

1. Detailed Results of Uniform-Weight Instances

The detailed results of EC and ECS on the 14 most challenging uniform-weight instances in S_A have been reported in Table 1 of the file "Analysis on uniform instances".

Table 1 Detailed Results of ECS-NTP, ECS-NSL, and ECS-NRS on the 14 Most Challenging Uniform-Weight Instances in S_A

Instances in S_A											
ECS-NTP											
ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU
120-30-1	6695	0.00	137.64	120-30-1	6662	0.00	54.64	120-30-1	6656	0.00	41.03
120-30-2	6747	0.00	47.80	120-30-2	6732	0.00	10.39	120-30-2	6726	0.00	28.45
120-30-3	6652	0.00	40.84	120-30-3	6635	0.00	45.21	120-30-3	6633	0.00	3.30
120-30-4	6679	0.00	26.73	120-30-4	6648	0.00	32.17	120-30-4	6639	0.00	144.74
120-30-5	–	–	–	120-30-5	6578	0.00	32.04	120-30-5	6565	0.00	17.97
ECS-NSL											
ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU
120-30-1	6695	0.00	107.68	120-30-1	6662	0.00	73.74	120-30-1	6656	0.00	53.51
120-30-2	6747	0.00	56.41	120-30-2	6732	0.00	29.21	120-30-2	6726	0.00	53.00
120-30-3	6652	0.00	46.20	120-30-3	6635	0.00	49.06	120-30-3	6633	0.00	3.15
120-30-4	6679	0.00	36.62	120-30-4	6648	0.00	69.99	120-30-4	6639	0.00	146.79
120-30-5	–	–	–	120-30-5	6578	0.00	31.80	120-30-5	6565	0.00	37.42
ECS-NRS											
ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU
120-30-1	6695	0.00	150.19	120-30-1	6662	0.00	97.32	120-30-1	6656	0.00	92.36
120-30-2	6747	0.00	108.13	120-30-2	6732	0.00	94.86	120-30-2	6726	0.00	108.80
120-30-3	6652	0.00	101.40	120-30-3	6635	0.00	101.20	120-30-3	6633	0.00	3.11
120-30-4	6679	0.00	124.03	120-30-4	6648	0.00	126.42	120-30-4	6639	0.00	186.99
120-30-5	–	–	–	120-30-5	6578	0.00	60.02	120-30-5	6565	0.00	47.98

Table 2 Detailed Results of ECS on Uniform-Weight Instances in S_A

ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU	Name	Cost	Gap%	CPU
60-10-1	1038	0.00	0.20	60-10-1	1035	0.00	0.09	60-10-1	1033	0.00	0.07
60-10-2	1062	0.00	0.08	60-10-2	1053	0.00	0.07	60-10-2	1052	0.00	0.08
60-10-3	1071	0.00	0.11	60-10-3	1068	0.00	0.10	60-10-3	1067	0.00	0.11
60-10-4	1058	0.00	0.05	60-10-4	1053	0.00	0.04	60-10-4	1052	0.00	0.05
60-10-5	1058	0.00	0.07	60-10-5	1056	0.00	0.05	60-10-5	1055	0.00	0.06
60-20-1	2141	0.00	0.11	60-20-1	2136	0.00	0.08	60-20-1	2133	0.00	0.08
60-20-2	2124	0.00	0.20	60-20-2	2118	0.00	0.64	60-20-2	2114	0.00	0.12
60-20-3	2027	0.00	0.17	60-20-3	2023	0.00	0.18	60-20-3	2016	0.00	0.11
60-20-4	2016	0.00	0.18	60-20-4	2010	0.00	0.20	60-20-4	2007	0.00	0.08
60-20-5	2146	0.00	0.17	60-20-5	2138	0.00	0.15	60-20-5	2134	0.00	0.11
60-30-1	3104	0.00	0.68	60-30-1	3100	0.00	0.55	60-30-1	3095	0.00	0.70
60-30-2	–	–	–	60-30-2	3183	0.00	1.33	60-30-2	3170	0.00	0.75
60-30-3	3180	0.00	0.54	60-30-3	3165	0.00	0.74	60-30-3	3159	0.00	0.29
60-30-4	–	–	–	60-30-4	3161	0.00	0.73	60-30-4	3154	0.00	0.56
60-30-5	–	–	–	60-30-5	3174	0.00	0.33	60-30-5	3163	0.00	0.26
90-10-1	1624	0.00	0.29	90-10-1	1622	0.00	0.20	90-10-1	1620	0.00	0.11
90-10-2	1673	0.00	0.12	90-10-2	1662	0.00	0.05	90-10-2	1659	0.00	0.06
90-10-3	1617	0.00	0.05	90-10-3	1612	0.00	0.06	90-10-3	1610	0.00	0.05
90-10-4	–	–	–	90-10-4	1638	0.00	0.04	90-10-4	1637	0.00	0.06
90-10-5	1634	0.00	0.12	90-10-5	1631	0.00	0.08	90-10-5	1630	0.00	0.09
90-20-1	3293	0.00	0.52	90-20-1	3279	0.00	0.41	90-20-1	3275	0.00	0.39
90-20-2	3309	0.00	0.90	90-20-2	3297	0.00	0.68	90-20-2	3290	0.00	2.18
90-20-3	3306	0.00	0.78	90-20-3	3297	0.00	0.56	90-20-3	3295	0.00	0.22
90-20-4	3312	0.00	0.32	90-20-4	3299	0.00	0.15	90-20-4	3291	0.00	0.38
90-20-5	–	–	–	90-20-5	3261	0.00	0.49	90-20-5	3253	0.00	0.21
90-30-1	4931	0.00	58.96	90-30-1	4909	0.00	8.92	90-30-1	4899	0.00	3.41
90-30-2	4840	0.00	3.86	90-30-2	4806	0.00	1.73	90-30-2	4796	0.00	2.00
90-30-3	4991	0.00	19.46	90-30-3	4978	0.00	8.56	90-30-3	4971	0.00	1.42
90-30-4	4694	0.00	2.04	90-30-4	4679	0.00	4.25	90-30-4	4675	0.00	0.71
90-30-5	4900	0.00	2.88	90-30-5	4887	0.00	2.66	90-30-5	4885	0.00	0.73
120-10-1	2209	0.00	4.37	120-10-1	2199	0.00	0.59	120-10-1	2198	0.00	0.65
120-10-2	2207	0.00	0.22	120-10-2	2206	0.00	0.20	120-10-2	2204	0.00	0.05
120-10-3	–	–	–	120-10-3	2208	0.00	0.30	120-10-3	2204	0.00	0.14
120-10-4	2158	0.00	1.48	120-10-4	2155	0.00	0.58	120-10-4	2154	0.00	0.47
120-10-5	2243	0.00	0.48	120-10-5	2238	0.00	0.69	120-10-5	2235	0.00	0.37
120-20-1	4543	0.00	6.18	120-20-1	4536	0.00	1.76	120-20-1	4535	0.00	1.90
120-20-2	4516	0.00	1.50	120-20-2	4503	0.00	1.21	120-20-2	4497	0.00	0.57
120-20-3	4515	0.00	22.81	120-20-3	4479	0.00	3.10	120-20-3	4469	0.00	6.32
120-20-4	4406	0.00	37.24	120-20-4	4394	0.00	9.25	120-20-4	4392	0.00	4.85
120-20-5	–	–	–	120-20-5	4455	0.00	2.68	120-20-5	4449	0.00	4.56

Table 3 Results of DK23-WTFRPA for the 14 Most Challenging Uniform-Weight Instances in S_A

ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU
120-30-1	6705	4.47	303.65	120-30-1	6666	0.00	327.98	120-30-1	6658	1.50	199.77
120-30-2	6749	2.96	341.81	120-30-2	6733	0.00	125.82	120-30-2	6726	1.48	180.50
120-30-3	6656	1.50	180.71	120-30-3	6636	0.00	20.89	120-30-3	6634	0.00	1.08
120-30-4	6684	2.99	181.18	120-30-4	6652	1.50	297.12	120-30-4	6640	0.00	51.74
120-30-5	–	–	–	120-30-5	6759	0.00	180.81	120-30-5	6566	1.52	180.53

Table 4 Results of ECS-WTFRPA for the 14 Most Challenging Uniform-Weight Instances in S_A

ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU
120-30-1	6705	0.00	39.02	120-30-1	6666	0.00	11.41	120-30-1	6658	0.00	36.31
120-30-2	6749	0.00	140.09	120-30-2	6733	0.00	6.95	120-30-2	6726	0.00	5.07
120-30-3	6656	0.00	8.42	120-30-3	6636	0.00	3.40	120-30-3	6634	0.00	2.35
120-30-4	6684	0.00	10.22	120-30-4	6652	0.00	7.81	120-30-4	6640	0.00	1.58
120-30-5	–	–	–	120-30-5	6579	0.00	5.39	120-30-5	6566	0.00	3.05

3.1 Results of Medium-Size Uniform-Weight Instances in S_B with Various Time Granularities

Table 5 Results of Medium-Size Uniform-Weight Instances in S_B with Granularity 300

ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU
90-30-1	4931	0.00	86.67	90-30-1	4909	0.00	27.23	90-30-1	4899	0.00	3.59
90-30-2	4840	0.00	4.86	90-30-2	4806	0.00	1.88	90-30-2	4796	0.00	2.17
90-30-3	4991	0.00	23.90	90-30-3	4978	0.00	23.70	90-30-3	4971	0.00	3.94
90-30-4	4694	0.00	2.52	90-30-4	4679	0.00	4.92	90-30-4	4675	0.00	0.69
90-30-5	4900	0.00	3.44	90-30-5	4887	0.00	2.48	90-30-5	4885	0.00	0.69

Table 6 Results of Medium-Size Uniform-Weight Instances in S_B with Granularity 60

ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU
90-30-1	4911.00	0.00	366.91	90-30-1	4896.20	0.00	33.61	90-30-1	4891.00	0.00	10.52
90-30-2	4816.20	0.00	41.46	90-30-2	4792.80	0.00	3.07	90-30-2	4785.00	0.00	4.71
90-30-3	4973.00	0.00	26.02	90-30-3	4962.80	0.00	3.28	90-30-3	4961.20	0.00	3.61
90-30-4	4682.40	0.00	14.78	90-30-4	4669.60	0.00	6.98	90-30-4	4666.40	0.00	1.82
90-30-5	4886.80	0.00	5.85	90-30-5	4878.00	0.00	4.17	90-30-5	4875.80	0.00	1.69

Table 7 Results of Medium-Size Uniform-Weight Instances in S_B with Granularity 30

ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap% ₀₀₀	CPU	Name	Cost	Gap% ₀₀₀	CPU	Name	Cost	Gap% ₀₀₀	CPU
90-30-1	4907.90	0.00	414.86	90-30-1	4892.60	0.00	34.34	90-30-1	4889.20	0.00	7.42
90-30-2	4810.50	0.00	123.32	90-30-2	4790.30	0.00	4.07	90-30-2	4782.90	0.00	5.39
90-30-3	4970.60	0.00	72.63	90-30-3	4960.50	0.00	3.44	90-30-3	4959.30	0.00	4.74
90-30-4	4678.40	0.00	10.49	90-30-4	4668.10	0.00	38.40	90-30-4	4664.10	0.00	1.73
90-30-5	4884.40	0.00	5.89	90-30-5	4875.70	0.00	4.39	90-30-5	4873.90	0.00	1.66

Table 8 Results of Medium-Size Uniform-Weight Instances in S_B with Granularity 15

ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap% ₀₀₀	CPU	Name	Cost	Gap% ₀₀₀	CPU	Name	Cost	Gap% ₀₀₀	CPU
90-30-1	4904.65	0.00	230.13	90-30-1	4890.90	0.00	55.55	90-30-1	4888.00	0.00	9.78
90-30-2	4805.95	0.00	12.37	90-30-2	4788.10	0.00	4.23	90-30-2	4781.20	0.00	4.59
90-30-3	4967.80	0.00	66.07	90-30-3	4958.55	0.00	4.39	90-30-3	4957.70	0.00	6.46
90-30-4	4677.05	0.00	12.91	90-30-4	4666.95	0.00	40.48	90-30-4	4662.95	0.00	15.50
90-30-5	4882.45	0.00	6.09	90-30-5	4874.55	0.00	4.09	90-30-5	4872.80	0.00	1.54

Table 9 Results of Medium-Size Uniform-Weight Instances in S_B with Granularity 5

ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap% ₀₀₀	CPU	Name	Cost	Gap% ₀₀₀	CPU	Name	Cost	Gap% ₀₀₀	CPU
90-30-1	4903.18	0.00	196.61	90-30-1	4889.90	0.00	110.06	90-30-1	4887.28	0.00	8.18
90-30-2	4804.40	0.00	30.49	90-30-2	4787.08	0.00	3.13	90-30-2	4780.33	0.00	6.50
90-30-3	4966.33	0.00	76.74	90-30-3	4957.42	0.00	3.94	90-30-3	4956.67	0.00	6.65
90-30-4	4675.62	0.00	17.04	90-30-4	4666.03	0.00	37.17	90-30-4	4662.25	0.00	1.81
90-30-5	4881.50	0.00	6.13	90-30-5	4873.57	0.00	4.18	90-30-5	4871.90	0.00	1.59

Table 10 Results of Medium-Size Uniform-Weight Instances in S_B with Granularity 1

ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap% ₀₀₀	CPU	Name	Cost	Gap% ₀₀₀	CPU	Name	Cost	Gap% ₀₀₀	CPU
90-30-1	4902.59	0.00	178.31	90-30-1	4889.46	0.00	74.12	90-30-1	4886.93	0.00	10.19
90-30-2	4803.78	0.00	34.45	90-30-2	4786.64	0.00	4.92	90-30-2	4780.06	0.00	4.37
90-30-3	4965.78	0.00	55.23	90-30-3	4956.97	0.00	4.16	90-30-3	4956.28	0.00	9.21
90-30-4	4675.14	0.00	15.25	90-30-4	4665.67	0.00	43.73	90-30-4	4662.03	0.00	1.71
90-30-5	4881.07	0.00	8.85	90-30-5	4873.20	0.00	5.70	90-30-5	4871.57	0.00	1.48

3.2 Results of Uniform-Weight Instances with 1-Second Time Granularity in S_B

Table 11 Summary of the Results for Instances with Uniform Weights and Granularity 1

ws-0.5				ws-0.6				ws-0.7			
Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU	Name	Cost	Gap‰	CPU
60-10-1	1032.67	0.00	0.30	60-10-1	1029.77	0.00	0.10	60-10-1	1029.00	0.00	0.05
60-10-2	1056.38	0.00	0.16	60-10-2	1048.56	0.00	0.04	60-10-2	1048.76	0.00	0.13
60-10-3	1066.86	0.00	0.15	60-10-3	1064.52	0.00	0.14	60-10-3	1063.25	0.00	0.07
60-10-4	1054.53	0.00	0.05	60-10-4	1049.02	0.00	0.09	60-10-4	1049.57	0.00	0.07
60-10-5	1054.13	0.00	0.09	60-10-5	1052.43	0.00	0.07	60-10-5	1050.58	0.00	0.07
60-20-1	2133.33	0.00	0.75	60-20-1	2129.83	0.00	0.20	60-20-1	2127.61	0.00	0.08
60-20-2	2114.16	0.00	0.50	60-20-2	2109.92	0.00	0.37	60-20-2	2106.94	0.00	0.34
60-20-3	2012.97	0.00	0.22	60-20-3	2014.14	0.00	0.47	60-20-3	2010.36	0.00	0.13
60-20-4	2006.85	0.00	0.25	60-20-4	2002.35	0.00	0.17	60-20-4	2000.57	0.00	0.18
60-20-5	2136.04	0.00	0.61	60-20-5	2128.89	0.00	0.24	60-20-5	2127.53	0.00	0.09
60-30-1	3094.13	0.00	1.08	60-30-1	3089.58	0.00	0.39	60-30-1	3085.21	0.00	0.81
60-30-2	3174.59	0.00	3.40	60-30-2	3168.24	0.00	8.28	60-30-2	3157.69	0.00	0.91
60-30-3	3160.79	0.00	2.55	60-30-3	3151.37	0.00	1.05	60-30-3	3148.10	0.00	0.59
60-30-4	3163.59	0.00	25	60-30-4	3144.28	0.00	1.82	60-30-4	3142.35	0.00	0.60
60-30-5	3176.07	0.00	3.30	60-30-5	3157.75	0.00	0.83	60-30-5	3153.47	0.00	0.36
90-10-1	1616.12	0.00	0.11	90-10-1	1616.97	0.00	0.16	90-10-1	1615.43	0.00	0.13
90-10-2	1661.55	0.00	0.18	90-10-2	1657.71	0.00	0.22	90-10-2	1654.32	0.00	0.07
90-10-3	1612.52	0.00	0.05	90-10-3	1608.18	0.00	0.05	90-10-3	1605.91	0.00	0.05
90-10-4	–	–	–	90-10-4	1632.11	0.00	0.07	90-10-4	1633.22	0.00	0.11
90-10-5	1626.50	0.00	0.10	90-10-5	1625.14	0.00	0.83	90-10-5	1624.14	0.00	0.08
90-20-1	3274.82	0.00	0.49	90-20-1	3269.88	0.00	0.62	90-20-1	3265.72	0.00	0.81
90-20-2	3294.67	0.00	29.79	90-20-2	3286.19	0.00	1.63	90-20-2	3281.67	0.00	0.32
90-20-3	3293.48	0.00	1.45	90-20-3	3288.52	0.00	0.43	90-20-3	3286.51	0.00	0.37
90-20-4	3291.29	0.00	1.39	90-20-4	3283.53	0.00	2.09	90-20-4	3281.33	0.00	9.70
90-20-5	3263.17	0.00	2.75	90-20-5	3248.24	0.00	0.92	90-20-5	3244.59	0.00	0.27
90-30-1	4902.59	0.00	178.31	90-30-1	4889.46	0.00	74.12	90-30-1	4886.93	0.00	10.19
90-30-2	4803.78	0.00	34.45	90-30-2	4786.64	0.00	4.92	90-30-2	4780.06	0.00	4.37
90-30-3	4965.78	0.00	55.23	90-30-3	4956.97	0.00	4.16	90-30-3	4956.28	0.00	9.21
90-30-4	4675.14	0.00	15.25	90-30-4	4665.67	0.00	43.73	90-30-4	4662.03	0.00	1.71
90-30-5	4881.07	0.00	8.85	90-30-5	4873.20	0.00	5.70	90-30-5	4871.57	0.00	1.48
120-10-1	2195.90	0.00	7.41	120-10-1	2193.25	0.00	2.40	120-10-1	2191.21	0.00	1.21
120-10-2	2200.70	0.00	0.33	120-10-2	2200.21	0.00	0.26	120-10-2	2198.78	0.00	0.07
120-10-3	–	–	–	120-10-3	2201.95	0.00	1	120-10-3	2198.88	0.00	0.14
120-10-4	2151.52	0.00	2.73	120-10-4	2148.67	0.00	0.73	120-10-4	2149.36	0.00	0.84
120-10-5	2234.86	0.00	0.59	120-10-5	2229.97	0.00	0.42	120-10-5	2228.95	0.00	0.29
120-20-1	4529.27	0.00	35.88	120-20-1	4524.85	0.00	5.07	120-20-1	4524.73	0.00	3.37
120-20-2	4496.84	0.00	26.38	120-20-2	4489.66	0.00	4.95	120-20-2	4482.61	0.00	0.95
120-20-3	4474.83	0.00	439.23	120-20-3	4458.51	0.00	24.89	120-20-3	4455.80	0.00	106.97
120-20-4	4385.61	0.00	151.39	120-20-4	4384.31	0.00	281.76	120-20-4	4380.75	0.00	33.62
120-20-5	4459.03	0.00	670.13	120-20-5	4438.32	0.00	32.54	120-20-5	4438.05	0.00	6.81
120-30-1	6662.35	2.90	3600.00(T)	120-30-1	6642.35	0.00	1126.31	120-30-1	6639.42	0.00	11.36
120-30-2	6715.91	0.00	1095.92	120-30-2	6708.66	0.00	290.97	120-30-2	6708.89	0.00	146.80
120-30-3	6628.26	0.00	859.14	120-30-3	6619.48	0.00	714.68	120-30-3	6616.98	0.00	665.11
120-30-4	6644.99	0.00	1894.08	120-30-4	6626.59	0.00	3172.35	120-30-4	6621.88	1.98	1058.18(M)
120-30-5	–	–	–	120-30-5	6553.91	0.00	93.50	120-30-5	6549.08	0.00	100.87