

1. Analysis on Uniform-Weight Instances

The following figure, comparing the computation times of the five algorithmic configurations conducted on the 14 most challenging uniform-weight instances in S_A .

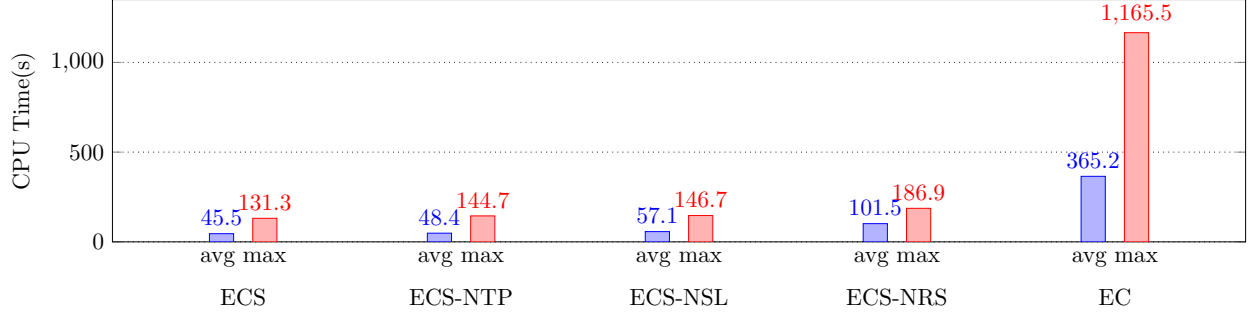


Figure 1 Computation Times of the Five Algorithm Configurations on the 14 Most Challenging Uniform-Weight Instances

The following table, comparing the number of tours enumerated for EC and ECS conducted on the 14 most challenging uniform-weight instances in S_A).

Table 1 Number of Tours Comparison between EC and ECS on 14 Uniform-Weight Instances

Name	EC						ECS					
	Cost	$ \mathcal{U}^1 $	$ \mathcal{U}^2 $	$ \mathcal{U}^3 $	$ \mathcal{U}^4 $	CPU	Cost	$ \mathcal{U}^1 $	$ \mathcal{U}^2 $	$ \mathcal{U}^3 $	$ \mathcal{U}^4 $	CPU
120-30-0.5-1	6695	8781	6018181	191071	143970	238.1	6695	5473	1090419	198302	139219	119.3
120-30-0.5-2	6747	13072	13361355	149785	104041	378.8	6747	7038	925997	60165	35868	45.9
120-30-0.5-3	6652	14059	6286077	24913	21870	197.5	6652	9314	871067	28071	22936	14.4
120-30-0.5-4	6679	18074	11214317	14332	10316	446.6	6679	8340	619692	23714	13766	27.1
120-30-0.6-1	6662	12901	9229395	225592	143967	310.4	6662	7242	1028148	107258	70282	52.1
120-30-0.6-2	6732	13267	11460121	25112	15126	257.7	6732	6590	182479	11689	11130	10.3
120-30-0.6-3	6635	16161	8410789	305221	161873	273.8	6635	10533	806259	82834	47287	42.3
120-30-0.6-4	6648	23045	12894824	34065	27379	575.0	6648	12584	680064	22271	17787	32.5
120-30-0.6-5	6578	14441	10848580	127442	103043	331.8	6578	7763	463945	88998	61995	32.6
120-30-0.7-1	6656	13622	8505618	309164	258747	330.2	6656	7407	900658	92716	76690	41.1
120-30-0.7-2	6726	13750	12270599	223344	121611	316.7	6726	4422	662981	103924	66566	28.1
120-30-0.7-3	6633	13179	0	0	0	4.0	6633	5995	0	0	0	3.2
120-30-0.7-4	6639	18594	14684908	1370042	779443	1165.5	6639	9827	1461558	327383	269120	131.3
120-30-0.7-5	6565	16115	11617300	86051	65488	345.0	6565	7441	433512	68584	35897	17.1

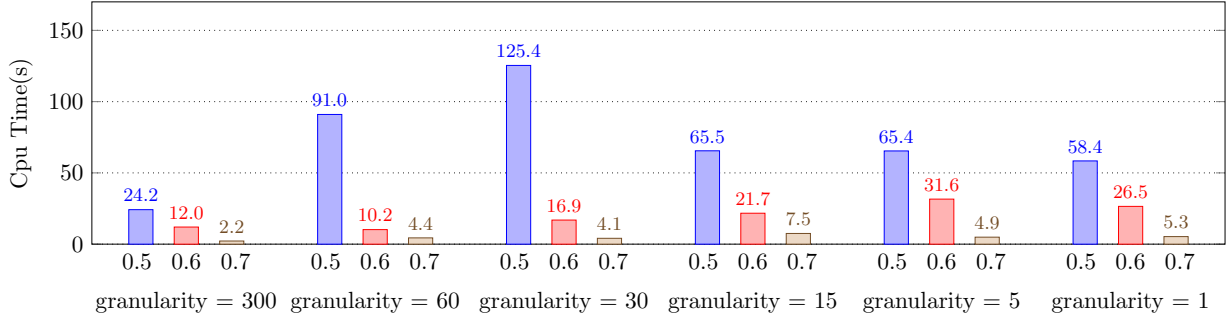
The following table, containing the summarized results for the uniform-weight instances in S_A :

Table 2 Summary of the Results for Uniform-Weight Instances in S_A

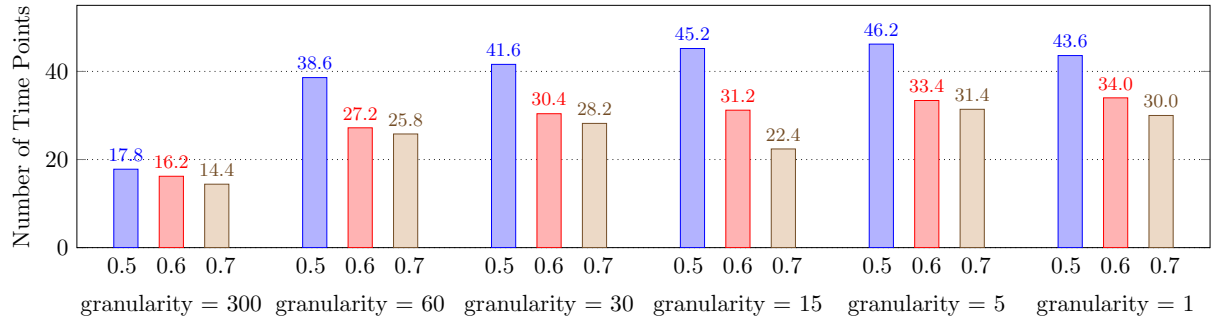
Name	Inst	Switch	<i>Step 1</i>			<i>Step 2</i>	<i>Step 3</i>			<i>Step 4</i>		CPU
			LB% _{oo}	$ \mathcal{T}^1 $	$ \mathcal{U}^1 $		$ \mathcal{U}^2 $	$ \mathcal{U}^3 $	$ \mathcal{U}^4 $	$ \hat{\mathcal{T}} $	$ \hat{\mathcal{U}} $	
60-10-0.5	5	0	4.8	5.8	130.6	0.0	85.2	39.4	29.0	0.0	0.0	0.1
60-10-0.6	5	0	3.1	5.2	131.0	0.0	63.6	31.4	25.4	0.0	0.0	0.1
60-10-0.7	5	0	6.2	4.0	100.0	0.0	91.6	54.6	40.6	0.0	0.0	0.1
60-20-0.5	5	0	2.1	8.0	328.8	0.0	250.0	81.6	60.0	0.0	0.0	0.2
60-20-0.6	5	1	2.3	7.6	688.4	0.0	1053.8	142.0	73.6	0.0	0.0	0.3
60-20-0.7	5	0	0.4	7.0	400.0	0.0	92.4	39.2	36.2	0.0	0.0	0.1
60-30-0.5	2	0	4.1	12.5	683.5	0.0	2070.0	517.0	422.5	0.0	0.0	0.6
60-30-0.6	5	0	3.0	12.0	832.2	0.0	2172.4	557.4	460.8	0.0	0.0	0.7
60-30-0.7	5	0	2.0	10.6	881.6	0.0	1853.6	486.0	407.2	0.0	0.0	0.5
90-10-0.5	4	0	6.2	8.0	270.3	0.0	279.3	118.8	98.3	0.0	0.0	0.1
90-10-0.6	5	0	4.0	6.6	259.6	0.0	219.4	105.2	72.4	0.0	0.0	0.1
90-10-0.7	5	0	3.8	5.4	258.2	0.0	315.6	139.4	98.8	0.0	0.0	0.1
90-20-0.5	4	0	2.9	13.0	1063.3	0.0	3868.8	511.0	401.3	0.0	0.0	0.6
90-20-0.6	5	0	2.1	11.8	999.2	0.0	3677.6	714.6	592.8	0.0	0.0	0.5
90-20-0.7	5	1	0.9	9.8	1750.0	0.6	18396.0	1413.4	994.4	0.4	7.2	0.7
90-30-0.5	5	2	4.8	17.4	4984.2	0.0	325016.0	15450.4	11397.2	0.0	0.0	17.4
90-30-0.6	5	1	2.4	15.4	3918.4	0.0	144270.6	9415.4	7499.6	0.0	0.0	5.2
90-30-0.7	5	0	0.9	14.4	2756.6	0.0	17331.6	3083.6	2823.2	0.0	0.0	1.7
120-10-0.5	4	1	12.8	12.0	1268.0	0.0	14553.5	4681.8	3850.8	0.0	0.0	1.6
120-10-0.6	5	0	7.2	9.0	646.8	0.0	5952.6	2503.4	2109.6	0.0	0.0	0.5
120-10-0.7	5	0	5.5	7.2	642.0	0.0	4274.2	2376.8	1494.2	0.0	0.0	0.3
120-20-0.5	4	1	9.6	17.8	3788.3	1.1	301130.0	26839.8	20790.8	0.0	0.0	16.9
120-20-0.6	5	0	2.5	14.4	2825.2	0.5	54099.0	13221.2	10006.0	0.0	0.0	3.6
120-20-0.7	5	0	3.0	12.2	2349.8	0.0	68545.2	16788.8	14045.0	0.0	0.0	3.6
120-30-0.5	4	0	3.7	21.3	7541.3	0.0	876793.8	77563.0	52947.3	0.0	0.0	58.5
120-30-0.6	5	0	1.6	19.6	8942.4	0.0	632179.0	62610.0	41696.2	0.0	0.0	34.0
120-30-0.7	5	0	1.6	18.6	7018.4	0.0	691741.8	118521.4	89654.6	0.0	0.0	44.2

1.1 Results for the WTFRP on Uniform-Weight Instances with Various Granularities in S_B

The following figures using uniform-weight instances with various time granularities :



(a) Average Computation Time



(b) Average Number of Discovered Time-Points

Figure 2 The Computation Time and Discovered Time-Points of the Obtained Solutions for Uniform-Weight Instances with Different Time Granularities

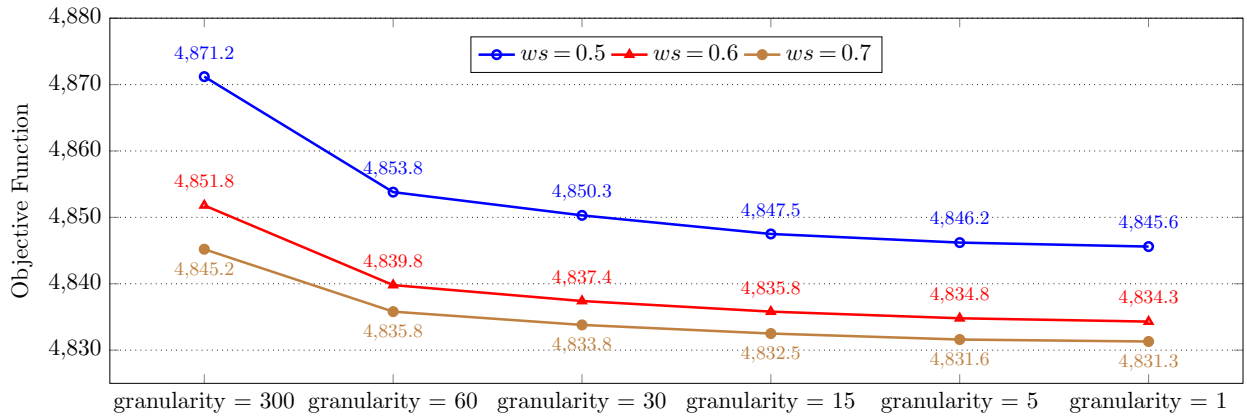


Figure 3 The Average Optimal Objective Value (in 5 Minutes) for Uniform-Weight Instances with Different Granularities

1.2 Summary of the Results for the Uniform-Weight Instances with 1-Second Granularity in S_B

Table 3 Summary of the Results for the WTFRP on Uniform-Weight Instances with 1-Second Granularity in S_B

Name	Inst	Switch	Step 1			Step 2		Step 3			Step 4		CPU
			LB% ₀₀	$ \mathcal{T}^1 $	$ \mathcal{U}^1 $	UB% ₀₀		$ \mathcal{U}^2 $	$ \mathcal{U}^3 $	$ \mathcal{U}^4 $	$ \hat{\mathcal{T}} $	$ \hat{\mathcal{U}} $	
60-10-0.5	5	0	8.44	8.0	170.6	0.00		99.0	50.2	48.0	0.2	0.2	0.1
60-10-0.6	5	0	2.62	5.4	151.0	0.00		102.2	45.4	38.2	0.0	0.0	0.1
60-10-0.7	5	0	1.83	5.2	145.6	0.00		65.6	26.8	22.2	0.0	0.0	0.1
60-20-0.5	5	0	2.11	15.8	526.0	0.27		597.8	153.6	137.2	2.0	4.8	0.5
60-20-0.6	5	0	1.75	13.4	459.8	0.00		434.4	123.0	109.4	0.0	0.0	0.3
60-20-0.7	5	0	1.09	10.2	436.4	0.00		284.6	89.8	76.4	0.0	0.0	0.2
60-30-0.5	5	1	2.82	40.6	1768.6	0.98		15790.4	1814.4	1557.4	0.8	4.4	7.1
60-30-0.6	5	0	2.54	26.8	1077.8	0.12		4760.8	1112.0	944.0	0.8	5.8	2.5
60-30-0.7	5	0	0.62	20.8	1151.2	0.00		3405.4	358.2	324.6	0.0	0.0	0.7
90-10-0.5	4	0	2.14	11.8	363.0	0.00		282.0	71.0	64.5	0.0	0.0	0.1
90-10-0.6	5	0	3.31	10.4	332.0	0.22		408.0	157.4	146.2	0.0	0.0	0.3
90-10-0.7	5	0	3.08	6.8	306.2	0.00		450.0	213.2	187.8	0.0	0.0	0.1
90-20-0.5	5	1	2.56	30.8	2346.2	0.00		33250.2	2525.8	2034.2	1.6	57.0	7.2
90-20-0.6	5	0	1.29	23.6	1432.0	0.00		11593.8	1388.2	1126.6	0.2	0.0	1.1
90-20-0.7	5	1	0.33	20.6	1201.4	0.00		36452.6	802.2	664.4	0.0	0.0	2.3
90-30-0.5	5	3	1.96	43.6	7511.4	0.06		1259350.2	13091.2	10716.6	0.0	0.0	58.4
90-30-0.6	5	1	0.97	33.6	5037.6	0.00		414706.0	14431.8	10271.8	0.4	0.0	26.5
90-30-0.7	5	0	0.49	30.0	4541.2	0.00		39481.4	5026.4	4473.0	0.0	0.0	5.4
120-10-0.5	4	0	9.48	15.5	940.8	0.05		10381.5	5310.3	4689.0	0.3	41.0	2.8
120-10-0.6	5	0	5.56	10.8	879.4	0.02		7867.0	3597.0	3136.4	0.0	0.0	1.0
120-10-0.7	5	0	4.05	8.4	832.6	0.00		5444.6	2900.6	2705.6	0.0	0.0	0.5
120-20-0.5	5	2	5.77	45.6	5575.8	0.90		1054988.6	104319.8	72926.0	0.6	324.4	264.6
120-20-0.6	5	2	1.75	26.0	5921.0	0.02		878396.6	62244.8	55157.4	0.2	986.6	69.8
120-20-0.7	5	0	2.39	20.8	3571.2	0.02		193304.0	56078.6	50040.8	0.0	0.0	30.3
120-30-0.5	4(1)	3	1.83	59.5	10423.8	0.39		10663528.0	230059.8	210788.5	0.0	0.0	1862.3
120-30-0.6	5	2	0.66	45.2	8965.0	0.04		5125192.6	100056.0	94613.2	0.4	29.8	1079.6
120-30-0.7	5(1)	0	0.75	41.6	7631.2	0.06		1946668.4	103450.2	100091.4	0.0	0.0	396.5