Appendix: Detailed computational results

All algorithms have been implemented in C++ and compiled with GCC 4.9.2, using OGDF and the dtree library for data structures. CPLEX 12.6 was used as MIP-solver with an imposed memory limit of 12GB RAM.

All experiments have been performed on a cluster of computers with the same performance, where a typical machine has 20 cores, 64GB RAM and runs at 2.5 GHz. A run of the DIMACS benchmark program measured 360.070111 trees/second. Reported computing times are in wall-clock seconds. To limit the overall time needed to complete our experiments, we decided to allow up to five simultaneous 4-core runs on the same computer, which however implies a significant slowdown due to shared memory.

1 Detailed exact results

Difficult instances have been identified by running B&C with a time limit of one hour. No sophisticated initialization heuristics (local branching, set-covering heuristic) have been used in these runs. All parameter settings have been selected dynamically by the proposed filter procedure. The specific settings are listed within the caption of each table. For each table the column 'Time' contains the time in seconds when the best feasible solution has been found. The column 'Time-t' contains the total time spent in seconds. Instances that could not be solved due to the time limit are marked with 'timeout', while those which could not be solved due to the memory limit are marked with 'memout'.

1.0.1 Exact results for the STP

Table 1: STP Copenhagen instances. Results computed by B&C using the (x, y)-model (starting solution generated by the partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
ind1	18	31	10	604	604	0.00	0	0.03	0.03
ind2	31	57	10	9500	9500	0.00	0	0.07	0.07
ind3	16	23	10	600	600	0.00	0	0.02	0.05
ind4	74	146	25	1086	1086	0.00	0	0.05	0.05
ind5	114	228	33	1341	1341	0.00	0	0.10	0.10
rc01	21	35	10	25980	25980	0.00	0	0.06	0.06
rc02	87	176	30	41350	41350	0.00	0	0.04	0.04
rc03	109	202	50	54160	54160	0.00	0	0.05	0.05
rc04	121	197	70	59070	59070	0.00	0	0.06	0.07
rc05	247	486	100	74070	74070	0.00	0	0.13	0.13
rc06	2502	6244	100	79714	79714	0.00	0	28.73	31.71
rc07	2740	6578	200	108740	108740	0.00	32	32.88	36.73
rc08	7527	18170	200	112564	112564	0.00	3	2048.48	2068.02
rc09	6128	15264	200	111005	111005	0.00	0	805.63	805.76
rc10	1572	3245	500	164150	164150	0.00	0	2.77	2.78
rc11	2858	5819	1000	230837	230837	0.00	11	82.95	83.29
rt01	262	740	10	2146	2146	0.00	0	0.32	0.32
rt02	788	1938	50	45852	45852	0.00	0	0.95	0.96
rt03	1725	4092	100	7964	7964	0.00	3	9.62	14.63
rt04	9469	22743	100	9693	9693	0.00	0	2397.46	2680.75
rt05	15473	38928	200	50831	51607	1.53	0	72.27	timeout

Table 2: STP PUC instances. Results computed by B&C using the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
bip42p	1200	3982	200	24617	24665	0.19	130623	103.89	timeout
bip42u	1200	3982	200	236	236	0.00	1603599	465.54	1038.01
bip52p	2200	7997	200	24283	24826	2.24	43906	771.38	timeout
bip52u	2200	7997	200	231	234	1.30	3212907	5.65	timeout
bip62p	1200	10002	200	22547	23082	2.37	21483	2349.91	timeout
bip62u	1200	10002	200	216	220	1.85	4250745	3.65	timeout
bipa2p	3300	18073	300	34721	36071	3.89	5718	408.76	timeout
bipa2u	3300	18073	300	331	338	2.11	956672	3301.33	timeout
bipe2p	550	5013	50	5616	5616	0.00	4333	59.07	76.04
bipe2u	550	5013	50	54	54	0.00	123	0.11	0.47
cc10-2p	1024	5120	135	34458	35756	3.77	3607	181.48	timeout
cc10-2u	1024	5120	135	335	345	2.99	10501	2401.75	timeout
cc11-2p	2048	11263	244	62019	64876	4.61	1348	3152.20	timeout
cc11-2u	2048	11263	244	602	621	3.16	2758	94.35	timeout
cc12-2p	4096	24574	473	118433	123517	4.29	21	1506.97	timeout
cc12-2u	4096	24574	473	1149	1189	3.48	91	508.71	timeout
cc3-10p	1000	13500	50	12645	13090	3.52	4242	1665.55	timeout
cc3-10u	1000	13500	50	117	126	7.69	32515	223.27	timeout
cc3-11p	1331	19965	61	15414	15975	3.64	844	29.65	timeout
cc3-11u	1331	19965	61	143	155	8.39	82	0.70	timeout
cc3-12p	1728	28512	74	18665	19228	3.02	1480	3542.87	timeout
cc3-12u	1728	28512	74	173	186	7.51	8041	1071.83	timeout
cc3-4p	64	288	8	2338	2338	0.00	45113	0.98	43.93
cc3-4u	64	288	8	23	23	0.00	4224	0.01	7.39
cc3-5p	125	750	13	3489	3661	4.93	164242	957.15	timeout
cc3-5u	125	750	13	34	36	5.88	165014	0.01	timeout
cc5-3p	243	1215	27	7223	7303	1.11	217015	557.48	timeout
cc5-3u	243	1215	27	71	71	0.00	220216	0.59	1940.34
cc6-2p	64	192	12	3271	3271	0.00	694	2.57	13.79
cc6-2u	64	192	12	32	32	0.00	108	0.01	17.00
cc6-3p	729	4368	76	20178	20557	1.88	28926	3396.08	timeout
cc6-3u	729	4368	76	197	197	0.00	10814	371.05	389.92
cc7-3p	2187	15308	222	55264	58151	5.22	412	370.08	timeout
cc7-3u	2187	15308	222	536	556	3.73	927	834.40	timeout
cc9-2p	512	2304	64	16869	17345	2.82	54096	3480.44	timeout
cc9-2u	512	2304	64	164	169	3.05	114357	2.20	timeout
hc6p	64	192	32	4003	4003	0.00	4004	0.32	2.08
hc6u	64	192	32	39	39	0.00	1142	0.05	0.19
hc7p	128	448	64	7828	7908	1.02	159104	0.42	timeout
hc7u	128	448	64	77	77	0.00	816615	0.06	1371.72
hc8p	256	1024	128	15204	15336	0.87	367331	1276.80	timeout
hc8u	256	1024	128	145	148	2.07	357664	0.78	timeout
hc9p	512	2304	256	29942	30339	1.33	46453	535.61	timeout
hc9u	512	2304	256	287	292	1.74	139179	6.04	timeout
hc10p	1024	5120	512	59256	61029	2.99	5638	340.94	timeout
hc10u	1024	5120	512	564	575	1.95	745739	3417.76	timeout
hc11p	2048	11264	1024	117395	121929	3.86	278	456.71	timeout
hc11u	2048	11264	1024	1122	1158	3.21	50316	3529.77	timeout
hc12p	4096	24576	2048	232899	240529	3.28	0	2841.91	timeout
hc12u	4096	24576	2048	2218	2305	3.92	8416	209.49	timeout

Table 3: STP I640 instances. Results computed by B&C using the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
i640-001	640	960	9	4033	4033	0.00	0	0.17	0.17
i640-002	640	960	9	3588	3588	0.00	0	0.03	0.19
i640-003	640	960	9	3438	3438	0.00	0	0.16	0.16
i640-004	640	960	9	4000	4000	0.00	0	0.21	0.21
i640-005	640	960	9	4006	4006	0.00	0	0.19	0.19
i640-011	640	4135	9	2392	2392	0.00	0	0.63	0.64
i640-012	640	4135	9	2465	2465	0.00	14	4.19	6.11
i640-013	640	4135	9	2399	2399	0.00	0	2.89	3.98
i640-014	640	4135	9	2171	2171	0.00	0	0.53	0.53
i640-015	640	4135	9	2347	2347	0.00	14	1.21	2.64
i640-021	640	204480	9	1749	1749	0.00	0	95.43	95.68
i640-022	640	204480	9	1756	1756	0.00	0	92.54	92.82
i640-023	640	204480	9	1754	1754	0.00	0	104.91	105.17
i640-024	640	204480	9	1751	1751	0.00	0	97.40	97.68
i640-025	640	204480	9	1745	1745	0.00	0	104.45	104.70
i640-031	640	1280	9	3278	3278	0.00	0	0.18	0.18
i640-032	640	1280	9	3187	3187	0.00	0	0.21	0.21
i640-033	640	1280	9	3260	3260	0.00	0	0.56	0.56
i640-034	640	1280	9	2953	2953	0.00	0	0.02	0.17
i640-035	640	1280	9	3292	3292	0.00	0	0.26	0.26
i640-041	640	40896	9	1897	1897	0.00	0	13.21	13.26
i640-042	640	40896	9	1934	1934	0.00	283	130.57	132.00
i640-043	640	40896	9	1931	1931	0.00	120	59.23	63.44
i640-044	640	40896	9	1938	1938	0.00	101	63.46	71.97
i640-045	640	40896	9	1866	1866	0.00	0	10.63	10.68
i640-101	640	960	25	8764	8764	0.00	0	0.64	0.64
i640-102	640	960	25	9109	9109	0.00	0	0.21	0.21
i640-103	640	960	25	8819	8819	0.00	0	0.18	0.18
i640-104	640	960	25	9040	9040	0.00	0	0.26	0.27
i640-105	640	960	25	9623	9623	0.00	0	1.64	1.65
i640-111	640	4135	25	6167	6167	0.00	251	2.24	23.61
i640-112	640	4135	25	6304	6304	0.00	169	28.65	35.32
i640-113	640	4135	25	6249	6249	0.00	877	97.38	109.35
i640-114	640	4135	25	6308	6308	0.00	267	44.72	52.90
i640-115	640	4135	25	6217	6217	0.00	702	70.80	85.53
i640-121	640	204480	25	4906	4906	0.00	0	207.51	207.76
i640-122	640	204480	25	4911	4911	0.00	0	9.34	183.03
i640-123	640	204480	25	4913	4913	0.00	0	199.73	200.03
i640-124	640	204480	25	4906	4906	0.00	0	193.24	193.51
i640-125	640	204480	25	4920	4920	0.00	0	258.74	259.01
i640-131	640	1280	25	8097	8097	0.00	0	0.80	1.11
i640-132	640	1280	25	8154	8154	0.00	0	0.92	3.12
i640-133	640	1280	25	8021	8021	0.00	0	0.36	0.36
i640-134	640	1280	25	7754	7754	0.00	0	0.52	0.53
i640-135	640	1280	25	7696	7696	0.00	0	0.03	0.53
i640-141	640	40896	25	5199	5199	0.00	816	357.90	791.55
i640-142	640	40896	25	5193	5193	0.00	459	471.45	1177.15
i640-143	640	40896	25	5194	5194	0.00	254	162.74	574.92
i640-144	640	40896	25	5205	5205	0.00	441	145.84	540.48
i640-145	640	40896	25	5218	5218	0.00	488	260.41	1205.79

Table 4: STP I640 instances. Results computed by B&C using the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
i640-201	640	960	50	16079	16079	0.00	0	0.24	0.24
i640-202	640	960	50	16324	16324	0.00	0	0.23	0.23
i640-203	640	960	50	16124	16124	0.00	0	0.24	0.24
i640-204	640	960	50	16239	16239	0.00	0	0.23	0.23
i640-205	640	960	50	16616	16616	0.00	0	0.34	0.34
i640-211	640	4135	50	11984	11984	0.00	33750	2619.02	2729.87
i640-212	640	4135	50	11795	11795	0.00	2271	166.13	225.07
i640-213	640	4135	50	11879	11879	0.00	6433	892.80	896.73
i640-214	640	4135	50	11898	11898	0.00	15319	1776.21	1826.15
i640-215	640	4135	50	12081	12081	0.00	7804	448.32	686.17
i640-221	640	204480	50	9812	9832	0.20	11	1762.27	timeout
i640-222	640	204480	50	9798	9798	0.00	49	7.84	1464.55
i640-223	640	204480	50	9811	9811	0.00	99	1951.00	2012.53
i640-224	640	204480	50	9805	9805	0.00	166	1773.71	1905.50
i640-225	640	204480	50	9807	9807	0.00	97	1530.97	1532.01
i640-231	640	1280	50	15014	15014	0.00	19	1.79	8.06
i640-232	640	1280	50	14630	14630	0.00	0	1.41	3.28
i640-233	640	1280	50	14797	14797	0.00	0	0.60	5.59
i640-234	640	1280	50	15203	15203	0.00	0	1.28	1.28
i640-235	640	1280	50	14803	14803	0.00	76	63.77	66.21
i640-241	640	40896	50	10162	10244	0.81	762	1180.30	timeout
i640-242	640	40896	50	10132	10195	0.62	54	899.74	timeout
i640-243	640	40896	50	10154	10243	0.88	87	627.45	timeout
i640-244	640	40896	50	10156	10301	1.43	54	1750.57	timeout
i640-245	640	40896	50	10154	10257	1.01	42	250.13	timeout
i640-301	640	960	160	45005	45005	0.00	0	0.39	0.39
i640-302	640	960	160	45736	45736	0.00	0	0.89	0.89
i640-303	640	960	160	44922	44922	0.00	0	0.21	0.21
i640-304	640	960	160	46233	46233	0.00	249	4.51	4.61
i640-305	640	960	160	45902	45902	0.00	0	0.56	0.85
i640-311	640	4135	160	35404	36087	1.93	45343	3092.71	timeout
i640-312	640	4135	160	35411	36033	1.76	43399	3471.48	timeout
i640-313	640	4135	160	35394	35594	0.57	38706	215.95	timeout
i640-314	640	4135	160	35226	35620	1.12	50388	3349.13	timeout
i640-315	640	4135	160	35424	35944	1.47	51786	3554.01	timeout
i640-321	640	204480	160	31009	31109	0.32	0	1654.58	timeout
i640-322	640	204480	160	31004	31077	0.24	6	1585.11	timeout
i640-323	640	204480	160	31017	31080	0.20	1	3039.77	timeout
i640-324	640	204480	160	31019	31104	0.27	0	1435.67	timeout
i640-325	640	204480	160	31006	31092	0.28	1	2892.04	timeout
i640-331	640	1280	160	42796	42796	0.00	69	17.36	17.54
i640-332	640	1280	160	42548	42548	0.00	43	24.67	24.75
i640-333	640	1280	160	42345	42345	0.00	48	44.81	50.31
i640-334	640	1280	160	42768	42768	0.00	412	15.95	17.54
i640-335	640	1280	160	43035	43035	0.00	170	30.60	30.81
i640-341	640	40896	160	31871	32152	0.88	71	233.05	timeout
i640-342	640	40896	160	31824	32004	0.57	79	103.76	timeout
i640-343	640	40896	160	31832	32114	0.89	103	165.72	timeout
i640-344	640	40896	160	31834	32090	0.80	38	364.16	timeout
i640-345	640	40896	160	31825	32074	0.78	79	341.26	timeout

Table 5: STP PUCN instances (uniform version of the PUC CC dataset). Results computed by B&C using the y-model

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
cc10-2n	1024	5120	135	176	182	3.41	415124	836.33	memout
cc11-2n	2048	11263	244	317	331	4.42	384505	69.83	memout
cc12-2n	4096	24574	473	601	626	4.16	303654	1053.61	memout
cc3-10n	1000	13500	50	68	75	10.29	225143	0.64	timeout
cc3-11n	1331	19965	61	82	92	12.20	239176	0.42	memout
cc3-12n	1728	28512	74	100	111	11.00	234201	1.54	timeout
cc3-4n	64	288	8	13	13	0.00	6	0.00	0.07
cc3-5n	125	750	13	20	20	0.00	1220	0.02	0.28
cc5-3n	243	1215	27	42	42	0.00	356685	170.52	263.81
cc6-2n	64	192	12	18	18	0.00	16	0.01	0.09
cc6-3n	729	4368	76	100	100	0.00	1467	1.49	1.52
cc7-3n	2187	15308	222	280	293	4.64	473360	187.31	memout
cc9-2n	512	2304	64	94	100	6.38	1302110	1.65	timeout

Table 6: STP B and C instances (random graphs). Results computed by B&C on the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
b01	50	63	9	82	82	0.00	0	0.02	0.05
b02	50	63	13	83	83	0.00	0	0.07	0.09
b03	50	63	25	138	138	0.00	0	0.06	0.09
b04	50	100	9	59	59	0.00	0	0.04	0.08
b05	50	100	13	61	61	0.00	0	0.04	0.08
b06	50	100	25	122	122	0.00	0	0.07	0.07
b07	75	94	13	111	111	0.00	0	0.00	0.04
b08	75	94	19	104	104	0.00	0	0.01	0.04
b09	75	94	38	220	220	0.00	0	0.01	0.04
b10	75	150	13	86	86	0.00	0	0.06	0.06
b11	75	150	19	88	88	0.00	0	0.06	0.06
b12	75	150	38	174	174	0.00	0	0.04	0.08
b13	100	125	17	165	165	0.00	0	0.08	0.08
b14	100	125	25	235	235	0.00	0	0.03	0.07
b15	100	125	50	318	318	0.00	0	0.02	0.07
b16	100	200	17	127	127	0.00	0	0.03	0.07
b17	100	200	25	131	131	0.00	0	0.02	0.05
b18	100	200	50	218	218	0.00	0	0.06	0.07
c01	500	625	5	85	85	0.00	0	0.01	0.12
c02	500	625	10	144	144	0.00	0	0.01	0.11
c03	500	625	83	754	754	0.00	0	0.19	0.19
c04	500	625	125	1079	1079	0.00	0	0.20	0.20
c05	500	625	250	1579	1579	0.00	0	0.14	0.14
c06	500	1000	5	55	55	0.00	0	0.02	0.16
c07	500	1000	10	102	102	0.00	0	0.02	0.14
c08	500	1000	83	509	509	0.00	0	0.20	0.20
c09	500	1000	125	707	707	0.00	0	0.17	0.17
c10	500	1000	250	1093	1093	0.00	0	0.25	0.26
c11	500	2500	5	32	32	0.00	0	0.42	0.43
c12	500	2500	10	46	46	0.00	0	0.10	0.26
c13	500	2500	83	258	258	0.00	0	0.64	1.24
c14	500	2500	125	323	323	0.00	0	0.38	0.38
c15	500	2500	250	556	556	0.00	0	0.45	0.58
c16	500	12500	5	11	11	0.00	0	0.55	0.55
c17	500	12500	10	18	18	0.00	0	0.18	0.42
c18	500	12500	83	113	113	0.00	0	0.27	1.08
c19	500	12500	125	146	146	0.00	0	0.42	0.43
c20	500	12500	250	267	267	0.00	0	0.52	0.66

Table 7: STP D and E instances (random graphs). Results computed by B&C on the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
d01	1000	1250	5	106	106	0.00	0	0.37	0.38
d02	1000	1250	10	220	220	0.00	0	0.06	0.22
d03	1000	1250	167	1565	1565	0.00	0	0.09	0.23
d04	1000	1250	250	1935	1935	0.00	0	0.34	0.35
d05	1000	1250	500	3250	3250	0.00	0	0.22	0.23
d06	1000	2000	5	67	67	0.00	0	0.55	0.59
d07	1000	2000	10	103	103	0.00	0	0.01	0.26
d08	1000	2000	167	1072	1072	0.00	0	0.84	1.14
d09	1000	2000	250	1448	1448	0.00	0	0.59	0.60
d10	1000	2000	500	2110	2110	0.00	0	0.57	0.58
d11	1000	5000	5	29	29	0.00	0	0.92	1.01
d12	1000	5000	10	42	42	0.00	0	0.02	0.38
d13	1000	5000	167	500	500	0.00	0	1.97	1.98
d14	1000	5000	250	667	667	0.00	0	3.58	3.60
d15	1000	5000	500	1116	1116	0.00	0	2.96	3.20
d16	1000	25000	5	13	13	0.00	0	0.43	1.18
d17	1000	25000	10	23	23	0.00	0	0.61	2.01
d18	1000	25000	167	223	223	0.00	0	2.80	3.05
d19	1000	25000	250	310	310	0.00	0	3.70	3.72
d20	1000	25000	500	537	537	0.00	0	2.83	3.09
e01	2500	3125	5	111	111	0.00	0	0.72	0.82
e02	2500	3125	10	214	214	0.00	0	0.55	0.56
e03	2500	3125	417	4013	4013	0.00	0	1.56	1.57
e04	2500	3125	625	5101	5101	0.00	0	0.58	0.59
e05	2500	3125	1250	8128	8128	0.00	0	1.40	1.40
e06	2500	5000	5	73	73	0.00	0	0.35	0.86
e07	2500	5000	10	145	145	0.00	0	1.38	1.40
e08	2500	5000	417	2640	2640	0.00	0	1.12	1.13
e09	2500	5000	625	3604	3604	0.00	0	1.10	1.12
e10	2500	5000	1250	5600	5600	0.00	0	1.10	1.11
e11	2500	12500	5	34	34	0.00	0	0.87	2.31
e12	2500	12500	10	67	67	0.00	0	3.14	3.44
e13	2500	12500	417	1280	1280	0.00	0	9.89	9.92
e14	2500	12500	625	1732	1732	0.00	0	23.54	24.60
e15	2500	12500	1250	2784	2784	0.00	0	15.40	16.16
e16	2500	62500	5	15	15	0.00	0	7.97	8.05
e17	2500	62500	10	25	25	0.00	0	8.40	8.47
e18	2500	62500	417	564	564	0.00	79	109.97	110.07
e19	2500	62500	625	758	758	0.00	0	33.88	36.97
e20	2500	62500	1250	1342	1342	0.00	0	35.88	36.60

Table 8: STP ALUE and ALUT instances. Results computed by B&C on the (x, y)-model (starting solution generated by partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
alue2087	1244	1971	34	1049	1049	0.00	0	1.72	1.73
alue2105	1220	1858	34	1032	1032	0.00	0	0.11	0.59
alue3146	3626	5869	64	2240	2240	0.00	0	17.65	28.71
alue5067	3524	5560	68	2586	2586	0.00	0	22.77	29.18
alue5345	5179	8165	68	3507	3507	0.00	0	486.59	486.63
alue5623	4472	6938	68	3413	3413	0.00	22	136.37	284.59
alue5901	11543	18429	68	3912	3912	0.00	0	976.67	976.70
alue6179	3372	5213	67	2452	2452	0.00	3	25.81	29.24
alue6457	3932	6137	68	3057	3057	0.00	0	61.46	81.95
alue6735	4119	6696	68	2696	2696	0.00	0	37.39	37.41
alue6951	2818	4419	67	2386	2386	0.00	0	17.71	19.01
alue7065	34046	54841	544	23282	24041	3.26	0	86.92	timeout
alue7066	6405	10454	16	2250	2275	1.11	0	0.53	timeout
alue7080	34479	55494	2344	61335	62717	2.25	0	159.66	timeout
alue7229	940	1474	34	824	824	0.00	0	0.04	0.97
alut0787	1160	2089	34	982	982	0.00	0	2.58	3.90
alut0805	966	1666	34	958	958	0.00	0	0.68	3.65
alut1181	3041	5693	64	2353	2353	0.00	0	104.40	236.80
alut2010	6104	11011	68	3307	3307	0.00	0	374.24	374.29
alut2288	9070	16595	68	3843	3843	0.00	0	2612.18	2703.96
alut2566	5021	9055	68	3073	3073	0.00	0	426.87	568.35
alut2610	33901	62816	204	11793	12376	4.94	0	83.85	timeout
alut2625	36711	68117	879	34171	35698	4.47	0	201.82	timeout
alut2764	387	626	34	640	640	0.00	0	0.05	0.24

Table 9: STP DIW instances. Results computed by B&C on the (x, y)-model (starting solution generated by partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
diw0234	5349	10086	25	1996	1996	0.00	0	122.72	195.82
diw0250	353	608	11	350	350	0.00	0	0.03	0.12
diw0260	539	985	12	468	468	0.00	0	0.04	0.42
diw0313	468	822	14	397	397	0.00	0	0.03	0.15
diw0393	212	381	11	302	302	0.00	0	0.02	0.08
diw0445	1804	3311	33	1363	1363	0.00	0	0.17	20.19
diw0459	3636	6789	25	1362	1362	0.00	0	0.36	30.21
diw0460	339	579	13	345	345	0.00	0	0.03	0.11
diw0473	2213	4135	25	1098	1098	0.00	0	11.45	11.46
diw0487	2414	4386	25	1424	1424	0.00	0	3.34	4.09
diw0495	938	1655	10	616	616	0.00	0	0.07	0.31
diw0513	918	1684	10	604	604	0.00	0	0.62	3.90
diw0523	1080	2015	10	561	561	0.00	0	0.04	2.01
diw0540	286	465	10	374	374	0.00	0	0.04	0.17
diw0559	3738	7013	18	1570	1570	0.00	0	108.08	375.58
diw0778	7231	13727	24	2173	2173	0.00	0	399.46	2070.66
diw0779	11821	22516	50	4322	4499	4.10	0	1604.01	timeout
diw0795	3221	5938	10	1550	1550	0.00	0	252.44	374.11
diw0801	3023	5575	10	1587	1587	0.00	0	74.91	551.05
diw0819	10553	20066	32	3363	3399	1.07	0	31.05	timeout
diw0820	11749	22384	37	4064	4190	3.10	0	62.18	timeout

Table 10: STP DMXA instances. Results computed by B&C on the (x, y)-model (starting solution generated by partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
dmxa0296	233	386	12	344	344	0.00	0	0.02	0.08
dmxa0368	2050	3676	18	1017	1017	0.00	0	29.17	29.19
dmxa0454	1848	3286	16	914	914	0.00	0	1.79	27.36
dmxa0628	169	280	10	275	275	0.00	0	0.07	0.39
dmxa0734	663	1154	11	506	506	0.00	0	0.04	1.24
dmxa0848	499	861	16	594	594	0.00	0	1.73	1.73
dmxa0903	632	1087	10	580	580	0.00	0	2.51	3.92
dmxa1010	3983	7108	23	1488	1488	0.00	0	14.22	306.76
dmxa1109	343	559	17	454	454	0.00	0	0.32	0.33
dmxa1200	770	1383	21	750	750	0.00	0	1.66	3.04
dmxa1304	298	503	10	311	311	0.00	0	0.15	0.16
dmxa1516	720	1269	11	508	508	0.00	0	0.05	0.99
dmxa1721	1005	1731	18	780	780	0.00	0	1.70	1.71
dmxa1801	2333	4137	17	1365	1365	0.00	0	134.01	139.93

Table 11: STP GAP instances. Results computed by B&C on the (x, y)-model (starting solution generated by partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
gap1307	342	552	17	549	549	0.00	0	0.12	0.12
gap1413	541	906	10	457	457	0.00	0	0.03	0.43
gap1500	220	374	17	254	254	0.00	0	0.02	0.09
gap1810	429	702	17	482	482	0.00	0	0.14	0.21
gap1904	735	1256	21	763	763	0.00	0	0.07	0.68
gap2007	2039	3548	17	1104	1104	0.00	7	10.37	21.42
gap2119	1724	2975	29	1244	1244	0.00	0	7.64	8.41
gap2740	1196	2084	14	745	745	0.00	0	0.07	8.65
gap2800	386	653	12	386	386	0.00	0	0.04	0.24
gap2975	179	293	10	245	245	0.00	0	0.03	0.07
gap3036	346	583	13	457	457	0.00	0	0.22	0.97
gap3100	921	1558	11	640	640	0.00	0	0.06	1.07
gap3128	10393	18043	104	4292	4292	0.00	0	230.82	1272.98

Table 12: STP TAQ instances. Results computed by B&C on the (x, y)-model (starting solution generated by partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
taq0014	6466	11046	128	5326	5326	0.00	0	975.07	1199.31
taq0023	572	963	11	621	621	0.00	0	2.25	2.26
taq0365	4186	7074	22	1914	1914	0.00	0	39.79	259.50
taq0377	6836	11715	136	6393	6393	0.00	0	1191.69	1789.58
taq0431	1128	1905	13	897	897	0.00	0	0.07	8.51
taq0631	609	932	10	581	581	0.00	0	0.06	2.32
taq0739	837	1438	16	848	848	0.00	0	5.71	7.89
taq0741	712	1217	16	847	847	0.00	0	3.77	4.12
taq0751	1051	1791	16	939	939	0.00	0	4.54	8.70
taq0891	331	560	10	319	319	0.00	0	0.03	0.17
taq0903	6163	10490	130	5099	5099	0.00	0	1662.33	1662.35
taq0910	310	514	17	370	370	0.00	0	0.04	0.14
taq0920	122	194	17	210	210	0.00	0	0.03	0.08
taq0978	777	1239	10	566	566	0.00	0	0.04	0.24

Table 13: STP LIN instances. Results computed by B&C on the (x, y)-model (starting solution generated by partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
lin01	53	80	4	503	503	0.00	0	0.02	0.05
lin02	55	82	6	557	557	0.00	0	0.02	0.05
lin03	57	84	8	926	926	0.00	0	0.01	0.03
lin04	157	266	6	1239	1239	0.00	0	0.04	0.15
lin05	160	269	9	1703	1703	0.00	0	0.04	0.09
lin06	165	274	14	1348	1348	0.00	0	0.04	0.13
lin07	307	526	6	1885	1885	0.00	0	0.01	0.13
lin08	311	530	10	2248	2248	0.00	0	0.03	0.11
lin09	313	532	12	2752	2752	0.00	0	0.09	0.09
lin10	321	540	20	4132	4132	0.00	0	0.34	0.34
lin11	816	1460	10	4280	4280	0.00	0	0.47	2.29
lin12	818	1462	12	5250	5250	0.00	0	0.76	3.89
lin13	822	1466	16	4609	4609	0.00	0	0.44	1.17
lin14	828	1472	22	5824	5824	0.00	0	0.03	1.78
lin15	840	1484	34	7145	7145	0.00	0	0.33	0.39
lin16	1981	3633	12	6618	6618	0.00	0	54.64	67.07
lin17	1989	3641	20	8405	8405	0.00	0	6.10	22.34
lin18	1994	3646	25	9714	9714	0.00	0	96.54	96.56
lin19	2010	3662	41	13268	13268	0.00	0	17.45	31.01
lin20	3675	6709	11	6673	6673	0.00	0	0.20	94.11
lin21	3683	6717	20	9143	9143	0.00	0	89.90	183.52
lin22	3692	6726	28	10519	10519	0.00	0	6.07	208.94
lin23	3716	6750	52	17560	17560	0.00	0	355.64	403.07
lin24	7998	14734	16	15020	15076	0.37	0	1480.48	timeout
lin25	8007	14743	24	17803	17803	0.00	0	2390.38	2739.06
lin26	8013	14749	30	21566	21834	1.24	0	3547.07	timeout
lin27	8017	14753	36	20350	20718	1.81	0	2552.83	timeout
lin28	8062	14798	81	32279	32633	1.10	0	3232.28	timeout
lin29	19083	35636	24	23042	23797	3.28	0	102.83	timeout
lin30	19091	35644	31	26799	27810	3.77	0	403.51	timeout
lin31	19100	35653	40	30342	31769	4.70	0	2450.49	timeout
lin32	19112	35665	53	38076	40068	5.23	0	109.16	timeout
lin33	19177	35730	117	54350	56265	3.52	0	3556.89	timeout
lin34	38282	71521	34	42693	45155	5.77	0	594.53	timeout
lin35	38294	71533	45	48135	50782	5.50	0	454.92	timeout
lin36	38307	71546	58	52279	55999	7.12	0	3122.27	timeout
lin37	38418	71657	172	95716	100203	4.69	0	502.75	timeout

Table 14: STP MSM instances. Results computed by B&C on the (x, y)-model (starting solution generated by partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
msm0580	338	541	11	467	467	0.00	0	0.45	0.46
msm0654	1290	2270	10	823	823	0.00	0	3.32	8.13
msm0709	1442	2403	16	884	884	0.00	0	1.46	2.75
msm0920	752	1264	26	806	806	0.00	0	0.53	2.84
msm1008	402	695	11	494	494	0.00	0	0.03	1.09
msm1234	933	1632	13	550	550	0.00	0	0.06	0.33
msm1477	1199	2078	31	1068	1068	0.00	0	1.14	2.28
msm1707	278	478	11	564	564	0.00	0	0.14	0.22
msm1844	90	135	10	188	188	0.00	0	0.07	0.07
msm1931	875	1522	10	604	604	0.00	0	0.04	0.93
msm2000	898	1562	10	594	594	0.00	0	0.25	0.25
msm2152	2132	3702	37	1590	1590	0.00	0	21.66	21.67
msm2326	418	723	14	399	399	0.00	0	0.16	0.16
msm2492	4045	7094	12	1459	1459	0.00	0	0.30	290.72
msm2525	3031	5239	12	1290	1290	0.00	0	0.27	61.48
msm2601	2961	5100	16	1440	1440	0.00	0	64.67	94.19
msm2705	1359	2458	13	714	714	0.00	0	0.77	10.54
msm2802	1709	2963	18	926	926	0.00	0	1.80	9.26
msm2846	3263	5783	89	3135	3135	0.00	0	180.78	194.61
msm3277	1704	2991	12	869	869	0.00	0	0.13	8.91
msm3676	957	1554	10	607	607	0.00	0	0.07	0.41
msm3727	4640	8255	21	1376	1376	0.00	0	40.69	104.37
msm3829	4221	7255	12	1571	1571	0.00	0	119.28	177.42
msm4038	237	390	11	353	353	0.00	0	0.09	0.11
msm4114	402	690	16	393	393	0.00	0	0.06	0.14
msm4190	391	666	16	381	381	0.00	0	0.01	0.28
msm4224	191	302	11	311	311	0.00	0	0.10	0.10
msm4312	5181	8893	10	2016	2016	0.00	0	1070.14	1143.12
msm4414	317	476	11	408	408	0.00	0	0.01	0.14
msm4515	777	1358	13	630	630	0.00	0	0.06	2.33

Table 15: STP Vienna instances (after adv. preprocessing). Results computed by B&C on the (x, y)-model (starting solution generated through partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
G101a	10734	16345	96	3443808	3494734	1.48	0	299.33	timeout
G102a	27896	43925	2003	15141304	15197079	0.37	0	65.07	timeout
G103a	36270	57370	2930	19830287	19951606	0.61	0	80.52	timeout
G104a	44251	70029	3776	26022885	26189177	0.64	0	87.84	timeout
G105a	14586	22450	525	12480112	12514342	0.27	0	35.05	timeout
G106a	62618	100067	5373	44316434	44577036	0.59	0	132.54	timeout
G107a	15536	23858	893	7316849	7331647	0.20	0	38.90	timeout
G201a	8286	12617	188	3484028	3484028	0.00	0	780.46	812.54
G202a	14028	21610	985	6849423	6849423	0.00	0	1199.06	1199.13
G203a	25651	40610	1999	13128133	13163336	0.27	0	67.54	timeout
G204a	9939	15249	376	5313548	5313548	0.00	0	324.73	338.69
G205a	37398	59323	3146	24688739	24830634	0.57	0	124.96	timeout
G206a	13688	21197	789	9175622	9175622	0.00	0	1822.94	1823.00
G207a	7565	11521	98	2265834	2265834	0.00	0	769.85	789.24
G301a	13291	20261	181	4792547	4797441	0.10	0	3581.01	timeout
G302a	24951	38647	1797	13257553	13305488	0.36	0	40.52	timeout
G303a	37085	57711	2915	27833134	27964584	0.47	0	74.90	timeout
G304a	15213	23329	403	6721180	6721180	0.00	0	3399.80	3399.87
G305a	47016	73861	3809	40450817	40658126	0.51	0	81.85	timeout
G306a	55423	87779	4766	33732970	33980536	0.73	0	105.46	timeout
G307a	71184	113616	6107	50899349	51252624	0.69	0	169.29	timeout
G308a	13298	20351	86	4628992	4702526	1.59	0	61.31	timeout
G309a	18704	28851	868	11247935	11260639	0.11	0	42.17	timeout

Table 16: STP Vienna instances (after adv. preprocessing). Results computed by B&C on the (x, y)-model (starting solution generated through partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
I001a	14675	22055	941	253921201	253921201	0.00	0	937.74	937.79
I002a	23800	35758	1282	399808266	399809303	0.00	0	3451.35	timeout
I003a	16270	23919	2336	788774494	788774494	0.00	0	1037.02	1085.09
I004a	867	1238	263	279512692	279512692	0.00	0	0.96	1.28
I005a	1677	2430	491	390876350	390876350	0.00	0	2.23	2.24
I006a	13339	19532	1842	504526035	504526035	0.00	7	611.40	611.55
I007a	6873	10299	599	177909660	177909660	0.00	0	24.56	48.81
I008a	6522	9629	708	201788202	201788202	0.00	0	56.02	67.90
I009a	14977	22435	1053	275558727	275558727	0.00	0	531.00	531.71
I010a	13041	19545	782	207889674	207889674	0.00	0	186.32	186.41
I011a	9298	13685	1202	317589880	317589880	0.00	0	59.91	65.88
I012a	3500	5214	387	118893243	118893243	0.00	0	5.95	6.98
I013a	7147	10608	670	193190339	193190339	0.00	0	48.22	49.07
I014a	3577	5311	364	105173465	105173465	0.00	0	3.60	3.63
I015a	20573	30541	2119	592240832	592240832	0.00	0	2059.64	2060.01
I016a	27214	39824	3434	1110914623	1110914623	0.00	0	2199.01	2200.78
I017a	7571	11571	386	109739695	109739695	0.00	0	33.10	33.14
I018a	12258	18014	1549	463887832	463887832	0.00	0	313.04	325.52
I019a	11693	17624	732	217647693	217647693	0.00	0	576.71	580.79
I020a	6405	9564	508	146515460	146515460	0.00	0	28.08	29.84
I021a	5195	7861	295	106470644	106470644	0.00	0	33.15	33.18
I022a	8869	13551	356	106799980	106799980	0.00	0	260.84	266.44
I023a	13724	20863	403	131044872	131044872	0.00	0	710.25	710.36
I024a	32357	48250	2511	758452688	758490043	0.00	0	40.24	timeout
I025a	10055	14961	833	232790758	232790758	0.00	0	584.38	735.46
I026a	18155	26568	2661	928032223	928032223	0.00	3	1727.11	1727.34
I027a	40772	60555	3490	976713069	976819149	0.01	0	52.67	timeout
I028a	43690	66461	1597	383990445	384054878	0.02	0	20.01	timeout
I029a	32979	49627	1946	492158487	492204224	0.01	0	25.43	timeout
I030a	12941	19279	1093	321646787	321646787	0.00	0	174.72	193.88
I031a	21054	31410	1832	578284709	578284709	0.00	0	2113.40	2254.35
I032a	21345	31353	2454	773096651	773096651	0.00	0	451.66	451.73
I033a	8500	12700	548	134461857	134461857	0.00	0	34.61	45.70
I034a	9128	13668	606	165115148	165115148	0.00	0	164.04	204.84
I035a	13129	19420	1428	414440370	414440370	0.00	0	18.30	179.67
I036a	17036	25482	1258	375260864	375260864	0.00	3	1327.00	1375.47
I037a	5886	8869	392	105720727	105720727	0.00	0	70.66	70.68
I038a	7733	11478	798	255767543	255767543	0.00	9	153.31	181.04
I039a	3719	5533	306	85566290	85566290	0.00	0	13.99	16.11
I040a	18837	28156	1501	431498867	431498867	0.00	0	2289.67	2289.75
I041a	22466	33868	1014	301914840	301914840	0.00	11	3153.18	3346.69
I042a	23925	35806	1923	532131412	532131412	0.00	2	3008.69	3009.04
I043a	4511	6740	335	95722094	95722094	0.00	0	23.38	28.78
I044a	31500	46757	2954	804504593	804536208	0.00	0	60.54	timeout
I045a	6775	10227	378	105944062	105944062	0.00	0	27.17	34.70
I046a	32376	48054	3154	925436862	925473248	0.00	0	54.99	timeout
I047a	10622	15440	1791	695163406	695163406	0.00	0	361.45	377.81
I048a	4920	7356	320	91509264	91509264	0.00	0	22.02	32.50
I049a	15045	22713	821	294811505	294811505	0.00	0	1044.47	1099.16

Table 17: STP Vienna instances (after adv. preprocessing). Results computed by B&C on the (x, y)-model (starting solution generated through partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
I050a	17787	26176	2232	792594678	792601598	0.00	0	3392.43	timeout
I051a	12130	17892	1337	357230839	357230839	0.00	0	467.01	467.05
I052a	160	237	23	13309487	13309487	0.00	0	0.12	0.12
I053a	693	1023	102	30854904	30854904	0.00	0	0.31	0.36
I054a	540	817	25	15841596	15841596	0.00	0	0.28	0.33
I055a	4701	6979	483	144164924	144164924	0.00	0	13.22	20.40
I056a	290	439	34	14171206	14171206	0.00	0	0.11	0.11
I057a	13078	19368	1346	412746415	412746415	0.00	0	165.96	221.55
I058a	7877	11657	997	305024188	305024188	0.00	0	48.76	48.80
I059a	2800	4157	286	107617854	107617854	0.00	0	3.13	3.14
I060a	18991	28536	1158	337290460	337290460	0.00	0	2193.60	2253.72
I061a	20958	31465	1337	363042601	363042860	0.00	0	3443.85	timeout
I062a	23714	35305	2812	792941137	792941137	0.00	0	1058.36	1058.45
I063a	9600	14042	1291	459801704	459801704	0.00	0	267.91	331.74
I064a	31712	46711	3182	863053120	863117791	0.01	0	108.08	timeout
I065a	1185	1756	119	32965718	32965718	0.00	0	3.20	3.20
I066a	4551	6821	417	174219813	174219813	0.00	0	13.18	18.98
I067a	10318	15588	579	175540750	175540750	0.00	0	11.92	317.61
I068a	12191	18023	1302	420730046	420730046	0.00	0	134.74	149.14
I069a	3508	5156	452	135161583	135161583	0.00	0	15.94	15.96
I070a	6739	10064	511	136700139	136700139	0.00	0	42.07	51.71
I071a	12772	18886	1281	382539099	382539099	0.00	0	220.27	220.42
I072a	11628	17411	851	289019226	289019226	0.00	0	286.46	320.92
I073a	7510	10873	1337	663004987	663004987	0.00	0	98.23	98.27
I074a	4441	6562	548	165573383	165573383	0.00	0	9.56	11.86
I075a	23195	34362	2498	815404026	815404026	0.00	0	1246.28	1246.38
I076a	4909	7268	498	166249692	166249692	0.00	0	24.37	25.02
I077a	9153	13363	1490	472503150	472503150	0.00	0	118.48	125.87
I078a	5864	8662	692	185525490	185525490	0.00	0	45.02	51.49
I079a	7933	11807	497	150506933	150506933	0.00	0	589.16	690.65
I080a	7589	11256	499	164299652	164299652	0.00	0	139.61	143.91
I081a	10747	16029	751	247527679	247527679	0.00	0	721.58	721.62
I082a	5850	8693	435	147407632	147407632	0.00	0	25.35	33.34
I083a	34221	50301	4138	1405593856	1405593856	0.00	0	3349.19	3351.14
I084a	17050	25201	1918	627187559	627187559	0.00	0	892.11	892.28
I085a	2780	4123	243	80628079	80628079	0.00	0	6.81	7.24

Table 18: STP ES1000FST and ES10000FST instances. Results computed by B&C on the (x, y)-model (starting solution generated through partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
es10000fst01	27019	39407	10000	715189151	716899482	0.24	0	3479.46	timeout
es1000fst01	2865	4267	1000	230535806	230535806	0.00	17	105.65	109.80
es1000fst02	2629	3793	1000	227886471	227886471	0.00	0	26.05	27.45
es1000fst03	2762	4047	1000	227807756	227807756	0.00	0	18.85	21.42
es1000fst04	2778	4083	1000	230200846	230200846	0.00	0	40.24	43.98
es1000fst05	2676	3894	1000	228330602	228330602	0.00	0	31.23	31.24
es1000fst06	2815	4162	1000	231028456	231028456	0.00	10	105.12	106.37
es1000fst07	2604	3756	1000	230945623	230945623	0.00	0	26.99	27.00
es1000fst08	2834	4207	1000	230639115	230639115	0.00	5	57.82	103.20
es1000fst09	2846	4187	1000	227745838	227745838	0.00	3	50.37	51.66
es1000fst10	2546	3620	1000	229267101	229267101	0.00	3	19.90	20.83
es1000fst11	2763	4038	1000	231605619	231605619	0.00	5	33.75	34.76
es1000fst12	2984	4484	1000	230904712	230904712	0.00	5	52.07	53.37
es1000fst13	2532	3615	1000	228031092	228031092	0.00	0	21.79	22.28
es1000fst14	2840	4200	1000	234318491	234318491	0.00	39	107.46	110.53
es1000fst15	2733	3997	1000	229965775	229965775	0.00	0	32.74	36.86

Table 19: STP TSPFST instances. Results computed by B&C on the (x, y)-model (starting solution generated through partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
a280fst	313	328	279	2502	2502	0.00	0	0.03	0.10
att48fst	139	202	48	30236	30236	0.00	0	0.18	0.18
att532fst	1468	2152	532	84009	84009	0.00	3	9.82	10.18
berlin52fst	89	104	52	6760	6760	0.00	0	0.03	0.06
bier127fst	258	357	127	104284	104284	0.00	0	0.19	0.19
d1291fst	1365	1456	1291	481421	481421	0.00	0	0.40	0.40
d1655fst	1906	2083	1655	584948	584948	0.00	0	1.70	1.71
d198fst	232	256	198	129175	129175	0.00	0	0.11	0.11
d2103fst	2206	2272	2103	769797	769797	0.00	0	0.77	0.78
d493fst	1055	1473	493	320137	320137	0.00	0	3.70	4.95
d657fst	1416	1978	657	471589	471589	0.00	3	7.37	9.33
dsj1000fst	2562	3655	1000	17564659	17564659	0.00	0	5.15	5.16
eil101fst	330	538	101	605	605	0.00	0	1.39	1.44
eil51fst	181	289	51	409	409	0.00	0	0.48	0.48
eil76fst	237	378	76	513	513	0.00	2	1.20	1.20
fl1400fst	2694	4546	1400	17964997	17980593	0.09	179153	23.35	timeout
fl1577fst	2413	3412	1577	19825626	19825626	0.00	0	19.13	32.41
fl3795fst	4859	6539	3795	25514335	25529891	0.06	245844	3578.65	timeout
fl417fst	732	1084	417	10883190	10883190	0.00	48	0.58	1.50
fnl4461fst	17127	27352	4461	181703	182566	0.47	0	113.68	timeout
gil262fst	537	723	262	2306	2306	0.00	0	0.34	0.34
kroA100fst	197	250	100	20401	20401	0.00	0	0.05	0.05
kroA150fst	389	562	150	25700	25700	0.00	0	0.30	0.54
kroA200fst	500	714	200	28652	28652	0.00	0	0.26	0.33
kroB100fst	230	313	100	21211	21211	0.00	0	0.07	0.09
kroB150fst	420	619	150	25217	25217	0.00	0	0.58	0.59
kroB200fst	480	670	200	28803	28803	0.00	0	0.64	0.64
kroC100fst	244	337	100	20492	20492	0.00	0	0.21	0.25
kroD100fst	216	288	100	20437	20437	0.00	0	0.12	0.12
kroE100fst	226	306	100	21245	21245	0.00	0	0.15	0.15
lin105fst	216	323	105	13429	13429	0.00	0	0.16	0.16
lin318fst	678	1030	318	39335	39335	0.00	0	1.70	2.02
linhp318fst	678	1030	318	39335	39335	0.00	0	1.62	1.92
nrw1379fst	5096	8105	1379	56207	56207	0.00	180	751.91	791.42
p654fst	777	867	654	314925	314925	0.00	0	0.19	0.19
pcb1173fst	1912	2223	1173	53301	53301	0.00	0	1.24	1.24
pcb3038fst	5829	7552	3038	131895	131895	0.00	0	39.52	45.11
pcb442fst	503	531	442	47675	47675	0.00	0	0.18	0.18
pla7397fst	8790	9815	7397	22481625	22481625	0.00	0	29.57	48.79
pr1002fst	1473	1715	1002	243176	243176	0.00	0	0.67	0.67
pr107fst	111	110	107	34850	34850	0.00	0	0.01	0.03
pr124fst	154	165	124	52759	52759	0.00	0	0.02	0.06
pr136fst	196	250	136	86811	86811	0.00	0	0.01	0.05
pr144fst	221	285	144	52925	52925	0.00	0	0.07	0.08
pr152fst	308	431	152	64323	64323	0.00	0	0.11	0.11
pr226fst	255	269	226	70700	70700	0.00	0	0.06	0.06
pr2392fst	3398	3966	2392	358989	358989	0.00	0	3.60	3.76
pr264fst	280	287	264	41400	41400	0.00	0	0.02	0.06
pr299fst	420	500	299	44671	44671	0.00	0	0.13	0.15
pr439fst	572	662	439	97400	97400	0.00	0	0.16	0.16
pr76fst	168	247	76	95908	95908	0.00	0	0.11	0.11
rat195fst	560	870	195	2386	2386	0.00	0	1.14	1.31
rat575fst	1986	3176	575	6808	6808	0.00	0	44.21	47.41
rat783fst	2397	3715	783	8883	8883	0.00	0	52.75	52.76
rat99fst	269	399	99	1225	1225	0.00	0	0.36	0.54
rd100fst	201	253	100	764269099	764269099	0.00	0	0.11	0.12
rd400fst	1001	1419	400	1490972006	1490972006	0.00	0	2.39	2.55

Table 20: STP TSPFST instances. Results computed by B&C on the (x, y)-model (starting solution generated through partitioning heuristic).

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
rl11849fst	13963	15315	11849	8779590	8779590	0.00	0	65.54	65.59
rl1304fst	1562	1694	1304	236649	236649	0.00	0	0.55	0.56
rl1323fst	1598	1750	1323	253620	253620	0.00	0	0.82	1.15
rl1889fst	2382	2674	1889	295208	295208	0.00	0	4.44	4.55
rl5915fst	6569	6980	5915	533226	533226	0.00	0	11.46	11.48
rl5934fst	6827	7365	5934	529890	529890	0.00	0	12.21	13.60
st70fst	133	169	70	626	626	0.00	0	0.06	0.09
ts225fst	225	224	225	1120	1120	0.00	0	0.06	0.08
tsp225fst	242	252	225	356850	356850	0.00	0	0.12	0.12
u1060fst	1835	2429	1060	21265372	21265372	0.00	905	6.57	7.18
u1432fst	1432	1431	1432	1465	1465	0.00	0	0.20	0.26
u159fst	184	186	159	390	390	0.00	0	0.01	0.07
u1817fst	1831	1846	1817	5513053	5513053	0.00	0	0.33	0.41
u2152fst	2167	2184	2152	6253305	6253305	0.00	0	0.64	0.65
u2319fst	2319	2318	2319	2322	2322	0.00	0	0.44	0.53
u574fst	990	1258	574	3509275	3509275	0.00	0	0.91	1.03
u724fst	1180	1537	724	4069628	4069628	0.00	0	1.31	1.52
vm1084fst	1679	2058	1084	2248390	2248390	0.00	0	2.22	3.02
vm1748fst	2856	3641	1748	3194670	3194670	0.00	0	27.65	35.37

1.0.2 Exact Results for the PCSTP

Table 21: PCSTP Random instances. Results computed by B&C on the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
a0200RandGraph.1.2	200	1636	200	122.214525	122.214525	0.00	0	0.16	0.16
a0200RandGraph.1.5	200	1575	200	141.877157	141.877157	0.00	0	0.19	0.20
a0200RandGraph.2	200	1605	200	157.017004	157.017004	0.00	0	0.20	0.20
a0200RandGraph.3	200	1616	200	170.286354	170.286354	0.00	0	0.14	0.14
a0400RandGraph.1.2	400	3194	400	234.981814	234.981814	0.00	0	0.31	0.32
a0400RandGraph.1.5	400	3231	400	272.874950	272.874950	0.00	0	0.48	0.49
a0400RandGraph.2	400	3292	400	300.920525	300.920525	0.00	0	0.46	0.47
a0400RandGraph.3	400	3222	400	337.596008	337.596008	0.00	0	0.34	0.35
a0600RandGraph.1.2	600	4821	600	360.393503	360.393503	0.00	0	0.61	0.72
a0600RandGraph.1.5	600	4845	600	407.632071	407.632071	0.00	0	0.72	0.73
a0600RandGraph.2	600	4831	600	460.016305	460.016305	0.00	0	0.69	0.87
a0600RandGraph.3	600	4808	600	507.937086	507.937086	0.00	0	0.60	0.62
a0800RandGraph.1.2	800	6453	800	464.776231	464.776231	0.00	577	2.70	2.73
a0800RandGraph.1.5	800	6301	800	530.442058	530.442058	0.00	0	0.95	0.97
a0800RandGraph.2	800	6465	800	603.326182	603.326182	0.00	0	1.03	1.05
a0800RandGraph.3	800	6385	800	663.607078	663.607078	0.00	0	0.75	0.77
a1000RandGraph.1.2	1000	8067	1000	580.349110	580.349110	0.00	0	2.32	2.33
a1000RandGraph.1.5	1000	7868	1000	673.474200	673.474200	0.00	0	1.69	1.71
a1000RandGraph.2	1000	8201	1000	753.290496	753.290496	0.00	0	1.14	1.16
a1000RandGraph.3	1000	8107	1000	831.582177	831.582177	0.00	0	0.97	0.99
a1200RandGraph.1.2	1200	9448	1200	705.672644	705.672644	0.00	73	3.06	3.11
a1200RandGraph.1.5	1200	9625	1200	810.482934	810.482934	0.00	0	1.44	1.47
a1200RandGraph.2	1200	9546	1200	906.792746	906.792746	0.00	0	1.37	1.39
a1200RandGraph.3	1200	9451	1200	1012.450204	1012.450204	0.00	0	1.22	1.25

Table 22: PCSTP Random instances. Results computed by B&C on the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
a1400RandGraph.1.2	1400	11192	1400	810.633664	810.633664	0.00	0	2.94	2.95
a1400RandGraph.1.5	1400	11226	1400	938.932467	938.932467	0.00	0	1.88	1.92
a1400RandGraph.2	1400	11100	1400	1051.010742	1051.010742	0.00	0	1.66	1.69
a1400RandGraph.3	1400	11263	1400	1158.955344	1158.955344	0.00	0	1.47	1.50
a1600RandGraph.1.2	1600	12869	1600	943.735583	943.735583	0.00	6	3.57	3.64
a1600RandGraph.1.5	1600	12739	1600	1078.797307	1078.797307	0.00	0	2.84	2.87
a1600RandGraph.2	1600	12779	1600	1217.051991	1217.051991	0.00	0	2.26	2.29
a1600RandGraph.3	1600	12963	1600	1351.983774	1351.983774	0.00	0	1.39	1.41
a1800RandGraph.1.2	1800	14473	1800	1061.393585	1061.393585	0.00	27	2.49	4.84
a1800RandGraph.1.5	1800	14222	1800	1218.777781	1218.777781	0.00	0	2.56	2.60
a1800RandGraph.2	1800	14329	1800	1364.892755	1364.892755	0.00	0	2.11	2.14
a1800RandGraph.3	1800	14531	1800	1507.266194	1507.266194	0.00	0	1.74	1.77
a2000RandGraph.1.2	2000	16008	2000	1151.953272	1151.953272	0.00	0	4.46	4.48
a2000RandGraph.1.5	2000	15835	2000	1330.773629	1330.773629	0.00	0	2.41	3.63
a2000RandGraph.2	2000	16062	2000	1483.836804	1483.836804	0.00	0	2.80	2.85
a2000RandGraph.3	2000	15751	2000	1669.345706	1669.345706	0.00	0	1.99	2.02
a3000RandGraph.1.2	3000	24045	3000	1781.194420	1781.194420	0.00	31	14.87	15.50
a3000RandGraph.1.5	3000	23852	3000	2028.619951	2028.619951	0.00	0	4.05	4.11
a3000RandGraph.2	3000	24065	3000	2282.917494	2282.917494	0.00	0	4.20	4.26
a3000RandGraph.3	3000	24026	3000	2537.202752	2537.202752	0.00	0	4.13	4.19
a4000RandGraph.1.2	4000	32087	4000	2396.919869	2396.919869	0.00	0	16.52	16.56
a4000RandGraph.1.5	4000	32119	4000	2735.178895	2735.178895	0.00	0	19.54	19.62
a4000RandGraph.2	4000	31880	4000	3072.261471	3072.261471	0.00	0	5.98	6.06
a4000RandGraph.3	4000	32025	4000	3406.618730	3406.618730	0.00	0	6.38	6.46
a6000RandGraph.1.2	6000	47899	6000	3544.386043	3544.386043	0.00	2	80.55	80.73
a6000RandGraph.1.5	6000	48077	6000	4059.186651	4059.186651	0.00	0	52.03	52.11
a6000RandGraph.2	6000	48069	6000	4551.766674	4551.766674	0.00	0	10.70	10.88
a6000RandGraph.3	6000	47915	6000	5049.263465	5049.263465	0.00	0	7.95	8.06
a8000RandGraph.1.2	8000	64373	8000	4719.965271	4719.965271	0.00	3010	204.76	208.94
a8000RandGraph.1.5	8000	63812	8000	5394.568019	5394.568019	0.00	0	125.68	125.78
a8000RandGraph.2	8000	63874	8000	6055.126421	6055.126421	0.00	0	14.14	14.32
a8000RandGraph.3	8000	64177	8000	6710.615114	6710.615114	0.00	0	13.61	13.75
a10000RandGraph.1.2	10000	80298	10000	5927.320571	5927.320571	0.00	0	88.15	88.29
a10000RandGraph.1.5	10000	80288	10000	6775.549913	6775.549913	0.00	0	120.66	120.85
a10000RandGraph.2	10000	79908	10000	7594.382998	7594.382998	0.00	0	17.53	17.71
a10000RandGraph.3	10000	79778	10000	8422.560949	8422.560949	0.00	0	19.94	20.14
a12000RandGraph.1.2	12000	96093	12000	7073.946539	7073.946539	0.00	13	253.23	254.93
a12000RandGraph.1.5	12000	96391	12000	8084.127875	8084.127875	0.00	0	330.76	330.91
a12000RandGraph.2	12000	95987	12000	9064.244250	9064.244250	0.00	0	61.91	62.17
a12000RandGraph.3	12000	96449	12000	10061.820468	10061.820468	0.00	0	55.77	56.12
a14000RandGraph.1.2	14000	112016	14000	8271.465230	8271.465230	0.00	0	424.01	424.22
a14000RandGraph.1.5	14000	112228	14000	9475.593560	9475.593560	0.00	0	236.73	237.02
a14000RandGraph.2	14000	112369	14000	10639.203544	10639.203544	0.00	0	27.79	28.10
a14000RandGraph.3	14000	111869	14000	11776.894300	11776.894300	0.00	0	75.29	75.68

Table 23: PCSTP Hand ICERM and DIMACS instances. Results computed by B&C on the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
handsd01	42500	84475	42500	171.636766	171.636766	0.00	0	76.79	77.07
handsd02	42500	84475	2325	157.435630	160.345804	1.85	0	702.28	timeout
handsd03	42500	84475	42500	31.306275	31.306275	0.00	0	47.08	47.33
handsd04	42500	84475	4368	486.662177	494.554042	1.62	0	14.15	timeout
handsd05	42500	84475	42500	21.937611	21.937611	0.00	0	62.05	62.29
handsd06	42500	84475	4158	279.903130	279.903130	0.00	0	948.68	948.84
handsd07	42500	84475	42500	11.804120	11.804120	0.00	0	68.28	68.41
handsd08	42500	84475	4392	143.237729	143.237729	0.00	0	14.74	610.27
handsd09	42500	84475	42500	3.791860	3.822404	0.81	0	1.24	timeout
handsd10	42500	84475	4179	1034.767359	1034.767359	0.00	0	0.87	24.50
handsi01	39600	78704	39600	295.453616	295.453616	0.00	0	48.86	49.08
handsi02	39600	78704	2077	125.429411	125.429411	0.00	0	2056.03	2239.58
handsi03	39600	78704	39600	56.149422	56.149422	0.00	0	57.22	57.44
handsi04	39600	78704	4056	722.508197	722.508202	0.00	0	2426.72	2863.35
handsi05	39600	78704	39600	35.043506	35.043506	0.00	0	0.57	41.77
handsi06	39600	78704	3989	452.953621	452.953621	0.00	0	693.17	775.48
handsi07	39600	78704	39600	18.410135	18.410135	0.00	0	0.58	56.45
handsi08	39600	78704	3970	229.529930	229.529930	0.00	0	81.71	532.43
handsi09	39600	78704	39600	5.889093	5.977964	1.51	0	0.65	timeout
handsi10	39600	78704	3811	1803.697508	1803.697508	0.00	0	482.81	482.95
handbd01	169800	338551	169800	721.017555	730.238277	1.28	0	3.53	timeout
handbd02	169800	338551	8886	281.771804	297.039586	5.42	0	3.65	timeout
handbd03	169800	338551	169800	135.070605	135.070605	0.00	0	553.70	554.73
handbd04	169800	338551	16981	1721.298264	1820.072929	5.74	0	53.89	timeout
handbd05	169800	338551	169800	105.474688	105.474688	0.00	0	675.43	704.63
handbd06	169800	338551	16447	1491.348188	1533.589874	2.83	0	738.81	timeout
handbd07	169800	338551	169800	77.861959	77.861959	0.00	0	2941.30	2941.83
handbd08	169800	338551	17486	1345.289953	1371.952680	1.98	0	976.58	timeout
handbd09	169800	338551	169800	62.717160	62.717160	0.00	0	1003.32	1004.44
handbd10	169800	338551	17293	1125.096236	1139.724449	1.30	0	2194.25	timeout
handbd11	169800	338551	169800	46.772533	46.772533	0.00	0	717.58	719.69
handbd12	169800	338551	16466	320.489947	321.207482	0.22	0	2558.62	timeout
handbd13	169800	338551	169800	12.871430	13.224294	2.74	0	7.67	timeout
handbd14	169800	338551	17597	4379.104236	4379.104236	0.00	0	6.93	45.48
handbi01	158400	315808	158400	1345.175362	1360.201440	1.12	0	5.09	timeout
handbi02	158400	315808	8594	518.158437	532.616534	2.79	0	2594.78	timeout
handbi03	158400	315808	158400	243.134201	243.134201	0.00	0	1245.38	1246.21
handbi04	158400	315808	16297	3090.616342	3226.919270	4.41	0	3368.18	timeout
handbi05	158400	315808	158400	184.467331	184.467331	0.00	0	915.13	916.31
handbi06	158400	315808	16022	2851.708099	2930.642408	2.77	0	58.87	timeout
handbi07	158400	315808	158400	150.974258	150.974258	0.00	0	1168.49	1265.80
handbi08	158400	315808	15544	2238.918398	2271.575687	1.46	0	2760.19	timeout
handbi09	158400	315808	158400	107.768806	107.768896	0.00	0	363.80	985.80
handbi10	158400	315808	15879	1867.723173	1874.645163	0.37	0	2188.43	timeout
handbi11	158400	315808	158400	68.878968	68.953380	0.11	0	4.95	timeout
handbi12	158400	315808	15642	138.257023	138.257023	0.00	0	70.28	3378.66
handbi13	158400	315808	158400	4.159144	4.268246	2.62	0	796.97	timeout
handbi14	158400	315808	15971	7881.768740	7881.768740	0.00	0	4.25	47.73

Table 24: PCSTP CRR instances. Results computed by B&C on the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
C01-A	500	625	5	18	18	0.00	0	0.02	0.11
C01-B	500	625	5	85	85	0.00	0	0.10	0.10
C02-A	500	625	10	50	50	0.00	0	0.01	0.09
C02-B	500	625	10	141	141	0.00	0	0.11	0.12
C03-A	500	625	83	414	414	0.00	0	0.01	0.10
C03-B	500	625	83	737	737	0.00	0	0.17	0.65
C04-A	500	625	125	618	618	0.00	0	0.19	0.19
C04-B	500	625	125	1063	1063	0.00	0	0.15	0.73
C05-A	500	625	250	1080	1080	0.00	0	0.26	0.26
C05-B	500	625	250	1528	1528	0.00	0	0.50	0.54
C06-A	500	1000	5	18	18	0.00	0	0.01	0.11
C06-B	500	1000	5	55	55	0.00	0	0.01	0.18
C07-A	500	1000	10	50	50	0.00	0	0.01	0.11
C07-B	500	1000	10	102	102	0.00	0	0.12	0.13
C08-A	500	1000	83	361	361	0.00	0	0.25	0.34
C08-B	500	1000	83	500	500	0.00	0	0.26	0.30
C09-A	500	1000	125	533	533	0.00	0	0.66	0.67
C09-B	500	1000	125	694	694	0.00	0	1.30	1.31
C10-A	500	1000	250	859	859	0.00	0	0.39	0.39
C10-B	500	1000	250	1069	1069	0.00	0	0.79	1.12
C11-A	500	2500	5	18	18	0.00	0	0.03	0.21
C11-B	500	2500	5	32	32	0.00	0	0.22	0.34
C12-A	500	2500	10	38	38	0.00	0	0.26	0.32
C12-B	500	2500	10	46	46	0.00	0	0.25	0.30
C13-A	500	2500	83	236	236	0.00	0	0.91	1.30
C13-B	500	2500	83	258	258	0.00	0	0.82	1.85
C14-A	500	2500	125	293	293	0.00	0	0.45	0.51
C14-B	500	2500	125	318	318	0.00	0	0.63	0.63
C15-A	500	2500	250	501	501	0.00	0	1.31	1.48
C15-B	500	2500	250	551	551	0.00	0	1.63	2.07
C16-A	500	12500	5	11	11	0.00	0	1.49	1.51
C16-B	500	12500	5	11	11	0.00	0	1.47	1.49
C17-A	500	12500	10	18	18	0.00	0	1.09	1.45
C17-B	500	12500	10	18	18	0.00	0	1.22	1.62
C18-A	500	12500	83	111	111	0.00	0	3.58	3.60
C18-B	500	12500	83	113	113	0.00	0	3.12	3.14
C19-A	500	12500	125	146	146	0.00	0	2.26	2.28
C19-B	500	12500	125	146	146	0.00	0	1.54	1.56
C20-A	500	12500	250	266	266	0.00	0	1.98	2.01
C20-B	500	12500	250	267	267	0.00	0	1.17	1.20

Table 25: PCSTP CRR instances. Results computed by B&C on the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
D01-A	1000	1250	5	18	18.00	0.00	0	0.02	0.16
D01-B	1000	1250	5	106	106.00	0.00	0	0.32	0.32
D02-A	1000	1250	10	50	50.00	0.00	0	0.01	0.18
D02-B	1000	1250	10	218	218.00	0.00	0	0.03	0.21
D03-A	1000	1250	167	807	807.00	0.00	0	0.25	0.28
D03-B	1000	1250	167	1509	1509.00	0.00	0	0.26	0.48
D04-A	1000	1250	250	1203	1203.00	0.00	0	0.29	0.29
D04-B	1000	1250	250	1881	1881.00	0.00	0	0.65	0.90
D05-A	1000	1250	500	2157	2157.00	0.00	0	0.35	0.39
D05-B	1000	1250	500	3135	3135.00	0.00	0	0.96	1.31
D06-A	1000	2000	5	18	18.00	0.00	0	0.02	0.19
D06-B	1000	2000	5	67	67.00	0.00	0	0.41	0.46
D07-A	1000	2000	10	50	50.00	0.00	0	0.01	0.22
D07-B	1000	2000	10	103	103.00	0.00	0	0.01	0.23
D08-A	1000	2000	167	755	755.00	0.00	0	0.75	0.96
D08-B	1000	2000	167	1036	1036.00	0.00	0	0.40	1.14
D09-A	1000	2000	250	1070	1070.00	0.00	0	1.61	1.62
D09-B	1000	2000	250	1420	1420.00	0.00	0	0.59	2.45
D10-A	1000	2000	500	1671	1671.00	0.00	0	4.11	4.12
D10-B	1000	2000	500	2079	2079.00	0.00	0	1.41	2.70
D11-A	1000	5000	5	18	18.00	0.00	0	0.04	0.48
D11-B	1000	5000	5	29	29.00	0.00	0	0.06	0.83
D12-A	1000	5000	10	42	42.00	0.00	0	0.46	0.58
D12-B	1000	5000	10	42	42.00	0.00	0	0.51	0.64
D13-A	1000	5000	167	445	445.00	0.00	0	3.62	4.80
D13-B	1000	5000	167	486	486.00	0.00	0	0.84	2.83
D14-A	1000	5000	250	602	602.00	0.00	0	1.04	7.14
D14-B	1000	5000	250	665	665.00	0.00	0	1.34	3.52
D15-A	1000	5000	500	1042	1042.00	0.00	0	5.27	6.75
D15-B	1000	5000	500	1108	1108.00	0.00	0	3.98	6.07
D16-A	1000	25000	5	13	13.00	0.00	0	2.37	2.58
D16-B	1000	25000	5	13	13.00	0.00	0	3.02	3.08
D17-A	1000	25000	10	23	23.00	0.00	0	3.27	3.97
D17-B	1000	25000	10	23	23.00	0.00	0	5.04	5.09
D18-A	1000	25000	167	218	218.00	0.00	0	6.95	6.97
D18-B	1000	25000	167	223	223.00	0.00	0	9.47	9.50
D19-A	1000	25000	250	306	306.00	0.00	0	9.53	9.56
D19-B	1000	25000	250	310	310.00	0.00	0	3.96	4.00
D20-A	1000	25000	500	536	536.00	0.00	0	5.09	5.12
D20-B	1000	25000	500	537	537.00	0.00	0	2.64	2.68

Table 26: PCSTP JMP instances. Results computed by B&C on the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
K100	100	351	14	135511	135511	0.00	0	0.01	0.08
K100.1	100	348	11	124108	124108	0.00	0	0.02	0.31
K100.10	100	319	14	133567	133567	0.00	0	0.02	0.23
K100.2	100	339	13	200262	200262	0.00	0	0.34	0.57
K100.3	100	407	10	115953	115953	0.00	0	0.02	0.29
K100.4	100	364	10	87498	87498	0.00	0	0.03	0.20
K100.5	100	358	16	119078	119078	0.00	0	0.01	0.07
K100.6	100	307	11	132886	132886	0.00	0	0.03	0.21
K100.7	100	315	13	172457	172457	0.00	0	0.03	0.31
K100.8	100	343	15	210869	210869	0.00	0	0.10	0.12
K100.9	100	333	11	122917	122917	0.00	0	0.01	0.11
K200	200	691	33	329211	329211	0.00	0	0.16	0.16
K400	400	1515	62	350093	350093	0.00	0	0.64	1.40
K400.1	400	1470	64	490771	490771	0.00	0	0.01	2.73
K400.10	400	1507	49	394191	394191	0.00	0	5.35	5.35
K400.2	400	1527	61	477073	477073	0.00	0	5.12	5.25
K400.3	400	1492	55	415328	415328	0.00	0	0.01	2.05
K400.4	400	1426	55	389451	389451	0.00	0	0.60	2.42
K400.5	400	1456	76	519526	519526	0.00	0	4.83	4.83
K400.6	400	1576	55	374849	374849	0.00	0	0.15	1.64
K400.7	400	1442	67	474466	474466	0.00	0	1.51	3.81
K400.8	400	1516	60	418614	418614	0.00	0	2.22	3.09
K400.9	400	1500	53	383105	383105	0.00	0	0.15	2.60
P100	100	317	33	803300	803300	0.00	0	0.08	0.11
P100.1	100	284	32	926238	926238	0.00	0	0.07	0.07
P100.2	100	297	26	401641	401641	0.00	3	0.10	0.10
P100.3	100	316	24	659644	659644	0.00	0	0.21	0.22
P100.4	100	284	32	827419	827419	0.00	0	0.08	0.09
P200	200	587	48	1317874	1317874	0.00	0	0.18	0.20
P400	400	1200	94	2459904	2459904	0.00	0	0.39	0.39
P400.1	400	1212	120	2808440	2808440	0.00	0	1.26	1.26
P400.2	400	1196	107	2518577	2518577	0.00	0	0.73	0.73
P400.3	400	1175	113	2951725	2951725	0.00	0	0.80	0.80
P400.4	400	1144	94	2852956	2852956	0.00	0	0.74	0.77

Table 27: PCSTP H instances. Results computed by B&C using the (x, y)-model for hc*p instances, and y-model for hc*u.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
hc6p	64	192	64	3908	3908	0.00	1324	1.42	1.48
hc6u	64	192	64	36	36	0.00	10	0.08	0.08
hc7p	128	448	128	7721	7721	0.00	61061	197.52	588.39
hc7u	128	448	128	72	72	0.00	322	0.15	0.17
hc8p	256	1024	256	15100	15264	1.09	178611	1878.44	timeout
hc8u	256	1024	256	143	143	0.00	18410	11.25	12.56
hc9p	512	2304	512	29740	30252	1.72	36536	3347.10	timeout
hc9u	512	2304	512	283	283	0.00	1001800	2549.50	2551.32
hc10p	1024	5120	1024	58951	60594	2.79	7193	2458.15	timeout
hc10u	1024	5120	1024	555	562	1.26	376031	305.50	memout
hc11p	2048	11264	2048	116860	120997	3.54	1129	354.47	timeout
hc11u	2048	11264	2048	1105	1120	1.36	203282	791.06	memout
hc12p	4096	24576	4096	231947	240481	3.68	15	1079.88	timeout
hc12u	4096	24576	4096	2193	2226	1.50	55328	3417.75	timeout

Table 28: PCSTP H2 instances. Results computed by B&C using the (x, y)-model for hc*p2 instances, and y-model for hc*u2.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
hc6p2	64	192	64	3923	3923	0.00	5231	4.45	4.84
hc6u2	64	192	64	20	20	0.00	0	0.02	0.05
hc7p2	128	448	128	7711	7711	0.00	22460	82.81	106.29
hc7u2	128	448	128	47	47	0.00	185	0.11	0.14
hc8p2	256	1024	256	15153	15291	0.91	263116	335.17	timeout
hc8u2	256	1024	256	97	97	0.00	5620	2.31	2.35
hc9p2	512	2304	512	29869	30466	2.00	53374	133.80	timeout
hc9u2	512	2304	512	190	190	0.00	198619	8.97	513.00
hc10p2	1024	5120	1024	58943	60531	2.69	3534	1305.47	timeout
hc10u2	1024	5120	1024	377	382	1.33	368341	843.62	memout
hc11p2	2048	11264	2048	116882	120998	3.52	1236	354.23	timeout
hc11u2	2048	11264	2048	745	761	2.15	219154	1702.11	memout
hc12p2	4096	24576	4096	232139	240480	3.59	13	1629.79	timeout
hc12u2	4096	24576	4096	1478	1507	1.96	112741	3572.66	timeout

Table 29: PCSTP ACTMODPC instances. Results computed by B&C after transforming the instances into their PCSTP representation. Based on the filter rules (cf. Section 3.4 in the main paper) the y-model is applied to the denser graphs (drosophila001/005/0075, HCMV, lymphoma), while the (x, y)-model is only applied to the remaining ones.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
HCMV	3863	29293	3863	7371.536373	7371.536373	0.00	33	1.38	1.39
drosophila001	5226	93394	5226	8273.982630	8273.982630	0.00	1436	13.35	13.47
drosophila005	5226	93394	5226	8121.313578	8121.313578	0.00	2531	12.00	12.08
drosophila0075	5226	93394	5226	8039.859460	8039.859460	0.00	580	9.58	9.69
lymphoma	2034	7756	2034	3341.890237	3341.890237	0.00	0	0.25	0.26
metabol_expr_mice_1	3523	4345	3523	11346.927189	11346.927189	0.00	0	1.86	1.87
metabol_expr_mice_2	3514	4332	3514	16250.235191	16250.235191	0.00	0	0.76	1.13
metabol_expr_mice_3	2853	3335	2853	16919.620407	16919.620407	0.00	0	0.44	0.79

Table 30: PCSTP PUCNU instances (uniform PCSTP version of CC and BIP instances from PUC). Results computed by B&C using the y-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
bip42nu	1200	3982	200	226	226	0.00	94423	145.09	145.44
bip52nu	2200	7997	200	222	222	0.00	72089	137.47	138.55
bip62nu	1200	10002	200	214	214	0.00	202867	0.60	210.84
bipa2nu	3300	18073	300	323	325	0.62	172496	4.67	memout
bipe2nu	550	5013	50	53	53	0.00	0	0.15	0.23
cc10-2nu	1024	5120	135	165	171	3.64	261737	143.11	memout
cc11-2nu	2048	11263	244	297	312	5.05	203753	341.92	memout
cc12-2nu	4096	24574	473	552	581	5.25	138670	87.52	memout
cc3-10nu	1000	13500	50	59	61	3.39	495805	53.99	memout
cc3-11nu	1331	19965	61	75	80	6.67	252916	291.78	timeout
cc3-12nu	1728	28512	74	89	96	7.87	245186	1.00	memout
cc3-4nu	64	288	8	10	10	0.00	0	0.03	0.04
cc3-5nu	125	750	13	17	17	0.00	0	0.01	0.04
cc5-3nu	243	1215	27	36	36	0.00	1799	0.54	0.55
cc6-2nu	64	192	12	15	15	0.00	0	0.01	0.04
cc6-3nu	729	4368	76	95	95	0.00	75306	116.12	116.94
cc7-3nu	2187	15308	222	264	280	6.06	198914	52.71	memout
cc9-2nu	512	2304	64	83	83	0.00	26012	15.86	16.09

Table 31: PCSTP I640 instances. Results computed by B&C using the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
i640-001	640	960	9	2932	2932	0.00	0	0.16	0.20
i640-002	640	960	9	2795	2795	0.00	0	0.15	0.25
i640-003	640	960	9	2630	2630	0.00	0	0.23	0.31
i640-004	640	960	9	3356	3356	0.00	0	0.15	0.15
i640-005	640	960	9	3288	3288	0.00	0	0.01	0.14
i640-011	640	4135	9	2166	2166	0.00	4	0.03	3.28
i640-012	640	4135	9	1999	1999	0.00	0	1.58	1.59
i640-013	640	4135	9	2002	2002	0.00	0	0.80	0.81
i640-014	640	4135	9	2171	2171	0.00	0	0.50	0.74
i640-015	640	4135	9	2295	2295	0.00	0	0.06	0.86
i640-021	640	204480	9	1585	1585	0.00	0	140.61	140.97
i640-022	640	204480	9	1704	1704	0.00	0	90.21	90.57
i640-023	640	204480	9	1614	1614	0.00	0	140.92	141.32
i640-024	640	204480	9	1563	1563	0.00	0	160.80	161.18
i640-025	640	204480	9	1550	1550	0.00	0	100.95	101.31
i640-031	640	1280	9	2400	2400	0.00	0	0.20	0.25
i640-032	640	1280	9	2053	2053	0.00	0	0.03	0.21
i640-033	640	1280	9	2789	2789	0.00	0	0.05	0.32
i640-034	640	1280	9	2757	2757	0.00	0	0.30	0.31
i640-035	640	1280	9	2510	2510	0.00	0	0.47	0.48
i640-041	640	40896	9	1639	1639	0.00	0	20.61	20.65
i640-042	640	40896	9	1621	1621	0.00	0	9.05	10.60
i640-043	640	40896	9	1401	1401	0.00	0	5.96	6.05
i640-044	640	40896	9	1665	1665	0.00	0	8.53	11.53
i640-045	640	40896	9	1569	1569	0.00	0	0.29	8.26
i640-101	640	960	25	8135	8135	0.00	0	0.77	1.10
i640-102	640	960	25	7791	7791	0.00	0	0.25	0.28
i640-103	640	960	25	7854	7854	0.00	0	0.44	0.51
i640-104	640	960	25	6965	6965	0.00	0	0.31	0.31
i640-105	640	960	25	8669	8669	0.00	0	0.49	0.62
i640-111	640	4135	25	5323	5323	0.00	136	6.97	8.14
i640-112	640	4135	25	5908	5908	0.00	50	7.36	9.15
i640-113	640	4135	25	5886	5886	0.00	359	17.01	17.87
i640-114	640	4135	25	5630	5630	0.00	9	2.61	4.88
i640-115	640	4135	25	6040	6040	0.00	371	14.74	20.02
i640-121	640	204480	25	4379	4379	0.00	0	208.18	224.89
i640-122	640	204480	25	4707	4707	0.00	100	273.72	275.11
i640-123	640	204480	25	4509	4509	0.00	25	243.46	291.61
i640-124	640	204480	25	4586	4586	0.00	15	230.39	230.66
i640-125	640	204480	25	4556	4556	0.00	33	474.80	482.45
i640-131	640	1280	25	6490	6490	0.00	0	0.45	0.45
i640-132	640	1280	25	7800	7800	0.00	0	0.58	1.88
i640-133	640	1280	25	6808	6808	0.00	0	0.60	1.85
i640-134	640	1280	25	6415	6415	0.00	0	0.25	0.25
i640-135	640	1280	25	6618	6618	0.00	0	0.37	1.55
i640-141	640	40896	25	5171	5171	0.00	2427	410.04	410.63
i640-142	640	40896	25	4733	4733	0.00	368	132.81	153.42
i640-143	640	40896	25	4321	4321	0.00	97	49.24	53.79
i640-144	640	40896	25	4562	4562	0.00	1686	263.24	283.33
i640-145	640	40896	25	4907	4907	0.00	1139	157.79	179.88

Table 32: PCSTP I640 instances. Results computed by B&C using the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
i640-201	640	960	50	14372	14372	0.00	0	0.32	0.34
i640-202	640	960	50	15059	15059	0.00	0	0.16	0.17
i640-203	640	960	50	13848	13848	0.00	0	0.18	0.35
i640-204	640	960	50	13108	13108	0.00	0	0.34	0.44
i640-205	640	960	50	15308	15308	0.00	0	1.56	1.56
i640-211	640	4135	50	11109	11109	0.00	11205	418.16	439.18
i640-212	640	4135	50	10351	10351	0.00	1154	65.44	69.55
i640-213	640	4135	50	10388	10388	0.00	1833	87.94	93.49
i640-214	640	4135	50	10675	10675	0.00	31	12.53	14.82
i640-215	640	4135	50	10740	10740	0.00	3760	114.81	123.28
i640-221	640	204480	50	8400	8400	0.00	511	946.02	1486.74
i640-222	640	204480	50	8993	8993	0.00	60	758.60	877.40
i640-223	640	204480	50	9210	9210	0.00	246	677.12	774.75
i640-224	640	204480	50	8870	8870	0.00	455	1019.81	1300.64
i640-225	640	204480	50	8386	8386	0.00	164	788.68	878.78
i640-231	640	1280	50	14279	14279	0.00	29	8.76	14.72
i640-232	640	1280	50	13526	13526	0.00	9	0.98	3.57
i640-233	640	1280	50	12948	12948	0.00	0	3.20	3.50
i640-234	640	1280	50	13645	13645	0.00	0	1.08	1.38
i640-235	640	1280	50	12650	12650	0.00	0	1.04	1.04
i640-241	640	40896	50	9693	9716	0.24	12581	3540.63	timeout
i640-242	640	40896	50	9250	9250	0.00	1560	169.37	439.84
i640-243	640	40896	50	9315	9315	0.00	5846	873.66	1151.62
i640-244	640	40896	50	8950	8950	0.00	14499	1535.09	1966.04
i640-245	640	40896	50	9448	9448	0.00	9587	1598.69	1826.44
i640-301	640	960	160	42701	42701	0.00	0	0.87	0.87
i640-302	640	960	160	42606	42606	0.00	0	0.65	1.18
i640-303	640	960	160	41286	41286	0.00	0	0.76	0.82
i640-304	640	960	160	42050	42050	0.00	0	0.61	0.68
i640-305	640	960	160	42798	42798	0.00	8	1.61	2.56
i640-311	640	4135	160	33320	33547	0.68	72680	3526.66	timeout
i640-312	640	4135	160	32518	32790	0.84	51318	3513.01	timeout
i640-313	640	4135	160	32401	32401	0.00	59731	2348.70	3198.79
i640-314	640	4135	160	32720	32959	0.73	71012	3531.49	timeout
i640-315	640	4135	160	32462	32666	0.63	83624	2956.92	timeout
i640-321	640	204480	160	28699	28803	0.36	665	450.83	timeout
i640-322	640	204480	160	28380	28467	0.31	835	478.14	timeout
i640-323	640	204480	160	28083	28157	0.26	1106	3002.73	timeout
i640-324	640	204480	160	28684	28760	0.26	825	3500.85	timeout
i640-325	640	204480	160	28305	28386	0.29	849	3306.30	timeout
i640-331	640	1280	160	39315	39315	0.00	8	7.45	7.54
i640-332	640	1280	160	39030	39030	0.00	3	6.02	6.03
i640-333	640	1280	160	39775	39775	0.00	324	28.74	29.62
i640-334	640	1280	160	39338	39338	0.00	11	4.22	4.23
i640-335	640	1280	160	39601	39601	0.00	8346	20.74	771.37
i640-341	640	40896	160	29505	29739	0.79	6181	637.22	timeout
i640-342	640	40896	160	29672	29838	0.56	3739	58.14	timeout
i640-343	640	40896	160	29882	30056	0.58	2536	62.79	timeout
i640-344	640	40896	160	29763	29942	0.60	7022	3365.72	timeout
i640-345	640	40896	160	29817	30082	0.89	2691	714.82	timeout

1.0.3 Exact results for the RPCSTP

Table 33: RPCSTP Cologne1 and Cologne2 instances. Results computed by B&C using the (x, y)-model.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
i101M1	748	6332	10	109271.502783	109271.502783	0.00	0	0.77	0.78
i101M2	748	6332	10	315925.310428	315925.310428	0.00	0	16.00	16.02
i101M3	748	6332	10	355625.408852	355625.408852	0.00	0	21.10	28.66
i102M1	749	6343	11	104065.801134	104065.801134	0.00	0	0.76	0.77
i102M2	749	6343	11	352538.818837	352538.818837	0.00	0	0.04	25.38
i102M3	749	6343	11	454365.927424	454365.927424	0.00	0	50.65	56.19
i103M1	751	6343	13	139749.407306	139749.407306	0.00	0	0.95	0.97
i103M2	751	6343	13	407834.227844	407834.227844	0.00	0	17.05	17.07
i103M3	751	6343	13	456125.487925	456125.487925	0.00	0	34.50	34.52
i104M2	741	6293	3	89920.835350	89920.835350	0.00	0	0.06	4.75
i104M3	741	6293	3	97148.789008	97148.789008	0.00	0	9.48	9.49
i105M1	741	6296	3	26717.202496	26717.202496	0.00	0	0.75	0.76
i105M2	741	6296	3	100269.618561	100269.618561	0.00	0	0.83	9.71
i105M3	741	6296	3	110351.163277	110351.163277	0.00	0	13.53	13.54
i201M2	1803	16743	9	355467.684304	355467.684304	0.00	0	0.11	15.31
i201M3	1803	16743	9	628833.614262	628833.614262	0.00	0	167.88	167.92
i201M4	1803	16743	9	773398.302518	773398.302518	0.00	0	169.90	169.93
i202M2	1804	16740	10	288946.831762	288946.831762	0.00	0	0.08	14.07
i202M3	1804	16740	10	419184.158992	419184.158992	0.00	0	66.74	66.78
i202M4	1804	16740	10	430034.263833	430034.263833	0.00	0	153.18	153.21
i203M2	1809	16762	15	459894.776495	459894.776495	0.00	0	10.01	13.52
i203M3	1809	16762	15	643062.019515	643062.019515	0.00	0	217.41	217.45
i203M4	1809	16762	15	677733.067256	677733.067256	0.00	0	237.77	237.80
i204M2	1801	16719	4	161700.545224	161700.545224	0.00	0	0.08	8.13
i204M3	1801	16719	4	245287.202568	245287.202568	0.00	0	37.19	37.22
i204M4	1801	16719	4	245287.202568	245287.202568	0.00	0	69.49	69.52
i205M2	1810	16794	13	571031.415345	571031.415345	0.00	0	0.10	13.41
i205M3	1810	16794	13	672403.143108	672403.143108	0.00	0	43.39	43.42
i205M4	1810	16794	13	713973.622715	713973.622715	0.00	0	97.70	97.74

1.0.4 Exact results for the MWCS

Table 34: MWCS ACTMOD instances. Results computed by B&C after transforming the instances into their PCSTP representation. Based on the filter rules (cf. Section 3.4 in the main paper) the y-model is applied to the denser graphs (drosophila001/005/0075, HCMV, lymphoma), while the (x, y)-model is only applied to the remaining ones.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
HCMV	3863	29293	3863	7.554315	7.554315	0.00	2	1.31	1.49
drosophila001	5226	93394	5226	24.385506	24.385506	0.00	723	8.57	9.09
drosophila005	5226	93394	5226	178.663952	178.663952	0.00	1791	10.97	11.47
drosophila0075	5226	93394	5226	260.523557	260.523557	0.00	603	9.59	9.70
lymphoma	2034	7756	2034	70.166309	70.166309	0.00	0	0.27	0.30
metabol_expr_mice_1	3523	4345	3523	544.948370	544.948370	0.00	0	1.99	2.00
metabol_expr_mice_2	3514	4332	3514	241.077524	241.077524	0.00	0	0.77	1.18
metabol_expr_mice_3	2853	3335	2853	508.260877	508.260877	0.00	0	0.55	0.99

Table 35: MWCS JMPALMK instances. Results computed by B&C using the y-model after transforming the instances into their PCSTP representation.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
a-0.62-d-0.25-e-0.25	500	2597	500	460.577357	460.577357	0.00	0	0.17	0.17
a-0.62-d-0.25-e-0.5	500	2597	500	992.967111	992.967111	0.00	0	0.02	0.09
a-0.62-d-0.25-e-0.75	500	2597	500	1447.544516	1447.544516	0.00	0	0.02	0.09
a-0.62-d-0.5-e-0.25	500	2597	500	280.832378	280.832378	0.00	0	0.02	0.09
a-0.62-d-0.5-e-0.5	500	2597	500	655.623217	655.623217	0.00	0	0.03	0.10
a-0.62-d-0.5-e-0.75	500	2597	500	965.554694	965.554694	0.00	0	0.02	0.08
a-0.62-d-0.75-e-0.25	500	2597	500	171.628785	171.628785	0.00	0	0.03	0.08
a-0.62-d-0.75-e-0.5	500	2597	500	362.188212	362.188212	0.00	0	0.02	0.07
a-0.62-d-0.75-e-0.75	500	2597	500	490.623986	490.623986	0.00	0	0.03	0.09
a-1-d-0.25-e-0.25	500	6519	500	471.393285	471.393285	0.00	0	0.04	0.15
a-1-d-0.25-e-0.5	500	6519	500	995.313181	995.313181	0.00	0	0.04	0.16
a-1-d-0.25-e-0.75	500	6519	500	1447.544516	1447.544516	0.00	0	0.05	0.21
a-1-d-0.5-e-0.25	500	6519	500	286.920868	286.920868	0.00	0	0.04	0.13
a-1-d-0.5-e-0.5	500	6519	500	661.711707	661.711707	0.00	0	0.08	0.21
a-1-d-0.5-e-0.75	500	6519	500	965.554694	965.554694	0.00	0	0.04	0.18
a-1-d-0.75-e-0.25	500	6519	500	171.628785	171.628785	0.00	0	0.03	0.12
a-1-d-0.75-e-0.5	500	6519	500	362.188212	362.188212	0.00	0	0.04	0.16
a-1-d-0.75-e-0.75	500	6519	500	490.623986	490.623986	0.00	0	0.07	0.18
a-0.647-d-0.25-e-0.25	750	4219	750	702.644057	702.644057	0.00	0	0.04	0.13
a-0.647-d-0.25-e-0.5	750	4219	750	1419.779858	1419.779858	0.00	0	0.02	0.13
a-0.647-d-0.25-e-0.75	750	4219	750	2116.582326	2116.582326	0.00	0	0.03	0.15
a-0.647-d-0.5-e-0.25	750	4219	750	403.177763	403.177763	0.00	0	0.04	0.12
a-0.647-d-0.5-e-0.5	750	4219	750	946.129495	946.129495	0.00	0	0.04	0.13
a-0.647-d-0.5-e-0.75	750	4219	750	1382.772025	1382.772025	0.00	0	0.02	0.13
a-0.647-d-0.75-e-0.25	750	4219	750	266.983922	266.983922	0.00	0	0.03	0.10
a-0.647-d-0.75-e-0.5	750	4219	750	580.407832	580.407832	0.00	0	0.03	0.10
a-0.647-d-0.75-e-0.75	750	4219	750	764.156726	764.156726	0.00	0	0.02	0.11
a-1-d-0.25-e-0.25	750	9822	750	708.143835	708.143835	0.00	0	0.05	0.22
a-1-d-0.25-e-0.5	750	9822	750	1426.449038	1426.449038	0.00	0	0.05	0.23
a-1-d-0.25-e-0.75	750	9822	750	2116.582326	2116.582326	0.00	0	0.05	0.32
a-1-d-0.5-e-0.25	750	9822	750	403.177763	403.177763	0.00	0	0.05	0.20
a-1-d-0.5-e-0.5	750	9822	750	946.129495	946.129495	0.00	0	0.07	0.27
a-1-d-0.5-e-0.75	750	9822	750	1382.772025	1382.772025	0.00	0	0.06	0.24
a-1-d-0.75-e-0.25	750	9822	750	266.983922	266.983922	0.00	0	0.06	0.21
a-1-d-0.75-e-0.5	750	9822	750	580.407832	580.407832	0.00	0	0.06	0.22
a-1-d-0.75-e-0.75	750	9822	750	764.156726	764.156726	0.00	0	0.06	0.25
a-0.6-d-0.25-e-0.25	1000	4936	1000	931.538552	931.538552	0.00	17	0.04	0.27
a-0.6-d-0.25-e-0.5	1000	4936	1000	1872.275395	1872.275395	0.00	0	0.04	0.17
a-0.6-d-0.25-e-0.75	1000	4936	1000	2789.579105	2789.579105	0.00	0	0.04	0.19
a-0.6-d-0.5-e-0.25	1000	4936	1000	522.525615	522.525615	0.00	0	0.06	0.25
a-0.6-d-0.5-e-0.5	1000	4936	1000	1197.851024	1197.851024	0.00	0	0.03	0.14
a-0.6-d-0.5-e-0.75	1000	4936	1000	1762.707468	1762.707468	0.00	0	0.03	0.15
a-0.6-d-0.75-e-0.25	1000	4936	1000	332.791924	332.791924	0.00	0	0.03	0.11
a-0.6-d-0.75-e-0.5	1000	4936	1000	754.300601	754.300601	0.00	0	0.04	0.16
a-0.6-d-0.75-e-0.75	1000	4936	1000	998.215414	998.215414	0.00	0	0.06	0.18
a-1-d-0.25-e-0.25	1000	13279	1000	939.393370	939.393370	0.00	0	0.08	0.32
a-1-d-0.25-e-0.5	1000	13279	1000	1883.213605	1883.213605	0.00	0	0.07	0.37
a-1-d-0.25-e-0.75	1000	13279	1000	2789.579105	2789.579105	0.00	0	0.10	0.47
a-1-d-0.5-e-0.25	1000	13279	1000	533.429400	533.429400	0.00	0	0.06	0.26
a-1-d-0.5-e-0.5	1000	13279	1000	1205.421314	1205.421314	0.00	0	0.12	0.41
a-1-d-0.5-e-0.75	1000	13279	1000	1770.277758	1770.277758	0.00	0	0.06	0.35
a-1-d-0.75-e-0.25	1000	13279	1000	336.829944	336.829944	0.00	0	0.07	0.24
a-1-d-0.75-e-0.5	1000	13279	1000	760.284581	760.284581	0.00	0	0.09	0.33
a-1-d-0.75-e-0.75	1000	13279	1000	1004.199394	1004.199394	0.00	0	0.09	0.36

Table 36: MWCS JMPALMK instances. Results computed by B&C using the y-model after transforming the instances into their PCSTP representation.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
a-0.6-d-0.25-e-0.25	1500	7662	1500	1333.476429	1333.476429	0.00	706	0.05	0.75
a-0.6-d-0.25-e-0.5	1500	7662	1500	2799.677215	2799.677215	0.00	0	0.05	0.30
a-0.6-d-0.25-e-0.75	1500	7662	1500	4230.251122	4230.251122	0.00	0	0.05	0.29
a-0.6-d-0.5-e-0.25	1500	7662	1500	847.452011	847.452011	0.00	0	0.05	0.19
a-0.6-d-0.5-e-0.5	1500	7662	1500	1858.092599	1858.092599	0.00	0	0.05	0.21
a-0.6-d-0.5-e-0.75	1500	7662	1500	2697.458763	2697.458763	0.00	0	0.05	0.25
a-0.6-d-0.75-e-0.25	1500	7662	1500	502.175990	502.175990	0.00	0	0.05	0.18
a-0.6-d-0.75-e-0.5	1500	7662	1500	1089.771170	1089.771170	0.00	0	0.04	0.18
a-0.6-d-0.75-e-0.75	1500	7662	1500	1423.610629	1423.610629	0.00	0	0.05	0.21
a-1-d-0.25-e-0.25	1500	20527	1500	1377.014397	1377.014397	0.00	0	0.11	0.49
a-1-d-0.25-e-0.5	1500	20527	1500	2820.051735	2820.051735	0.00	0	0.16	0.62
a-1-d-0.25-e-0.75	1500	20527	1500	4230.251122	4230.251122	0.00	0	0.14	0.78
a-1-d-0.5-e-0.25	1500	20527	1500	860.618961	860.618961	0.00	0	0.14	0.48
a-1-d-0.5-e-0.5	1500	20527	1500	1865.662889	1865.662889	0.00	0	0.14	0.62
a-1-d-0.5-e-0.75	1500	20527	1500	2707.700013	2707.700013	0.00	0	0.13	0.63
a-1-d-0.75-e-0.25	1500	20527	1500	502.175990	502.175990	0.00	0	0.10	0.34
a-1-d-0.75-e-0.5	1500	20527	1500	1089.771170	1089.771170	0.00	0	0.11	0.49
a-1-d-0.75-e-0.75	1500	20527	1500	1423.610629	1423.610629	0.00	0	0.16	0.59

1.0.5 Exact results for the DCST

Table 37: DCST TREEFARM instances. Results computed by B&C using the (x, y)-model augmented with degree constraints. If infeasibility was proven before the time limit, columns LB and UB contain the keyword 'infeasible'.

Instance	$|V|$	$|E|$	$|T|$	LB	UB	Gap%	Nodes	Time	Time-t
TF101057-t1	52	1326	35	infeasible	infeasible	0.00	0	-	0.22
TF101057-t3	52	1326	35	2756	2756	0.00	0	0.53	0.53
TF101125-t1	304	46056	155	infeasible	infeasible	0.00	0	-	13.65
TF101125-t3	304	46056	155	54683	140774	157.44	0	0.20	timeout
TF101202-t1	188	17578	72	79920	79920	0.00	87	259.70	259.77
TF101202-t3	188	17578	72	77978	77978	0.00	90	468.09	473.42
TF102003-t1	832	345696	407	241243	-	-	0	-	timeout
TF102003-t3	832	345696	407	178410	474672	166.06	0	3.49	timeout
TF105035-t1	237	27966	104	35618	35618	0.00	52	463.18	469.10
TF105035-t3	237	27966	104	32753	50830	55.19	0	0.14	timeout
TF105272-t1	476	113050	223	185160	-	-	0	-	timeout
TF105272-t3	476	113050	223	125841	400546	218.30	0	0.81	timeout
TF105419-t1	55	1485	24	18668	18668	0.00	0	0.92	0.92
TF105419-t3	55	1485	24	18223	18223	0.00	2	3.26	3.27
TF105897-t1	314	49141	133	112790	-	-	0	-	timeout
TF105897-t3	314	49141	133	97236	200508	106.21	0	0.29	timeout
TF106403-t1	119	7021	46	54124	54124	0.00	5	11.62	11.65
TF106403-t3	119	7021	46	53760	53760	0.00	4	35.47	35.53
TF106478-t1	130	8385	54	55132	55132	0.00	9	10.96	11.03
TF106478-t3	130	8385	54	54839	54839	0.00	62	35.93	35.98

2 Detailed heuristic results

From the set of instances that remained unsolved after applying B&C with a time limit of one hour, we selected difficult ones to apply our heuristic setting (local branching and the set-covering heuristic). No experiments have been performed with the heuristic setting on the large-sparse type of instances, which can be solved more efficiently by other methods. Each run has been computed by running the heuristic setting with ten different seeds, each with one hour time limit. The used heuristic approach was chosen dynamically through the filter procedure. Each table is structured as follows: The column 'Instance' gives the instance name, followed by the instance's number of nodes, edges and terminals. The next pair of columns (BEST) show objective value and time of computation for the best found solution. The following pairs (AVG and STD) list the average and standard deviation of these two values over all ten runs. For tests on the STP (PUC, I640, except for PUCN where no results have been published before), the column 'Impr.' lists the improvement with respect to the previously best known published solutions (by August 1st, 2014) according to the DIMACS challenge (http://dimacs11.cs.princeton.edu/instances/bounds20140801.txt). In all other cases, the improvement to the best primal solutions produced during the exact runs after one hour is given.

Table 38: STP PUCN instances remaining unsolved by B&C after one hour. Results computed through y-model-based local branching.

Instance	$|V|$	$|E|$	$|T|$	BEST UB	BEST Time	AVG UB	AVG Time	STD UB	STD Time	Impr.
cc10-2n	1024	5120	135	180	89.50	181.00	690.13	0.67	952.37	2
cc11-2n	2048	11263	244	327	39.84	328.00	658.63	0.67	904.00	4
cc12-2n	4096	24574	473	617	930.40	621.80	933.09	2.57	639.18	9
cc3-10n	1000	13500	50	75	0.31	75.00	1.19	0.00	1.03	0
cc3-11n	1331	19965	61	92	0.53	92.00	1.24	0.00	0.81	0
cc3-12n	1728	28512	74	111	2.07	111.00	6.61	0.00	3.83	0
cc7-3n	2187	15308	222	290	51.42	290.70	449.57	0.82	410.34	3
cc9-2n	512	2304	64	98	73.52	98.90	598.66	0.57	575.48	2

Table 39: STP I640 instances remaining unsolved by B&C after one hour. Results computed through (x, y)-model-based local branching.

Instance	$|V|$	$|E|$	$|T|$	BEST UB	BEST Time	AVG UB	AVG Time	STD UB	STD Time	Impr.
i640-311	640	4135	160	35766	117.65	35779.00	1520.97	21.75	1219.66	0
i640-312	640	4135	160	35768	1410.35	35793.20	1478.45	25.38	1104.32	3
i640-313	640	4135	160	35535	292.62	35538.20	923.67	4.13	921.39	0
i640-314	640	4135	160	35533	1610.03	35547.00	1673.70	12.53	679.53	5
i640-315	640	4135	160	35720	156.24	35733.50	866.76	21.87	695.92	21
i640-321	640	204480	160	31097	405.51	31100.20	1366.13	2.30	862.44	-3
i640-322	640	204480	160	31068	1396.55	31071.30	1491.06	3.02	996.57	0
i640-323	640	204480	160	31080	117.25	31080.40	984.90	0.97	1136.27	0
i640-324	640	204480	160	31093	190.69	31094.50	1034.46	0.85	968.31	-1
i640-325	640	204480	160	31081	317.54	31081.40	880.76	0.52	870.80	0
i640-341	640	40896	160	32088	1246.17	32121.80	1874.78	14.22	941.07	-46
i640-342	640	40896	160	31992	646.97	32009.30	2480.25	9.75	1106.75	-14
i640-343	640	40896	160	32044	1788.55	32066.20	2174.56	15.83	916.95	-29
i640-344	640	40896	160	32022	3033.54	32054.70	2371.76	18.60	1208.35	-31
i640-345	640	40896	160	32020	3248.00	32058.60	2097.10	21.72	974.07	-26

Table 40: STP PUC instances remaining unsolved by B&C after one hour. Results computed by the set-covering heuristic for instances with a set cover structure (bip*u/p, hc*u/p), and through (x, y)-model-based local branching for the rest.

Instance	$|V|$	$|E|$	$|T|$	BEST		AVG		STD		Impr.
				UB	Time	UB	Time	UB	Time	
bip42p	1200	3982	200	24657	38.36	24660.80	664.65	2.04	1125.16	0
bip52p	2200	7997	200	24549	805.57	24566.90	1403.00	13.91	1357.42	-14
bip52u	2200	7997	200	233	1390.10	233.80	287.94	0.42	597.96	1
bip62p	1200	10002	200	22906	3.60	22907.00	55.37	1.05	80.78	-36
bip62u	1200	10002	200	219	6.21	219.00	12.28	0.00	5.04	1
bipa2p	3300	18073	300	35355	547.18	35360.90	1342.88	4.38	879.59	24
bipa2u	3300	18073	300	337	185.06	337.00	310.89	0.00	215.22	4
cc10-2p	1024	5120	135	35257	875.45	35353.20	704.89	75.12	705.21	122
cc10-2u	1024	5120	135	342	206.27	342.60	818.02	0.52	1078.16	0
cc11-2p	2048	11263	244	63680	744.33	63895.70	976.37	103.40	726.59	146
cc11-2u	2048	11263	244	615	1388.68	616.90	1203.83	0.99	951.61	-1
cc12-2p	4096	24574	473	122166	1884.06	123096.00	1912.64	467.97	799.12	-1060
cc12-2u	4096	24574	473	1183	1559.46	1186.30	1937.01	1.77	804.16	-4
cc3-10p	1000	13500	50	12784	3471.19	12826.20	1801.62	43.46	1139.72	76
cc3-10u	1000	13500	50	125	61.88	125.00	615.79	0.00	683.51	0
cc3-11p	1331	19965	61	15599	458.95	15633.30	812.14	35.44	965.08	10
cc3-11u	1331	19965	61	153	29.69	153.00	269.26	0.00	580.93	0
cc3-12p	1728	28512	74	18879	1290.13	18936.60	1771.08	31.50	1139.80	-41
cc3-12u	1728	28512	74	185	59.70	185.00	900.54	0.00	985.39	1
cc3-5p	125	750	13	3661	0.75	3661.00	10.53	0.00	13.25	0
cc3-5u	125	750	13	36	0.01	36.00	0.02	0.00	0.01	0
cc5-3p	243	1215	27	7299	16.41	7299.00	238.22	0.00	208.56	0
cc5-3u	243	1215	27	71	0.65	71.00	2.61	0.00	1.24	0
cc6-3p	729	4368	76	20340	1266.76	20395.90	1543.97	46.02	983.95	116
cc7-3p	2187	15308	222	57080	1385.54	57328.70	1197.71	153.94	888.00	8
cc7-3u	2187	15308	222	551	383.80	554.10	1267.21	1.52	1078.48	1
cc9-2p	512	2304	64	17202	1603.44	17274.40	1579.81	28.51	984.36	94
cc9-2u	512	2304	64	167	14.95	167.30	753.10	0.48	1018.65	0
hc7p	128	448	64	7905	2479.97	7915.80	875.57	6.00	746.95	0
hc8p	256	1024	128	15337	2494.80	15349.50	1057.47	7.49	1128.89	-15
hc8u	256	1024	128	148	0.05	148.00	0.07	0.00	0.01	0
hc9p	512	2304	256	30319	1232.02	30342.30	1824.93	14.08	777.70	-61
hc9u	512	2304	256	292	0.27	292.00	0.39	0.00	0.08	0
hc10p	1024	5120	512	59981	267.51	60041.30	1013.51	33.38	816.95	513
hc10u	1024	5120	512	575	11.17	575.00	86.97	0.00	85.92	6
hc11p	2048	11264	1024	119500	3327.76	119533.00	1708.94	35.11	1129.07	279
hc11u	2048	11264	1024	1145	663.27	1145.40	1319.21	0.52	873.14	9
hc12p	4096	24576	2048	236267	2782.93	236347.10	2514.01	55.44	565.26	682
hc12u	4096	24576	2048	2261	2756.85	2262.50	2805.22	1.27	747.01	14

Table 41: PCSTP PUCNU instances unsolved by B&C after one hour. Results computed by y-model-based local branching.

Instance	$|V|$	$|E|$	$|T|$	BEST		AVG		STD		Impr.
				UB	Time	UB	Time	UB	Time	
bipa2nu	3300	18073	300	324	17.99	324.00	534.20	0.00	580.83	1
cc10-2nu	1024	5120	135	168	253.05	169.20	1059.52	0.63	1140.60	3
cc11-2nu	2048	11263	244	305	158.46	306.50	612.65	1.27	562.96	7
cc12-2nu	4096	24574	473	568	1427.16	571.00	921.48	1.49	893.82	13
cc3-10nu	1000	13500	50	61	0.52	61.00	4.21	0.00	5.57	0
cc3-11nu	1331	19965	61	79	11.62	79.30	365.37	0.48	571.75	1
cc3-12nu	1728	28512	74	95	12.23	95.00	412.33	0.00	538.46	1
cc7-3nu	2187	15308	222	271	565.00	274.10	639.51	1.29	751.37	9

Table 42: PCSTP I640 instances unsolved by B&C after one hour. Results computed by (x, y)-model-based local branching.

Instance	$|V|$	$|E|$	$|T|$	BEST UB	BEST Time	AVG UB	AVG Time	STD UB	STD Time	Impr.
i640-311	640	4135	160	33503	1062.15	33518.80	2044.98	20.39	1093.29	44
i640-312	640	4135	160	32721	152.92	32721.00	1846.09	0.00	1147.93	69
i640-313	640	4135	160	32401	200.14	32403.00	1302.32	6.32	906.75	0
i640-314	640	4135	160	32871	1572.85	32893.10	1590.90	20.36	1147.87	88
i640-315	640	4135	160	32616	491.25	32631.30	1621.18	9.31	1059.35	50
i640-321	640	204480	160	28787	309.34	28788.30	1121.02	1.57	1234.34	16
i640-322	640	204480	160	28458	943.72	28461.20	989.01	3.88	828.89	9
i640-323	640	204480	160	28153	9.22	28153.50	667.85	0.53	687.52	4
i640-324	640	204480	160	28746	44.53	28747.50	864.61	0.97	1116.14	14
i640-325	640	204480	160	28385	31.32	28386.00	1588.58	0.94	1588.99	1
i640-341	640	40896	160	29702	1585.79	29720.50	1679.07	14.21	984.23	37
i640-342	640	40896	160	29806	1591.95	29828.80	1889.09	16.78	915.53	32
i640-343	640	40896	160	30056	307.35	30059.90	1093.91	8.23	691.12	0
i640-344	640	40896	160	29921	365.16	29943.80	1370.59	12.75	913.09	21
i640-345	640	40896	160	30004	2580.47	30029.60	2289.36	18.68	1141.93	78

Table 43: PCSTP H and H2 instances remaining unsolved by B&C after one hour. Results computed through local branching using the y-model for uniform instances (hc*u(2)). For small non-uniform hypercubes (up to hc9p(2)), (x, y)-model-based local branching has been applied. For all larger hypercubes the set covering heuristic has been applied

Instance	$|V|$	$|E|$	$|T|$	BEST UB	BEST Time	AVG UB	AVG Time	STD UB	STD Time	Impr.
hc8p	256	1024	256	15206	537.28	15228.50	1514.80	15.69	1234.15	58
hc9p	512	2304	512	30043	3062.51	30084.00	1967.64	25.21	1073.46	209
hc10p	1024	5120	1024	59866	919.12	59965.20	1078.30	46.36	922.72	728
hc10u	1024	5120	1024	559	2349.42	559.90	773.58	0.32	1081.27	3
hc11p	2048	11264	2048	119191	3600.53	119377.60	1851.08	96.35	1114.04	1806
hc11u	2048	11264	2048	1116	2284.54	1117.20	1568.57	0.79	1193.87	4
hc12p	4096	24576	4096	235860	2542.60	236103.40	2417.05	147.20	685.50	4621
hc12u	4096	24576	4096	2221	310.53	2223.10	1078.51	1.45	1035.82	5
hc8p2	256	1024	256	15231	178.35	15255.00	1271.71	17.83	996.89	60
hc9u2	512	2304	512	190	10.01	190.00	15.40	0.00	3.03	0
hc10p2	1024	5120	1024	59930	2119.75	59966.40	1849.67	21.55	983.48	601
hc10u2	1024	5120	1024	380	47.66	380.30	1287.84	0.48	1119.22	2
hc11p2	2048	11264	2048	119236	330.52	119381.80	1106.48	89.67	703.96	1762
hc11u2	2048	11264	2048	750	2009.52	751.40	1596.31	0.70	1131.72	11
hc12p2	4096	24576	4096	235687	3172.89	235985.00	2099.70	217.33	1075.97	4793
hc12u2	4096	24576	4096	1494	101.86	1494.10	671.75	0.32	1031.32	13