Supplementary Materials

1 Results of Real Data

The runtime analysis of two datasets are shown in figure 1. From the figures, the runtime decreases as the seed size becomes larger. When the seed size goes larger, the matrices to be optimized(B_i and D_i) becomes relatively smaller, which causes a faster computation in optimization.

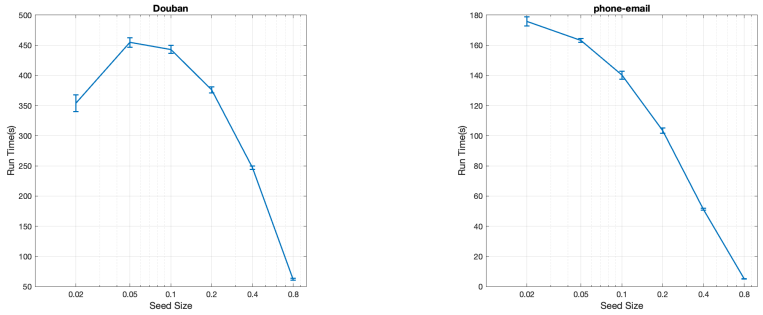

Fig. 1: **Runtime of Douban and phone-email dataset as a function of seed sizes.** The curves and errorbars show the mean and standard deviations among 5 runs.

2 Results of Synthetic Data

Figure 2 shows the runtime of the synthetic data. As noise level becomes higher, the runtime decreases a little. However, the curves are not so smooth and the standard deviations are not stable. This results show that adding noise might change the topological features of the graphs and affects runtime, but it might cause information loss of the graphs and it is not a crucial factor of runtime.

Figure 3 shows the runtime of GGWNA on synthetic data with different percentages of overlaps. From the results, there is not an obvious relevant relationships between the overlapping levels and the runtime. The runtime decreases at some point(0.4 or 0.8) might because the network pairs become more similar so that the learning becomes faster.

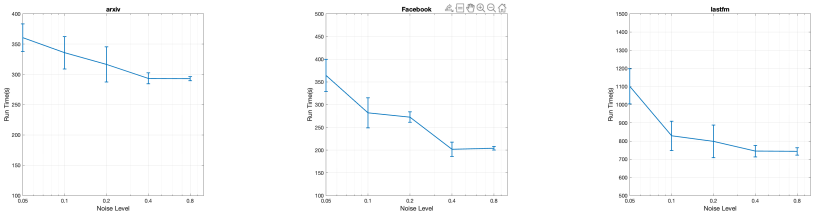

Fig. 2: **Runtime of synthetic datasets as a function of noise levels.** The seed sizes of all experiments are 0.5. The curves and errorbars show the mean and standard deviations among 5 runs.

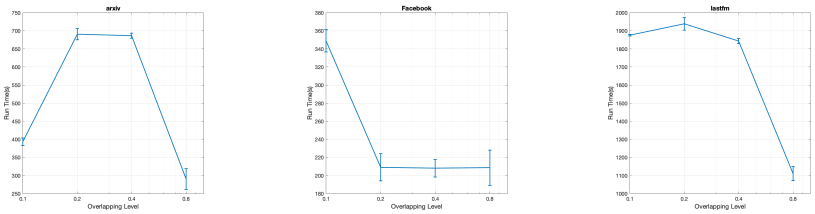

Fig. 3: **Runtime of synthetic datasets as a function of overlapping levels.** The seed sizes of all experiments are 0.5. The curves and errorbars show the mean and standard deviations among 5 runs.

3 Descriptions of Computing Infrastructure

Our experiments run on High Performance Computing(HPC) clusters. Single-processor CPU node with 16-32GB memories are used.