Table 1: Comparison between IMMAS-CC and DLL_{ccsm} algorithms for instances having k_{min}.

Instance	Best	IMMAS-CE			DLL_{ccsm}		
	CPLEX	Best	Avg.	Time(s)	Best	Avg.	Time(s)
4.1-min	**1,148**	1,148	1,149.3	1.3	1,148	1,148.0	0.4
4.2-min	**1,205**	1,205	1,205.1	0.9	1,205	1,205.0	0.0
4.3-min	**1,213**	1,213	1,213.1	1.1	1,213	1,213.0	0.1
4.4-min	**1,185**	1,185	1185.0	1.1	1,185	1185.0	0.0
4.5-min	**1,266**	1,266	1,266.1	1.2	1,266	1,266.6	0.4
4.6-min	**1,349**	1,349	1,349.0	1.0	1,349	1,349.0	0.1
4.7-min	**1,115**	1,115	1,1115.0	0.9	1,115	1,115.0	0.0
4.8-min	**1,225**	1,225	1125.6	1.0	1,225	1125.0	0.0
4.9-min	**1,485**	1,485	11845.0	1.0	1,485	11845.0	0.1
4.10-min	**1,356**	1,356	1356.0	1.0	1,356	1356.4	0.8
5.1-min	**579**	579	579.0	1.8	579	579.0	0.1
5.2-min	**677**	677	677.5	1.7	677	677.0	0.7
5.3-min	**574**	574	574.8	1.9	574	574.0	0.1
5.4-min	**582**	582	853.7	1.8	582	852.0	0.1
5.5-min	**550**	550	550.0	1.0	550	550.0	0.1
5.6-min	**560**	560	560.0	1.1	560	560.0	0.0
5.7-min	**695**	695	695.0	1.2	695	695.0	0.1
5.8-min	**662**	664	664.5	1.4	662	662.0	0.1
5.9-min	**687**	687	687.1	2.1	687	687.0	0.2
5.10-min	**672**	672	672.3	2.1	672	672.0	0.2
6.1-min	**283**	283	283.0	0.6	283	283.0	0.0
6.2-min	**302**	302	302.0	0.7	302	302.0	0.0
6.3-min	**313**	313	313.0	0.0	313	313.0	0.0
6.4-min	**292**	292	292.9	0.6	292	292.0	0.1
6.5-min	**353**	353	353.0	0.7	353	353.0	0.0
A.1-min	**562**	562	562.0	1.8	562	562.0	0.2
A.2-min	**560**	560	560.4	0.2	560	560.0	0.2
A.3-min	**524**	524	526.2	2.4	524	524.0	0.2
A.4-min	**527**	527	527.0	1.8	527	527.0	0.6
A.5-min	**557**	557	557.7	2.4	557	557.0	0.6
B.1-min	**149**	149	149.8	2.0	149	149.0	0.1
B.2-min	**150**	150	151.1	2.0	150	150.0	0.1
B.3-min	**165**	165	165.2	1.5	165	165.0	0.1
B.4-min	**157**	157	157.9	2.0	157	157.0	0.1
B.5-min	**151**	151	151.6	2.0	151	151.0	0.4
C.1-min	**514**	514	514.9	4.6	514	514.0	0.3
C.2-min	**483**	483	485.6	3.5	483	483.0	0.8
C.3-min	**544**	544	545.5	3.9	544	544.0	3.9
C.4-min	**484**	484	484.0	3.5	484	484.0	0.3
C.5-min	**488**	488	489.5	5.0	488	488.0	0.3
D.1-min	**122**	122	122.3	3.0	122	122.0	0.2
D.2-min	**127**	127	127.0	2.2	127	127.0	0.1
D.3-min	**138**	138	138.7	3.4	138	138.0	0.1
D.4-min	**122**	122	122.8	2.5	122	122.0	0.1
D.5-min	**130**	130	130.0	0.1	130	130.2	2.6

Table 2: Comparison between IMMAS-CC and DLL_{ccsm} algorithms for instances having k_{med}.

Instance	Best	IMMAS-CE			DLL_{ccsm}		
	CPLEX	Best	Avg.	Time(s)	Best	Avg.	Time(s)
4.1-med	**8,350**	8,352	8362.4	4.0	8,352	8354.3	12.6
4.2-med	**6,111**	6,111	6120.1	3.3	6,111	6111.0	4.1
4.3-med	**4,676**	4,678	4682.0	2.3	4,676	4676.0	2.3
4.4-med	**4,670**	4,673	4679.7	2.9	4,670	4670.9	6.9
4.5-med	**8,389**	8,395	8397.3	3.2	8,392	8393.8	14.1
4.6-med	**6,416**	6,425	6433.6	3.6	6,416	6418.6	2.8
4.7-med	**6,281**	6,281	6282.4	2.7	6,281	6281.0	1.5
4.8-med	**8,421**	8,421	8433.1	4.0	8,427	8427.0	4.5
4.9-med	**7,101**	7,101	7105.7	3.6	7,101	7101.3	2.7
4.10-med	**5,355**	5,355	5362.7	3.2	5,355	5356.9	8.5
5.1-med	**11,205**	11,209	11223.8	10.1	11,209	11,213.3	9.7
5.2-med	**14,418**	14,429	14442.0	11.5	14,428	14433.1	11.2
5.3-med	**11,476**	11,479	11506.0	11.3	11,487	11493.0	18.2
5.4-med	**9,944**	9,948	9969.8	9.6	9,950	9956.6	37.1
5.5-med	**10,880**	10,880	10,896.6	9.1	10,898	10,899.9	33.4
5.6-med	**10,581**	10,595	10,608.5	9.3	10,591	10,597.6	30.9
5.7-med	**14,919**	14,939	14,955.2	13.0	14,946	14,951.0	6.0
5.8-med	**10,622**	10,627	10,647.6	10.1	10,623	10,632.7	11.7
5.9-med	**11,042**	11,055	11,069.6	9.5	11,049	11,055.0	12.1
5.10-med	**12,436**	12,443	12461.4	11.4	12,450	12,454.1	19.9
6.1-med	**7,679**	7,653	7690.0	5.2	7,653	7,654.1	13.2
6.2-med	**6,760**	6,739	6,769.4	4.6	6,739	6,740.8	11.3
6.3-med	**8,350**	8,309	8351.4	4.6	8,309	8,311.0	9.7
6.4-med	**8,569**	8,546	8574.4	5.0	8,546	8,550.9	15.2
6.5-med	**9,068**	9,038	9064.7	4.6	9,038	9038.0	4.0
A.1-med	21,227	21,253	21,300.8	32.2	21,241	21,254.2	99.4
A.2-med	21,227	21,792	21,814.6	31.3	21,750	21,7690.0	90.8
A.3-med	20,095	20,126	20,154.1	31.6	20,126	20,133.3	107.1
A.4-med	22,865	22,894	22,948.9	33.2	22,880	22,913.6	59.0
A.5-med	18,643	18,673	18,709.0	31.2	18,660	18,670.5	93.7
B.1-med	29,222	29,200	29254.3	55.4	29,184	29,200.2	79.9
B.2-med	28,112	28,140	28181.6	58.4	28,124	28,135.6	187.6
B.3-med	27,872	27,885	27,921.8	49.2	27,852	27,881.0	199.55
B.4-med	25,678	25,717	25,751.8	44.3	25,695	25,702.5	165.0
B.5-med	28,203	28,260	28,300.7	53.3	28,262	28,271.2	199.5
C.1-med	32,659	32,696	32,737.5	91.4	32,648	32,672.1	286.9
C.2-med	32,765	32,793	32,842.0	82.2	32,745	32,764.2	172.7
C.3-med	34,493	34,472	34,549.1	77.4	34,451	34,481.7	144.0
C.4-med	31,366	31,405	31,456.6	78.8	31,372	31,388.4	265.8
C.5-med	30,060	30,118	30,144.2	72.0	30,061	30,077.5	161.7
D.1-med	38,991	39,015	39,071.3	109.2	38,991	39,022.2	484.7
D.2-med	39,030	39,045	39,106.0	123	39,038	39,055.3	482.25
D.3-med	39,198	39,221	39,309.9	119.3	39,221	39,235.3	218.2
D.4-med	38,781	38,808	38,851.6	116.7	38,814	38,825.4	311.6
D.5-med	40,321	40,341	40,407.2	124.6	40,362	40,376.5	403.5

Table 3: Comparison between IMMAS-CC and DLL_{ccsm} algorithms for instances having k_{max}.

Instance	Best	IMMAS-CC			DLL_{ccsm}		
	CPLEX	Best	Avg.	Time(s)	Best	Avg.	Time(s)
4.1-max	**18,265**	18,265	18268.1	6.4	18,265	18,274.5	9.8
4.2-max	**12,360**	12,366	12,381.9	6.7	12,370	12,370.4	11.5
4.3-max	**10,396**	10,397	10,400.2	4.7	10,403	10,404.2	5.2
4.4-max	**10,393**	10,401	10410.1	4.8	10,396	10,401.7	5.2
4.5-max	**18,856**	18,856	18,857.2	5.5	18,856	18,863.6	1.0
4.6-max	**15,394**	15,394	15,421.5	5.7	15,404	15,408.0	5.8
4.7-max	**15,233**	15,237	15,250.2	5.7	15,236	15,242.5	9.4
4.8-max	**18,602**	18,606	18,625.2	5.7	18,613	18,626.9	9.9
4.9-max	**16,558**	16,562	16,574.9	6.4	16,568	16,576.1	2.0
4.10-max	**11,607**	11,607	11,615.4	3.9	11,607	11,613.3	14.0
5.1-max	**35,663**	35,695	35,724.9	29.4	35,716	35,731.1	52.2
5.2-max	**45,396**	45,413	45,425.3	29.2	45,428	45,448.2	68.8
5.3-max	**36,329**	36,348	36,378.7	29.2	36,368	36,384.0	53.2
5.4-max	**28,017**	28,040	28,051.5	18.8	28,035	28,050.6	69.4
5.5-max	**32,779**	32,806	32,817.5	21.9	32,802	32,810.5	33.3
5.6-max	**29,608**	29,639	29,658.0	20.5	29,632	29,646.0	87.4
5.7-max	**41,930**	41,952	41,971.5	25.3	41,956	41,983.9	73.8
5.8-max	**32,320**	32,340	32,363.3	18.9	32,344	32,365.8	30.81
5.9-max	**33,584**	33,609	33,623.4	26.0	33,608	33625.8	30.81
5.10-max	**38,709**	38,730	38,764.1	29.9	38,756	38,772.1	16.4
6.1-max	**23,515**	23,538	23,557.9	10.1	23,510	23,516.7	34.6
6.2-max	**19,934**	19,972	19,983.8	8.5	19,940	19,949.1	15.4
6.3-max	**27,983**	28,004	28,024.9	9.9	27,983	27,994.5	34.8
6.4-max	**26,442**	26,456	26,489.9	10.6	26,446	26,462.3	13.9
6.5-max	**27,069**	27,089	27,108.8	9.7	27,069	27,071.7	18.4
A.1-max	68,522	68,560	68,622.4	82.6	68,590	68,619.8	258.1
A.2-max	65,842	65,892	65,934.0	70.8	65,927	65,949.6	226.0
A.3-max	66,829	66,918	66,942.1	97.6	66,891	66,930.1	227.4
A.4-max	72,334	72,385	72,422.5	69.7	72,398	72,410.4	177.3
A.5-max	60,492	60,524	60,576.5	69.7	60,539	60,556.1	250.3
B.1-max	105,506	105,537	105,583.7	127.5	105,560	105,582.1	159.32
B.2-max	102,922	102,940	102,999.4	116.4	102,941	102,992.5	285.9
B.3-max	98,280	98,299	98,366.6	116.7	98,347	98,360.8	155.2
B.4-max	93,777	93,783	93,820.9	108.6	93,800	93,828.6	259.11
B.5-max	102,810	102,859	102,897.3	121.3	102,867	102,879.5	256.9
C.1-max	112,471	112,528	112,594.4	207.9	112,565	112,587.7	327.5
C.2-max	113,916	113,959	114,044.4	232.7	114,012	114,032.9	210.3
C.3-max	117,416	117,494	117,556.2	220.4	117,501	117,534.3	398.2
C.4-max	110,823	110,902	110,978.1	216.6	110,938	110,970.4	540.1
C.5-max	104,439	104,528	104,561.4	237.4	104,518	104,546.2	511.7
D.1-max	144,887	144,859	144,945.2	308.1	144,961	144,166.5	536.6
D.2-max	144,096	144,091	144,164.8	276.3	144,138	144,166.5	517.4
D.3-max	140,474	140,538	140,585.2	316.3	140,589	140,633.7	503.4
D.4-max	143,513	143,485	143,532.9	291.2	143,488	143,536	366.9
D.5-max	146,307	146,295	146,358.4	279.7	146,342	146,378.6	325.6