.00	5.00	00:00.945
AVG	10.33	41.88	0.32	0.86	0.66	0.36	0.96	0.83	23.08	15.08	3.71	00:03.694

Table 3: EPFULL computational results (individual average).

Instance	N. of pallets	N. of layers	Pallet filling			2D fill factor			Single-item layers	Single-family layers	Residual layers (RL)	Time (min:sec.milli)
			Min	Max	Avg	Min	Max	Avg				
01	10.00	45.00	0.64	0.86	0.80	0.10	0.95	0.85	19.00	23.00	3.00	02:12.036
02	6.00	17.00	0.09	0.82	0.43	0.58	0.86	0.77	10.00	4.00	3.00	00:19.650
03	6.00	26.00	0.61	0.84	0.78	0.68	0.96	0.87	11.00	14.00	1.00	01:38.174
04	4.00	6.00	0.05	0.51	0.21	0.34	0.96	0.79	1.00	2.00	3.00	00:22.079
05	7.00	29.00	0.11	0.86	0.60	0.50	0.93	0.88	16.00	11.00	2.00	01:44.650
06	29.00	106.00	0.09	0.92	0.77	0.50	0.98	0.89	86.00	16.00	4.00	01:15.327
07	11.00	50.00	0.51	0.91	0.83	0.35	0.94	0.89	25.00	23.00	2.00	03:07.334
08	19.00	91.00	0.32	0.90	0.78	0.56	0.95	0.86	61.00	26.00	4.00	03:25.827
09	4.00	16.00	0.73	0.81	0.77	0.40	0.96	0.86	6.00	8.00	2.00	01:47.783
10	8.00	24.00	0.05	0.87	0.48	0.33	0.95	0.82	9.00	11.00	4.00	01:13.216
11	6.00	19.00	0.10	0.89	0.53	0.57	0.96	0.85	0.00	17.00	2.00	02:16.216
12	12.00	43.00	0.12	0.87	0.57	0.11	0.95	0.82	17.00	22.00	4.00	02:14.166
13	9.00	33.00	0.13	0.83	0.64	0.23	0.96	0.86	12.00	18.00	3.00	02:46.520
14	8.00	32.00	0.09	0.94	0.63	0.44	0.98	0.84	12.00	17.00	3.00	02:33.528
15	10.00	46.00	0.74	0.90	0.82	0.66	0.96	0.89	13.00	31.00	2.00	04:07.588
16	11.00	51.00	0.56	0.88	0.79	0.02	0.93	0.85	20.00	28.00	3.00	03:29.289
17	5.00	16.00	0.09	0.79	0.51	0.31	0.94	0.83	2.00	11.00	3.00	02:09.711
18	11.00	38.00	0.13	0.87	0.57	0.34	0.98	0.86	13.00	20.00	5.00	03:13.187
19	11.00	49.00	0.50	0.89	0.76	0.60	0.96	0.88	14.00	31.00	4.00	04:32.811
20	12.00	53.00	0.17	0.90	0.78	0.73	0.94	0.90	19.00	29.00	5.00	05:31.439
21	11.00	52.00	0.48	0.91	0.77	0.50	0.96	0.86	13.00	36.00	3.00	05:25.681
22	13.00	58.00	0.18	0.89	0.74	0.57	0.95	0.87	15.00	38.00	5.00	06:36.848
23	9.00	43.00	0.74	0.89	0.81	0.71	0.96	0.89	7.00	32.00	4.00	06:25.965
24	11.00	44.00	0.16	0.92	0.69	0.58	0.95	0.89	6.00	33.00	5.00	05:28.801
AVG	10.13	41.13	0.31	0.86	0.67	0.45	0.95	0.86	16.96	20.88	3.29	03:04.909

Table 4: GREP computational results (individual average).

Instance	N. of pallets	N. of layers	Pallet filling			2D fill factor			Single-item layers	Single-family layers	Residual layers (RL)	Objective function			Total iterations (TI)	Total local searches (LS)	Ratio LS/TI
			Min	Max	Avg	Min	Max	Avg				Min	Max	Avg			
01	11.00	45.00	0.41	0.88	0.73	0.56	0.95	0.85	32.00	12.00	1.00	0.6727	0.6727	0.6727	4148.00	643.47	0.1551
02	6.00	17.00	0.12	0.82	0.43	0.58	0.86	0.77	10.00	4.00	3.00	0.5397	0.5397	0.5397	16991.13	2395.13	0.1410
03	7.00	30.00	0.49	0.77	0.66	0.51	0.92	0.75	20.80	8.20	1.00	0.6486	0.6486	0.6486	11600.53	1649.93	0.1422
04	3.00	6.00	0.12	0.59	0.28	0.66	0.94	0.79	1.00	2.00	3.00	0.4562	0.4562	0.4562	24652.27	3500.60	0.1420
05	8.00	30.00	0.06	0.86	0.53	0.27	0.93	0.85	19.00	9.00	2.00	0.6300	0.6300	0.6300	10380.87	1528.53	0.1472
06	29.00	107.00	0.13	0.88	0.77	0.67	0.98	0.88	99.00	4.00	4.00	0.6024	0.6024	0.6024	1489.27	251.40	0.1688
07	13.00	50.00	0.22	0.91	0.70	0.73	0.95	0.89	38.00	10.00	2.00	0.6476	0.6476	0.6476	6900.47	960.47	0.1392
08	20.00	91.00	0.24	0.91	0.74	0.56	0.97	0.86	69.00	18.00	4.00	0.6118	0.6118	0.6118	3787.87	517.40	0.1366
09	5.00	17.00	0.25	0.85	0.62	0.53	0.93	0.81	7.93	8.07	1.00	0.6494	0.6494	0.6494	12332.47	1734.80	0.1407
10	8.00	24.00	0.13	0.81	0.48	0.60	0.91	0.82	13.00	7.93	3.07	0.5444	0.5675	0.5659	15494.47	1225.27	0.0791
11	6.00	19.00	0.12	0.87	0.53	0.65	0.96	0.85	7.00	10.00	2.00	0.6127	0.6127	0.6127	8160.80	1143.33	0.1401
12	12.00	42.00	0.14	0.85	0.57	0.40	0.96	0.84	18.00	20.00	4.00	0.5762	0.5762	0.5762	6857.87	951.93	0.1388
13	8.00	34.00	0.56	0.79	0.72	0.10	0.95	0.83	15.00	16.00	3.00	0.6080	0.6080	0.6080	9297.93	1302.53	0.1401
14	10.00	33.87	0.07	0.84	0.51	0.31	0.98	0.79	14.13	15.73	4.00	0.5539	0.5588	0.5546	4041.53	684.07	0.1693
15	11.00	47.00	0.58	0.88	0.74	0.66	0.96	0.87	22.00	22.00	3.00	0.6228	0.6228	0.6228	5495.07	951.33	0.1731
16	12.00	51.00	0.52	0.89	0.73	0.21	0.95	0.85	29.00	19.00	3.00	0.6162	0.6162	0.6162	6798.87	942.67	0.1387
17	6.00	16.00	0.07	0.86	0.42	0.46	0.95	0.83	3.00	10.00	3.00	0.5517	0.5517	0.5517	10067.93	1623.13	0.1612
18	11.00	39.00	0.13	0.91	0.57	0.61	0.98	0.83	18.00	17.00	4.00	0.5744	0.5744	0.5744	3775.07	520.20	0.1378
19	12.00	50.00	0.27	0.87	0.69	0.68	0.95	0.86	21.00	24.00	5.00	0.5845	0.5845	0.5845	5680.67	731.00	0.1287
20	13.07	54.13	0.15	0.88	0.72	0.68	0.98	0.88	26.20	23.00	4.93	0.5915	0.5936	0.5917	4203.93	581.53	0.1383
21	12.00	54.00	0.45	0.86	0.71	0.19	0.96	0.83	24.00	26.00	4.00	0.5965	0.5965	0.5965	4380.93	609.73	0.1392
22	14.20	59.53	0.17	0.90	0.68	0.27	0.97	0.84	28.80	25.00	5.73	0.5715	0.5792	0.5725	3478.13	561.27	0.1614
23	11.00	44.00	0.30	0.86	0.67	0.40	0.97	0.87	14.00	26.00	4.00	0.5973	0.5973	0.5973	4616.53	637.07	0.1380
24	11.00	48.00	0.51	0.90	0.69	0.58	0.95	0.81	21.00	23.00	4.00	0.5867	0.5867	0.5867	4686.07	675.13	0.1441
AVG	10.80	42.02	0.26	0.85	0.62	0.49	0.95	0.84	23.79	15.00	3.24	0.5936	0.5952	0.5946	7888.28	1096.75	0.1390

Table 5: MGREP computational results (individual average).

Instance	N. of pallets	N. of layers	Pallet filling			2D fill factor			Single-item layers	Single-family layers	Residual layers (RL)	Objective function			Total iterations (TI)	Total local searches (LS)	Ratio LS/TI
			Min	Max	Avg	Min	Max	Avg				Min	Max	Avg			
01	10.00	44.93	0.68	0.86	0.80	0.57	0.96	0.85	31.93	11.93	1.07	0.6496	0.6803	0.6782	748.67	108.87	0.1454
02	6.20	17.20	0.09	0.81	0.42	0.53	0.85	0.76	10.13	3.87	3.20	0.4921	0.5397	0.5302	3358.60	480.47	0.1431
03	6.93	29.80	0.49	0.79	0.67	0.53	0.92	0.76	20.73	8.13	0.93	0.6486	0.7159	0.6553	20056.27	2966.67	0.1479
04	3.00	6.00	0.13	0.58	0.28	0.68	0.91	0.79	1.00	2.00	3.00	0.4562	0.4562	0.4562	67840.20	9689.40	0.1428
05	6.93	30.73	0.13	0.86	0.61	0.38	0.93	0.83	20.07	8.67	2.00	0.6238	0.6420	0.6379	1779.20	270.07	0.1518
06	29.07	107.47	0.13	0.88	0.77	0.67	0.98	0.87	99.53	4.00	3.93	0.5980	0.6162	0.6023	8.93	2.07	0.2313
07	11.60	51.40	0.42	0.89	0.80	0.68	0.95	0.87	39.20	10.20	2.00	0.6154	0.6607	0.6516	1428.40	209.40	0.1466
08	19.60	95.67	0.51	0.89	0.76	0.41	0.97	0.82	74.13	17.53	4.00	0.5876	0.6154	0.6035	15.33	3.60	0.2348
09	4.00	16.80	0.69	0.85	0.77	0.53	0.94	0.82	7.33	8.27	1.20	0.6342	0.6704	0.6632	18171.60	2595.93	0.1429
10	8.00	24.07	0.10	0.84	0.48	0.51	0.92	0.81	13.00	7.47	3.60	0.5382	0.5675	0.5532	444.27	69.67	0.1568
11	6.00	19.07	0.12	0.87	0.53	0.63	0.95	0.85	7.07	9.93	2.07	0.5724	0.6127	0.6100	5284.07	755.73	0.1430
12	11.33	42.27	0.13	0.87	0.61	0.43	0.96	0.83	18.67	19.53	4.07	0.5559	0.5833	0.5789	225.67	33.33	0.1477
13	8.00	34.40	0.50	0.89	0.72	0.17	0.95	0.82	15.40	16.00	3.00	0.5931	0.6080	0.6060	294.67	44.33	0.1505
14	9.20	33.13	0.06	0.86	0.55	0.27	0.98	0.81	12.47	16.60	4.07	0.5416	0.5678	0.5642	145.20	21.47	0.1478
15	10.40	48.20	0.64	0.87	0.79	0.65	0.95	0.85	23.60	21.80	2.80	0.6172	0.6302	0.6276	305.07	44.40	0.1455
16	11.20	51.87	0.66	0.87	0.78	0.26	0.95	0.84	30.27	18.60	3.00	0.5864	0.6230	0.6187	885.13	126.27	0.1427
17	6.00	16.00	0.10	0.84	0.42	0.55	0.95	0.83	2.60	10.40	3.00	0.5517	0.5517	0.5517	7295.00	1130.87	0.1550
18	10.27	39.07	0.12	0.88	0.61	0.58	0.98	0.83	17.73	17.13	4.20	0.5580	0.5823	0.5766	301.40	43.80	0.1453
19	11.33	51.33	0.48	0.89	0.74	0.61	0.96	0.84	23.00	23.33	5.00	0.5702	0.5913	0.5843	2307.53	324.13	0.1405
20	12.80	55.93	0.15	0.88	0.73	0.67	0.97	0.85	28.67	22.53	4.73	0.5749	0.5977	0.5905	192.67	29.07	0.1509
21	11.47	55.13	0.53	0.88	0.74	0.37	0.96	0.81	26.13	25.00	4.00	0.5865	0.6032	0.5962	1194.00	189.13	0.1584
22	14.27	62.27	0.14	0.88	0.67	0.44	0.96	0.81	32.47	24.93	4.87	0.5666	0.5893	0.5749	119.13	20.27	0.1701
23	10.00	44.00	0.49	0.87	0.73	0.40	0.97	0.87	14.00	26.00	4.00	0.6049	0.6049	0.6049	351.33	51.13	0.1455
24	10.33	48.40	0.55	0.87	0.74	0.57	0.95	0.81	21.00	23.47	3.93	0.5830	0.5984	0.5915	1011.73	147.27	0.1456
AVG	10.33	42.71	0.34	0.85	0.66	0.50	0.95	0.83	24.59	14.89	3.24	0.5794	0.6045	0.5962	5573.50	806.56	0.1447

Table 6: GREPFULL computational results (individual average).

Instance	N. of pallets	N. of layers	Pallet filling			2D fill factor			Single-item layers	Single-family layers	Residual layers (RL)	Objective function			Total iterations (TI)	Total local searches (LS)	Ratio LS/TI
			Min	Max	Avg	Min	Max	Avg				Min	Max	Avg			
01	10.00	43.73	0.64	0.88	0.80	0.67	0.96	0.87	25.07	16.67	2.00	0.6496	0.6546	0.6510	7.60	1.40	0.1842
02	6.00	17.00	0.11	0.79	0.43	0.51	0.87	0.77	9.93	4.07	3.00	0.5397	0.5397	0.5397	44.20	6.67	0.1508
03	6.00	26.00	0.65	0.86	0.78	0.65	0.95	0.87	10.53	14.47	1.00	0.6895	0.6895	0.6895	8.13	2.00	0.2459
04	4.00	6.00	0.06	0.51	0.21	0.35	0.96	0.79	1.00	2.00	3.00	0.4180	0.4180	0.4180	38.33	6.00	0.1565
05	6.73	29.00	0.17	0.87	0.63	0.57	0.94	0.88	12.60	14.40	2.00	0.6483	0.6614	0.6518	9.00	2.00	0.2222
06	29.00	106.00	0.10	0.90	0.77	0.55	0.98	0.89	89.73	12.27	4.00	0.6044	0.6044	0.6044	13.53	2.00	0.1478
07	11.00	49.67	0.52	0.90	0.83	0.50	0.94	0.90	19.67	28.00	2.00	0.6607	0.6652	0.6622	4.87	1.13	0.2329
08	18.60	90.33	0.57	0.90	0.80	0.55	0.96	0.87	64.07	22.67	3.60	0.6154	0.6381	0.6251	6.20	1.73	0.2796
09	4.00	16.00	0.70	0.84	0.77	0.48	0.96	0.86	5.80	8.20	2.00	0.6342	0.6342	0.6342	8.00	1.33	0.1667
10	7.00	23.00	0.12	0.87	0.54	0.61	0.94	0.85	10.40	9.60	3.00	0.5869	0.5869	0.5869	12.13	2.73	0.2253
11	6.00	19.00	0.12	0.83	0.53	0.65	0.96	0.85	2.47	14.53	2.00	0.6127	0.6127	0.6127	7.00	1.00	0.1429
12	11.00	42.00	0.13	0.86	0.63	0.52	0.95	0.84	15.87	22.87	3.27	0.5833	0.6031	0.5978	6.67	1.33	0.2000
13	8.00	32.33	0.18	0.89	0.72	0.43	0.96	0.88	12.27	17.73	2.33	0.6137	0.6471	0.6360	4.67	1.53	0.3286
14	8.00	31.07	0.15	0.89	0.63	0.57	0.98	0.86	10.20	17.87	3.00	0.6044	0.6104	0.6100	4.93	1.47	0.2973
15	10.00	46.07	0.70	0.90	0.82	0.58	0.96	0.89	11.40	32.60	2.07	0.6302	0.6597	0.6577	3.07	1.07	0.3478
16	11.00	50.00	0.68	0.90	0.79	0.60	0.95	0.87	18.20	29.80	2.00	0.6514	0.6514	0.6514	4.13	1.00	0.2419
17	5.00	16.00	0.11	0.81	0.51	0.22	0.95	0.83	0.20	12.80	3.00	0.5698	0.5698	0.5698	7.00	1.00	0.1429
18	10.33	37.07	0.12	0.89	0.61	0.59	0.98	0.88	12.27	19.80	5.00	0.5626	0.5755	0.5725	3.33	1.67	0.5000
19	10.73	48.80	0.49	0.89	0.78	0.67	0.95	0.88	14.33	30.47	4.00	0.6109	0.6226	0.6137	2.80	1.20	0.4286
20	12.27	53.07	0.16	0.91	0.76	0.62	0.96	0.90	14.93	33.13	5.00	0.5915	0.6016	0.5996	2.20	1.13	0.5152
21	11.00	51.73	0.53	0.89	0.77	0.49	0.96	0.87	10.93	37.80	3.00	0.6294	0.6334	0.6305	2.00	1.00	0.5000
22	13.53	57.13	0.16	0.91	0.71	0.55	0.96	0.88	15.73	36.40	5.00	0.5874	0.5966	0.5931	2.00	1.00	0.5000
23	9.80	43.00	0.36	0.90	0.75	0.62	0.96	0.89	3.73	35.20	4.07	0.5935	0.6180	0.6102	2.27	1.00	0.4412
24	10.20	44.60	0.41	0.89	0.75	0.35	0.96	0.87	6.87	32.80	4.93	0.5876	0.6066	0.5920	2.80	1.20	0.4286
AVG	9.97	40.78	0.33	0.86	0.68	0.54	0.95	0.86	16.59	21.09	3.09	0.6031	0.6125	0.6087	8.62	1.82	0.2108