The DCAP Test Problems

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This test problem suite consists of data and computational results for 12 two-stage stochastic integer programs arising in dynamic capacity acquisition and allocation applications. The problem formulation is described in [1]. The problems have mixed-integer first-stage variables, pure binary second-stage variables, and discrete distributions.

DATA:

The following table presents the sizes of the deterministic equivalents for each of the 12 problems instances and links to the data files. Columns NS, Rows, Cols, Bins, and Nonz refers to the number of scenarios, rows, columns, binary variables, and non-zero elements respectively. The data for the problems is organized into 4 zipped files. Each file includes SMPS data for three problem instances corresponding to three scenario numbers (200,300,500). The core files are provided in both MPS as well as the CPLEX LP format (.lp extension).

Name	NS	Size of the Det. Eq.				Data
		Rows	Cols	Bins	Nonz	
dcap233_200	200	3012	5418	5406	10230	
dcap233_300	300	4512	8118	8106	15330	dcap233.zip
dcap233_500	500	7512	13518	13506	25530	
dcap243_200	200	3612	7218	7206	13230	
dcap243_300	300	5412	10818	10806	19830	dcap243.zip
dcap243_500	500	9012	18018	18006	33030	
dcap332_200	200	2412	4818	4806	9627	
dcap332_300	300	3612	7218	7206	14427	dcap332.zip
dcap332_500	500	6012	12018	12006	24027	
dcap342_200	200	2812	6418	6406	12427	
dcap342_300	300	4212	9618	9606	18627	dcap342.zip
dcap342_500	500	7012	16018	16006	31027	

SOLUTION:

The following table presents the best known upper and lower bounds obtained with a specialized decomposition based branch & bound (DBB) algorithm (described in [1] and [2]), and that obtained by solving the deterministic equivalent MIP using the CPLEX 7.5 MIP solver (with default options). A CPU time limit of 1800 secs and a termination tolerance of 0.01% relative optimality gap was used. The computations were performed on a Sun Ultra 60 workstation with 512 MB RAM and a 480MHz processor.

	DBB Algorithm						CPLEX 7.5					
	Iter	Nodes	LB	UB	% Gap	CPUs	Iter	Nodes	LB	UB	% Gap	CPUs
dcap233_200	343	687	1834.868	1834.893	0.0014	18.15	2263792	92397	1823.8912	1854.8395	1.6968	1802.68
dcap233_300	128	257	1644.342	1644.504	0.0098	10.25	1476305	19222	1623.1511	1657.1376	2.0939	1801.00
dcap233_500	124	249	1737.719	1737.728	0.0005	15.89	621088	36565	1712.0552	1748.6441	2.1371	1802.48
dcap243_200	331	663	2322.721	2322.721	0.0000	51.68	468340	103803	2299.1849	2352.5774	2.3222	1802.95
dcap243_300	100	201	2559.297	2559.545	0.0097	23.48	190918	73342	2541.5712	2640.6479	3.8982	1802.47
dcap243_500	231	463	2167.512	2167.512	0.0000	83.84	420752	21677	2128.5289	2197.3689	3.2342	1801.93
dcap332_200	1754	3509	1060.676	1060.781	0.0100	133.34	350650	151932	1059.4573	1061.1722	0.1619	1802.63
dcap332_300	1270	2541	1253.040	1253.082	0.0033	141.32	320464	94357	1251.0195	1257.7704	0.5396	1803.20
dcap332_500	1155	2311	1588.717	1588.876	0.0100	199.67	765243	35132	1587.6687	1590.7464	0.1939	1801.93
dcap342_200	462	925	1619.531	1619.654	0.0076	131.94	390094	113059	1619.2613	1620.9507	0.1043	1802.62
dcap342_300	980	1961	2067.777	2067.818	0.0020	439.15	429196	59446	2066.9391	2071.3888	0.2153	1802.69
dcap342_500	510	1021	1904.722	1904.803	0.0043	349.98	679448	14831	1903.7113	1913.4352	0.5108	1801.23

REFERENCES:

[1] S. Ahmed and R. Garcia. "Dynamic Capacity Acquisition and Assignment under Uncertainty," Annals of Operations Research, vol.124, pp. 267-283, 2003.

[2] S. Ahmed, M. Tawarmalani, and N. V. Sahinidis. "A Finite Branch and Bound Algorithm for Two-stage Stochastic Integer Programs," Mathematical Programming , vol.100, pp.355-377, 2004.

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