Appendix A Problems in the training set

Table 2 captures the problems we solved in the training set. They are randomly selected problems from MIPLIB (Gleixner et al. 2021, Koch et al. 2011, Bixby et al. 1998). We did remove instances that did not complete computation of the objective value within 30 minutes. In total, 27 problem instances are used in this training set. We capture the characteristics of the problem below.

Table 2: **The problem instances used for training in §4.2 and §4.3 and their characteristics are shown in this table.**

Problem Instance	Total variables	Binary variables	General integer variables	Continuous variables	Solutions within 1% of the optimum
air03	10757	10757	0	0	938
bell5	104	30	28	46	>10,000
dcmulti	548	75	0	473	>10,000
fiber	1298	1254	0	44	>279
fixnet6	878	378	0	500	>10,000
gen	870	144	6	720	>10,000
gesa3	1152	216	168	768	>10,000
gt2	188	24	164	0	>10,000
khb05250	1350	24	0	1326	28
l152lav	1989	1989	0	0	>10,000
misc03	160	159	0	1	24
misc06	1808	112	0	1696	>10,000
mod008	319	319	0	0	68
mod010	2655	2655	0	0	>10,000
p0033	33	33	0	0	15
p0201	201	201	0	0	44
p0548	548	548	0	0	>10,000
pp08a	240	64	0	176	64
pp08aCUTS	240	64	0	176	64
$qnet1_o$	1541	1288	129	124	>10,000
qnet1	1541	1288	129	124	>10,000
rgn	180	100	0	90	>720
set1ch	712	240	0	472	>10,000
stein27	27	0	0	0	2106
stein45	45	0	0	0	70
vpm1	378	168	0	210	>10,000
vpm2	378	168	0	210	33

Appendix B Problems in the testing set

Table 3 captures the problems we solved in the testing set. They are randomly selected problems from MIPLIB (Gleixner et al. 2021). We did remove instances that did not complete computation of the objective value within 30 minutes. In total, 9 problem instances are used in this training set. We capture the characteristics of the problem below.

Table 3: **The problem instances used for testing in §4.2 and §4.3 and their characteristics are shown in this table.**

Problem Instance	Total variables	Binary variables	General integer variables	Continuous vari-ables	Solutions within 1% of the optimum
23588	368	231	0	137	82
bppc8-02	232	229	1	2	>10,000
exp-1-500-5-5	990	250	0	740	>1,338
mtest4ma	1950	975	0	975	>10,000
neos-1425699	105	5	80	20	>10,000
neos17	535	300	0	235	>10,000
nexp-50-20-1-1	490	245	0	245	>10,000
sp150x300d	600	300	0	300	>9,455

Appendix C Parameter groups for diversity-emphasizing rules

Figure 6 shows the clustering of the problem instances into the four groups. As the figure shows, these four groups consolidate to three (HHL, HLL, and LLH) when the number of requested solutions reaches 50 and to two (HHL and HLL) for 200 requested solutions or more. The consolidation to groups HHL and HLL indicate that emphasizing diversity after generating a seed set of solutions results in a higher overall diversity of all generated solutions.

One might suspect that two instances of the same problem (e.g., stein27 and stein45) would typically have the same parameter group. However, surprisingly we found that similar problems like stein27/stein45 and qnet1/qnet1_0 did not always belong to the same group. At $p_1 \geq 50$, some problems took too long to complete all test cases in the grid search and thus were excluded from the parameter groups shown in Figure 6.

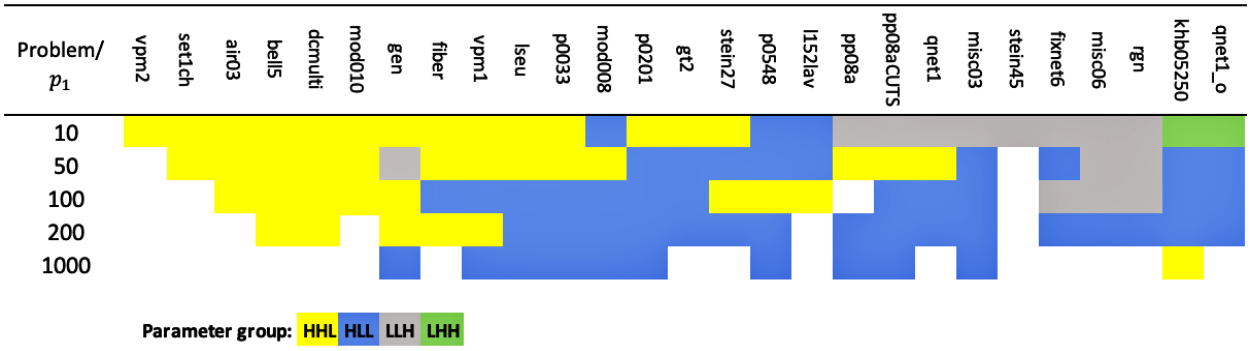

Figure 6: The four parameter groups and the problem instances in each group as the number of requested solutions increases from 10 to 1,000.