QIX best first search test results

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Here we present our runtime statistics when running our implementation of the algorithm in QIX with best first search heuristic to solve random instances of the warehouse problem with different attributes. Every attribute is either of the value 'Low' or 'High'. The first table displays what high and low for the different attributes represents.

Attribute \Value	Low	High
Demands	Demands on $\frac{1}{4}$ of all products	Demands on all products
Sparsity	No warehouses are empty	$\frac{1}{2}$ of all warehouses are empty
Products	Warehouses have at least 0 of each product	Warehouses have at least $\frac{1}{5}$ of the maximum demand of each product

Furthermore a column having the value '*' means that it did not terminate within a reasonable time frame (>12 hours). A value of '**' means that we did not bother to run the instance at all since the problem is considered harder than a previously unfinished problem.

In our implementation we put the values from the hypercube built by QIX in hashes for easy access, that is we spend some time building the model. This time is represented by Setup time in the tables below, while Algorithm Time is the time spent on the actual algorithm.

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
10x10	Low	Low	High	2	0	0	4
	Low	Low	Low	3	0	0	4
	Low	High	High	1	0	0	2
	Low	High	Low	1	0	0	2
	High	Low	High	6	0	0	4
	High	Low	Low	10	0	0	12
	High	High	High	79	0	0	33
	High	High	Low	48	0	0	20

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
10x100	Low	Low	High	10	0	0	14
	Low	Low	Low	12	0	0	12
	Low	High	High	135	0	0	42
	Low	High	Low	677	0	0	82
	High	Low	High	4	0	0	4
	High	Low	Low	45	0	0	19
	High	High	High	430	0	0	65
	High	High	Low	708	0	0	68

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
20x100	Low	Low	High	14	0	0	6
	Low	Low	Low	36	0	0	12
	Low	High	High	142	0	0	15
	Low	High	Low	673	0	0	24
	High	Low	High	19	0	0	6
	High	Low	Low	76	0	0	15
	High	High	High	554	0	0	18
	High	High	Low	12726	0	6	40

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
30x100	Low	Low	High	8	0	0	6
	Low	Low	Low	28	0	0	7
	Low	High	High	319	0	0	10
	Low	High	Low	545	0	0	13
	High	Low	High	26	0	0	8
	High	Low	Low	47	0	0	4
	High	High	High	7180	0	3	35
	High	High	Low	18772	0	8	27

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
40x100	Low	Low	High	18	0	0	7
	Low	Low	Low	69	0	0	8
	Low	High	High	2282	0	0	21
	Low	High	Low	1518	0	1	14
	High	Low	High	17	0	0	5
	High	Low	Low	29	0	0	5
	High	High	High	3977	0	2	16
	High	High	Low	12321	0	5	22

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
50x50	Low	Low	High	7	0	0	3
	Low	Low	Low	15	0	0	4
	Low	High	High	112	0	0	8
	Low	High	Low	991	0	0	13
	High	Low	High	12	0	0	4
	High	Low	Low	20	0	0	3
	High	High	High	2610	0	0	12
	High	High	Low	15057	0	4	20

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
50x100	Low	Low	High	14	0	0	2
	Low	Low	Low	38	0	0	5
	Low	High	High	159	0	0	10
	Low	High	Low	3514	0	1	17
	High	Low	High	21	0	0	6
	High	Low	Low	102	0	0	7
	High	High	High	372	0	0	7
	High	High	Low	75331	0	31	29

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
100x10	Low	Low	High	8	0	0	2
	Low	Low	Low	1	0	0	1
	Low	High	High	1	0	0	1
	Low	High	Low	8	0	0	2
	High	Low	High	10	0	0	2
	High	Low	Low	11	0	0	2
	High	High	High	110	0	0	5
	High	High	Low	144	0	0	5

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
100x20	Low	Low	High	8	0	0	2
	Low	Low	Low	12	0	0	3
	Low	High	High	21	0	0	2
	Low	High	Low	26	0	0	3
	High	Low	High	16	0	0	2
	High	Low	Low	23	0	0	3
	High	High	High	481	0	0	7
	High	High	Low	4065	0	1	8

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
100x30	Low	Low	High	11	0	0	2
	Low	Low	Low	10	0	0	2
	Low	High	High	25	0	0	4
	Low	High	Low	919	0	0	7
	High	Low	High	18	0	0	2
	High	Low	Low	66	0	0	3
	High	High	High	1276	0	0	7
	High	High	Low	6805	0	1	7

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
100x40	Low	Low	High	3	0	0	1
	Low	Low	Low	14	0	0	3
	Low	High	High	42	0	0	3
	Low	High	Low	386	0	0	7
	High	Low	High	12	0	0	2
	High	Low	Low	148	0	0	5
	High	High	High	1457	0	0	8
	High	High	Low	13541	0	3	9

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
100x50	Low	Low	High	15	0	0	3
	Low	Low	Low	11	0	0	2
	Low	High	High	298	0	0	5
	Low	High	Low	102	0	0	4
	High	Low	High	9	0	0	3
	High	Low	Low	25	0	0	3
	High	High	High	1568	0	0	6
	High	High	Low	3467	0	1	7

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
100x100	Low	Low	High	16	0	0	2
	Low	Low	Low	47	0	0	4
	Low	High	High	774	0	0	5
	Low	High	Low	991	0	0	8
	High	Low	High	29	0	0	3
	High	Low	Low	265	0	0	6
	High	High	High	6907	0	3	10
	High	High	Low	208739	0	93	15

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
200x200	Low	Low	High	20	0	0	2
	Low	Low	Low	99	0	0	3
	Low	High	High	4293	0	1	6
	Low	High	Low	169891	0	51	10
	High	Low	High	56	0	0	3
	High	Low	Low	413	0	1	4
	High	High	High	54999	0	34	9
	High	High	Low	1397726	0	1081	11

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
500x500	Low	Low	High	155	0	0	2
	Low	Low	Low	380	1	0	3
	Low	High	High	228993	1	103	6
	Low	High	Low	4180226	1	2226	9
	High	Low	High	717	2	1	3
	High	Low	Low	11699	2	21	4
	High	High	High	4817265	2	7721	8
	High	High	Low	*	*	*	-

Size	Type			Branches	Setup Time(s)	Algorithm Time (s)	Optimal Value
	Demands	Sparsity	Products				
1000x1000	Low	Low	High	1110	2	1	3
	Low	Low	Low	17502	3	15	4
	Low	High	High	18818268	2	16410	6
	Low	High	Low	*	*	*	-
	High	Low	High	1209	9	3	3
	High	Low	Low	53122	9	180	4
	High	High	High	*	*	*	-
	High	High	Low	**	**	**	-