Constraint Satisfaction Problem Assignment

Report

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Section: A1

Value Order Heuristics:
Least constraining value order was taken as value order heuristic. In CSP, we have to assign value to each variable. So every variable has to be taken into consideration. But in the case of values, all possible values don't lead to solution. So we can leave some value to be unused. In this scenario we prioritize least constraining values. Least constraining values rules out the fewest values for other variables.

Table:
* Intractable

Problem	Solver	VAH	#Node	#BT	Runtime
d-10-01	BT	VAH1	713	655	7
		VAH2	*	*	*
		VAH3	62	4	0
		VAH4	79	21	0
		VAH5	*	*	*
	FC	VAH1	661	603	7
		VAH2	876119	876061	14316
		VAH3	61	3	0
		VAH4	75	17	0
		VAH5	2663734	2663676	14603
d-10-06	BT	VAH1	76	18	0
		VAH2	*	*	*
		VAH3	58	0	0
		VAH4	58	0	0
		VAH5	*	*	*
	FC	VAH1	75	17	0
		VAH2	3563641	3563583	52796
		VAH3	58	0	0
		VAH4	58	0	0
		VAH5	1345	1287	7
d-10-07	BT	VAH1	141	83	1
		VAH2	144315828	144315770	1.19E+06
		VAH3	102	44	0
		VAH4	59	1	0
		VAH5	*	*	*
	FC	VAH1	135	77	1

		VAH2	141345	141287	2340
		VAH3	97	39	0
		VAH4	58	0	0
		VAH5	714638	714580	3796
d-10-08	BT	VAH1	587	529	5
		VAH2	*	*	*
		VAH3	69	11	0
		VAH4	69	11	0
		VAH5	*	*	*
	FC	VAH1	544	486	5
		VAH2	44971937	44971879	734074
		VAH3	66	8	0
		VAH4	66	8	0
		VAH5	22987	22929	125
d-10-09	BT	VAH1	58	0	0
		VAH2	*	*	*
		VAH3	70	12	0
		VAH4	72	14	0
		VAH5	*	*	*
	FC	VAH1	58	0	0
		VAH2	28283	28225	442
		VAH3	67	9	0
		VAH4	69	11	0
		VAH5	464561407	464561349	2502260
d-15-01	BT	VAH1	153508	153401	2368
		VAH2	*	*	*
		VAH3	81088	80981	1436
		VAH4	134166	134059	2385
		VAH5	*	*	*
	FC	VAH1	139193	139086	2507
		VAH2	*	*	*
		VAH3	72673	72566	1505
		VAH4	118963	118856	2508
		VAH5	*	*	*

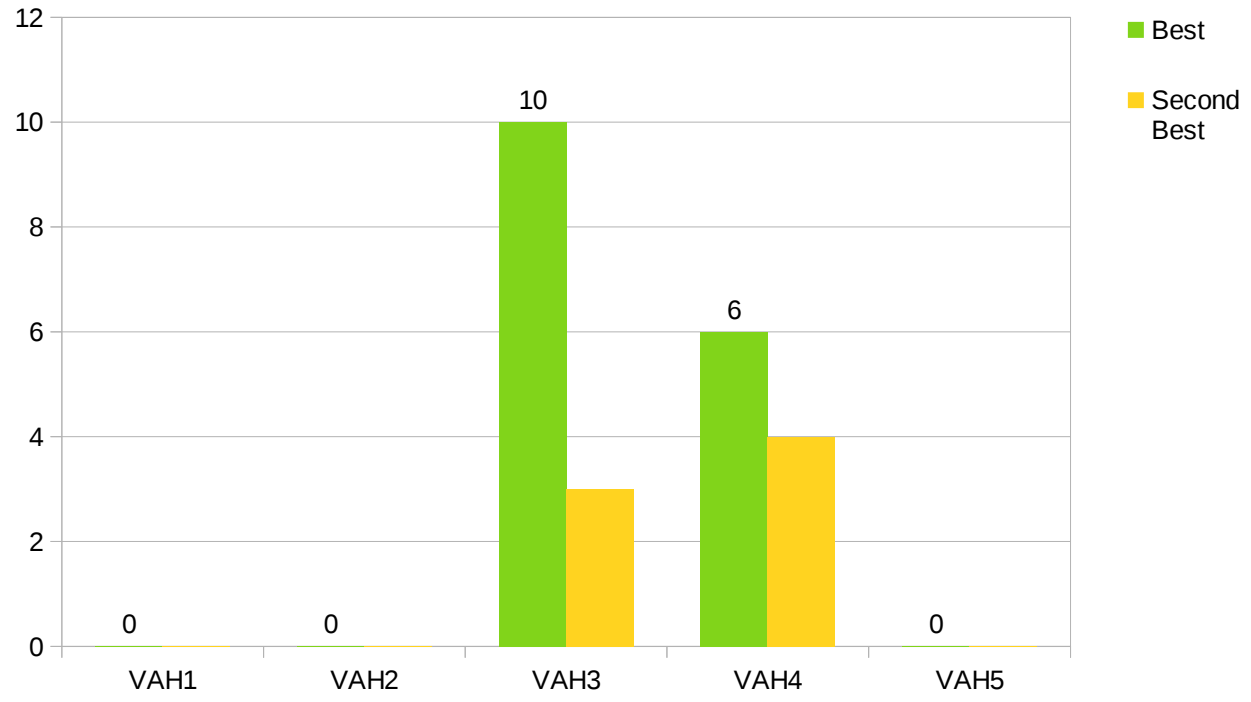

Figure 1: Performance Chart

Conclusion:

VAH3 seems the best according to the measured metrics.

VAH3 orders the variables according to the non-decreasing order of their domain size, then breaks ties according to the non-increasing order of their degree to the number of unassigned variables. This scheme performs better because it selects the most constraining variable and thus can detect failure earlier. Selecting the variable with the smallest domain allows us to detect failure and inconsistencies earlier. This scheme also break ties by taking the variable with higher degree. It reduces the branching factor. When we take a higher degree variable, it tries to reduce the highest amount of domain size of other variables.