Constraint generation approaches for submodular function maximization leveraging graph properties
Supplementary Information

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Parameter choices

This section reports the results we obtained by running the four algorithm variants, namely ICG, ICG($k-1$), GCG and ECG, on selected graphs from our benchmark set. The experiments were done on those benchmark graphs for which the algorithm variants were able to finish within the time limit (i.e. 2 hours). Detailed results are visualized for

- $\lambda = 10 \cdot k, 8 \cdot k, 12 \cdot k$;

- $\kappa = 9, 10, 11, 12, 13$.

Choice of parameter λ

The results are shown on Figures 1 - 41. On each figure the y-axis shows the running times of the algorithm variants relative to the choice $\lambda = 10 \cdot k$, where $k = 5, 8$.

We observe that our default value $\lambda = 10 \cdot k$ sometimes gets outperformed by other choices, however, overall it provides us with the best results with respect to running time.
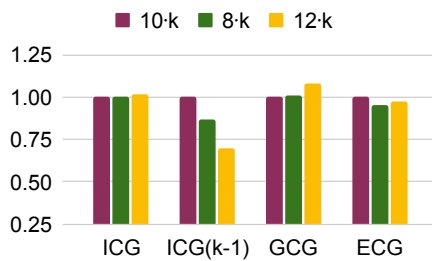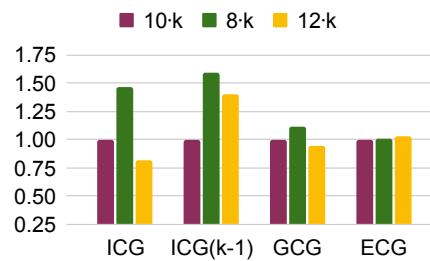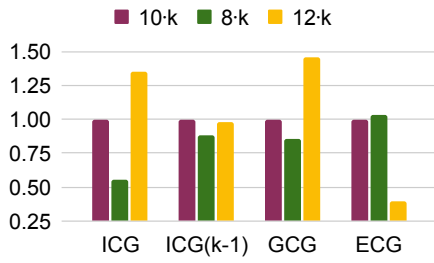

Figure 1: I.40.5.1

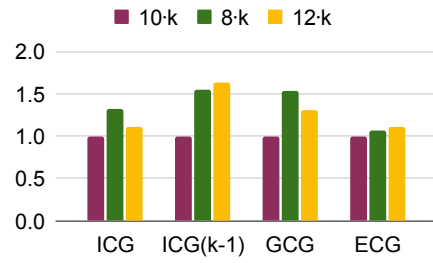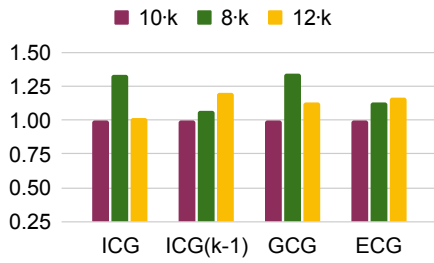

Figure 2: I.40.5.2

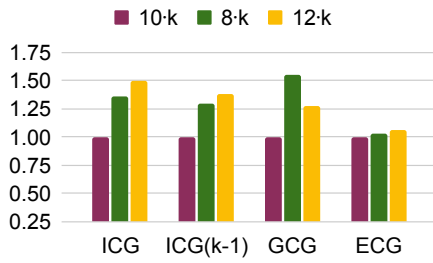Figure 3: I.40.5.3

Figure 4: I.40.5.4
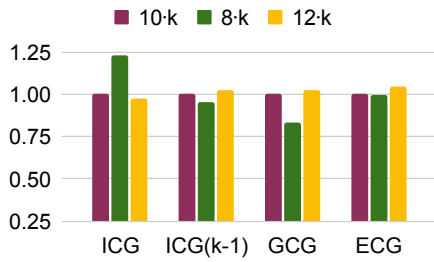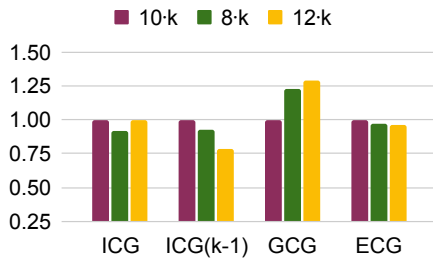

Figure 5: I.40.5.5

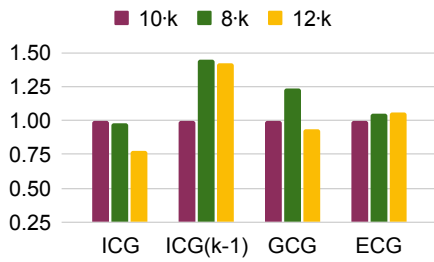Figure 6: L.40.5.1

Figure 7: L.40.5.2
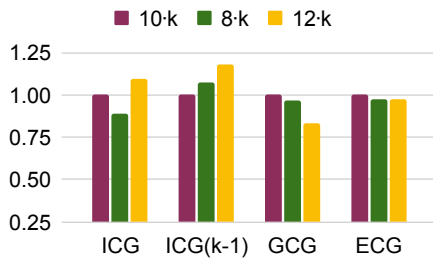

Figure 8: L.40.5.3
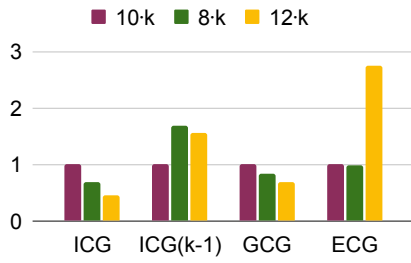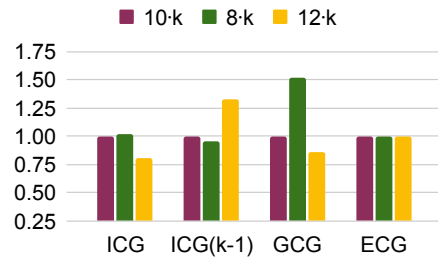

Figure 9: L.40.5.4

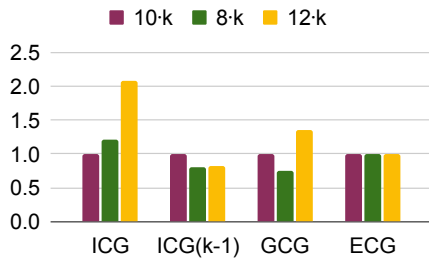Figure 10: L.40.5.5

Figure 11: I.40.8.1
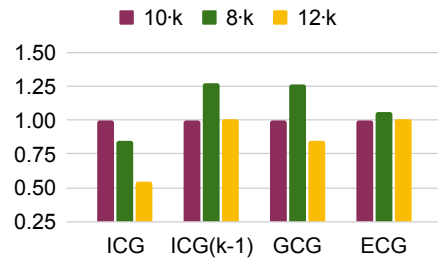

Figure 12: L.40.8.2
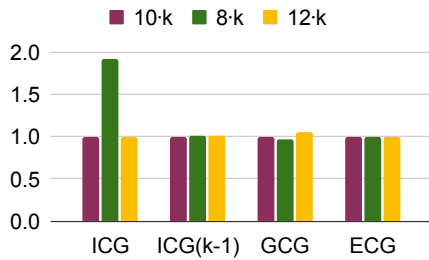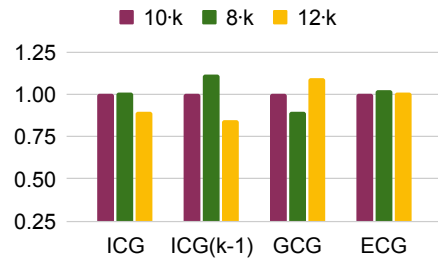

Figure 13: L.40.8.3

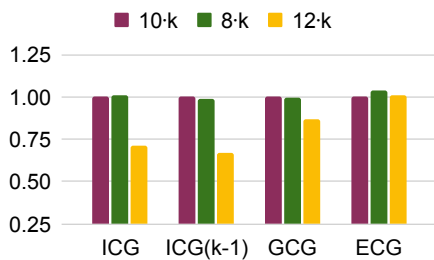Figure 14: L.40.8.4

Figure 15: L.40.8.5
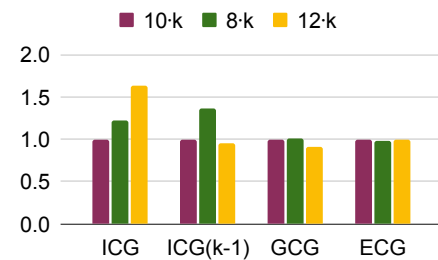

Figure 16: L.50.5.1
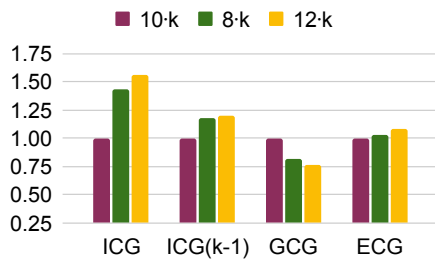

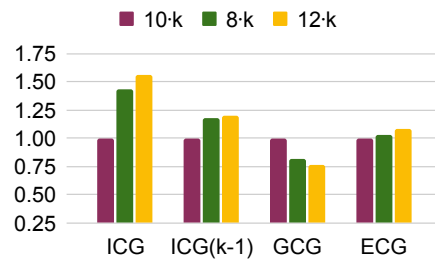Figure 17: L.50.5.2

Figure 18: L.50.5.3
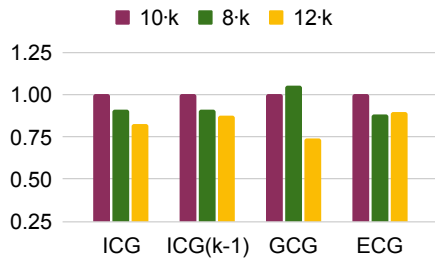
Figure 19: L.50.5.4

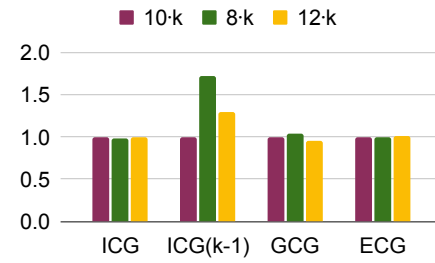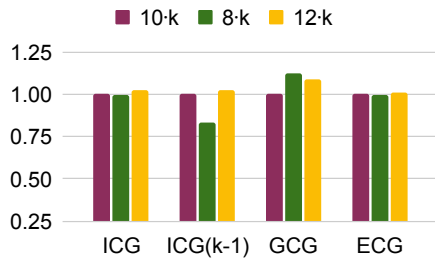Figure 20: L.50.5.4

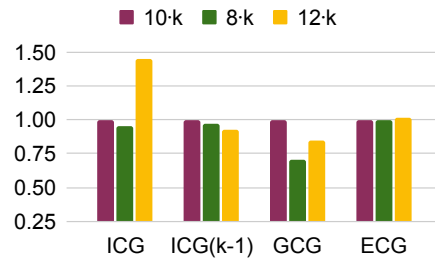Figure 21: L.50.5.5

Figure 22: L.60.5.1
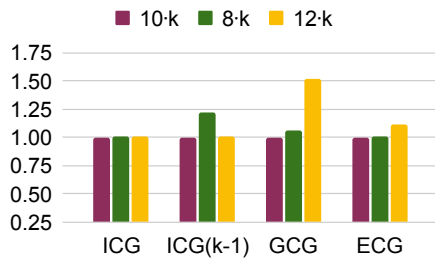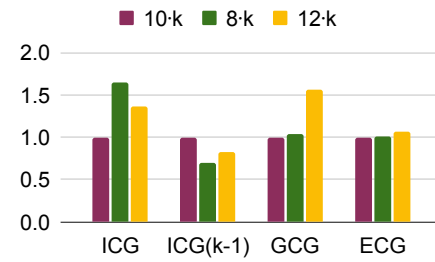

Figure 23: L.60.5.2
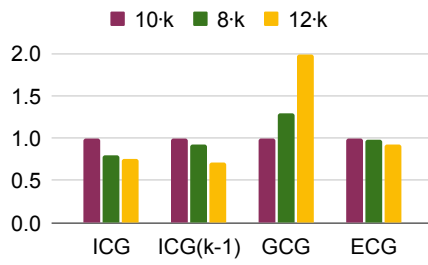

Figure 24: L.60.5.3

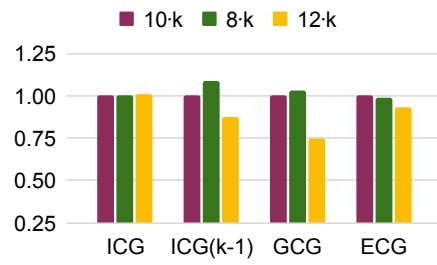Figure 25: L.60.5.4

Figure 26: L.60.5.5
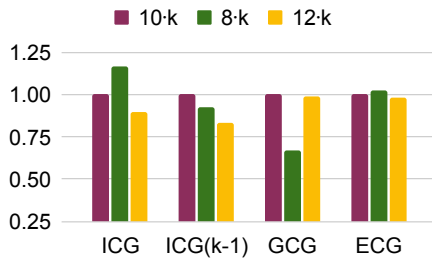
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Figure 27: C.80.5.1
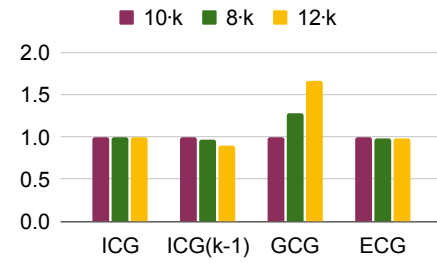
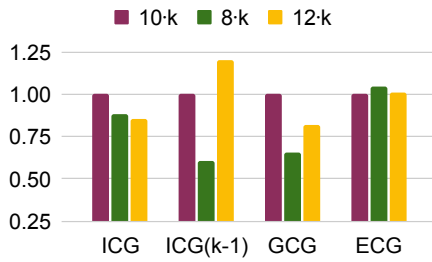

Figure 28: C.80.5.2

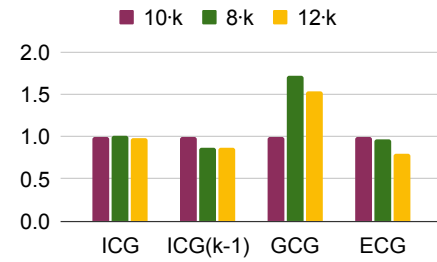Figure 29: C.80.5.3

Figure 30: C.80.5.4
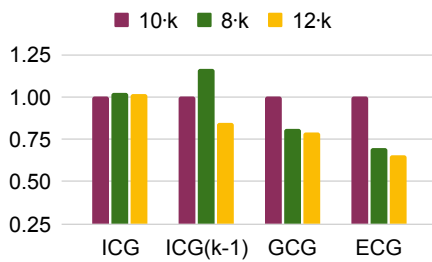

Figure 31: C.80.5.1
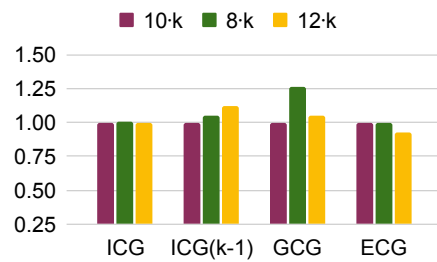

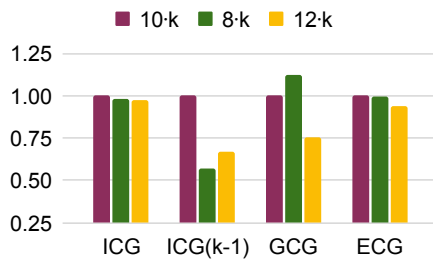Figure 32: C.100.5.1

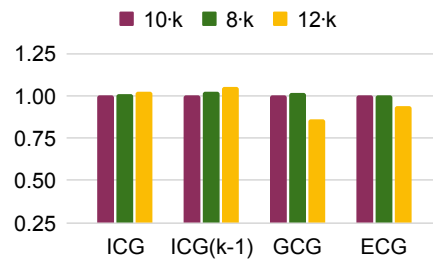Figure 33: C.100.5.2

Figure 34: C.100.5.3
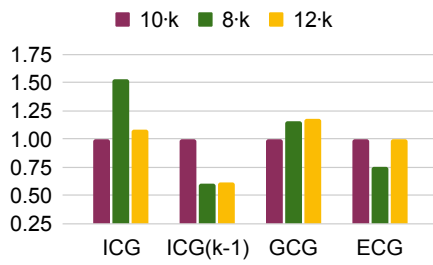
Figure 35: C.100.5.4
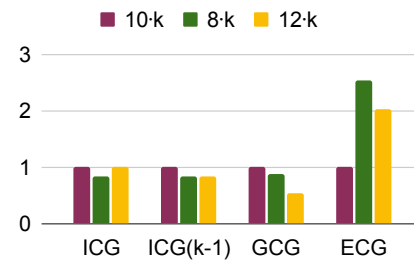

Figure 36: C.100.5.5

Figure 37: C.80.8.1
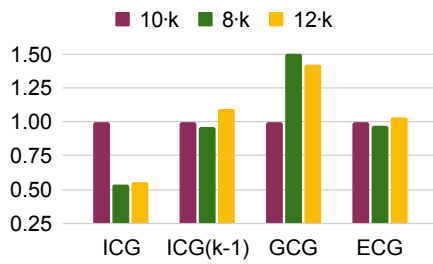

Figure 38: C.80.8.2
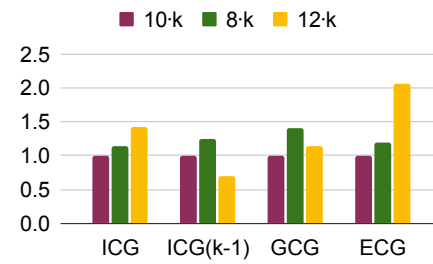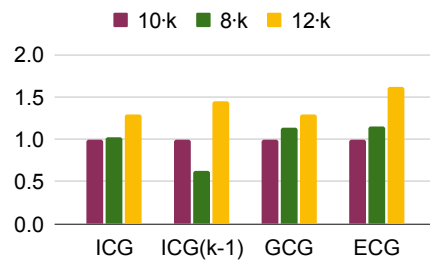

Figure 39: C.80.8.3

Figure 40: C.80.8.4

Figure 41: C.80.8.5

Choice of parameter κ

The results are shown on Figures 42 - 49, they are grouped according to the graph types and sizes, as indicated on the x-axes. On each figure the y-axis shows the running times of the ECG algorithm relative to the choice $\kappa = 12$.

We can notice that the ECG algorithm is not really sensitive for the choice of the κ parameter when $k = 5$. On the other hand with $k = 8$ smaller κ values resulted in strikingly bad performance.
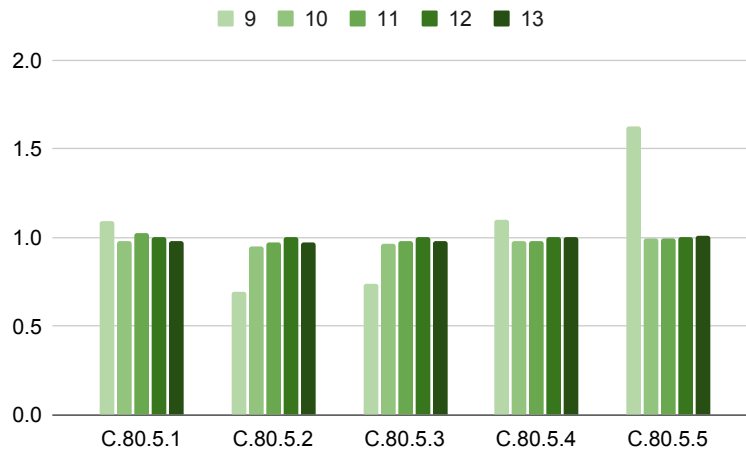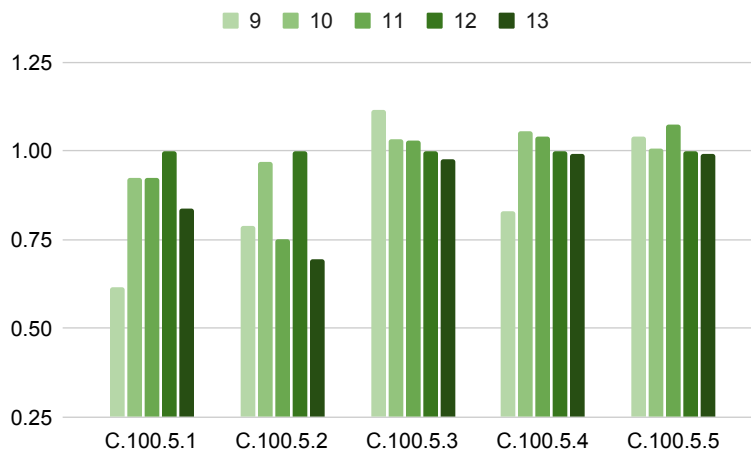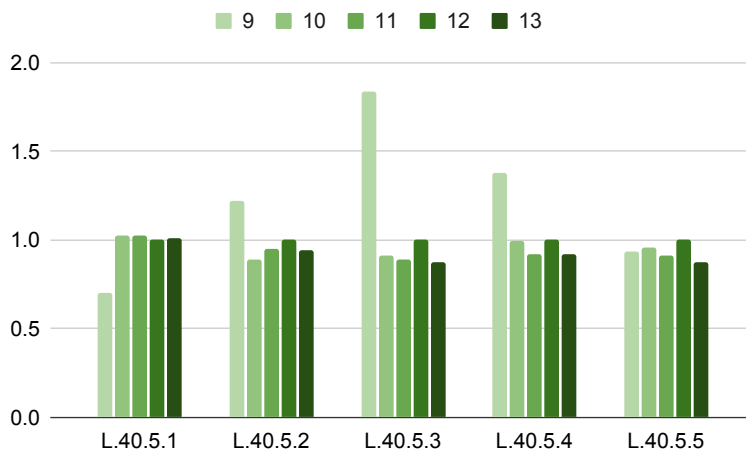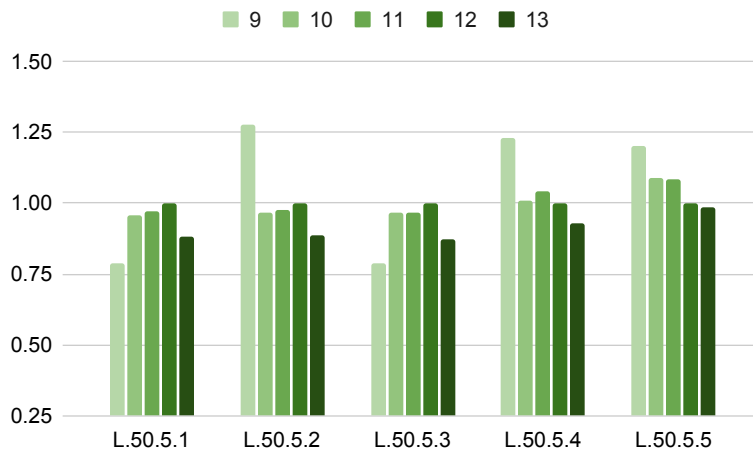

Figure 42: C.80.5
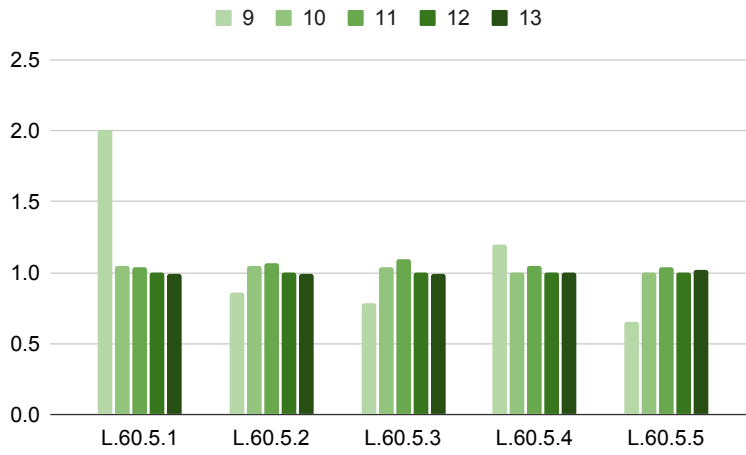

Figure 43: C.100.5

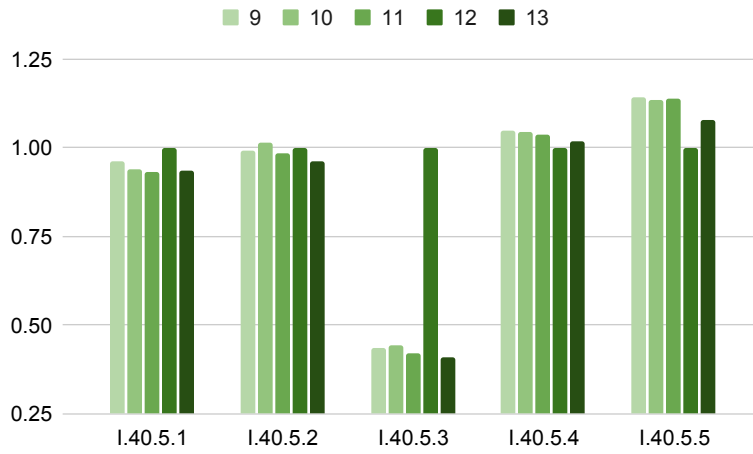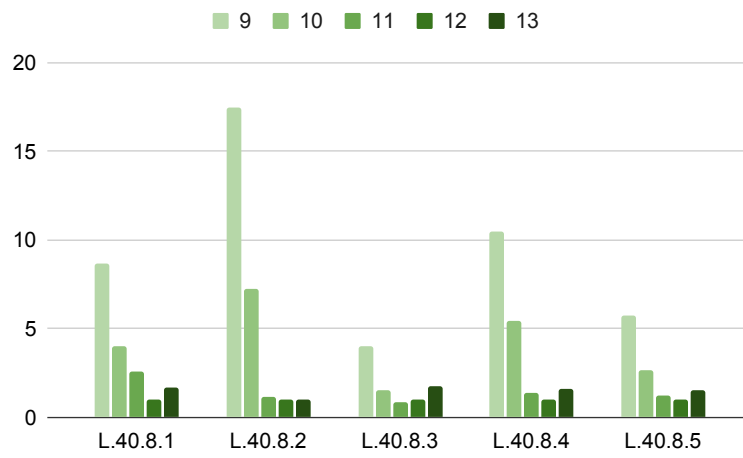Figure 44: L.40.5

Figure 45: L.50.5
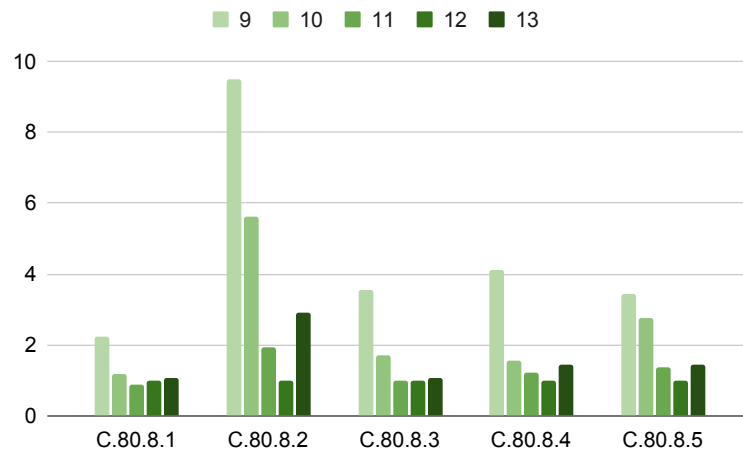
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Figure 46: L.60.5

Figure 47: I.40.5

Figure 48: L.40.8

Figure 49: C.80.8