Graphon-based Visual Abstraction for Large Multi-layer Networks: Supplementary Materials with High-resolution Figures

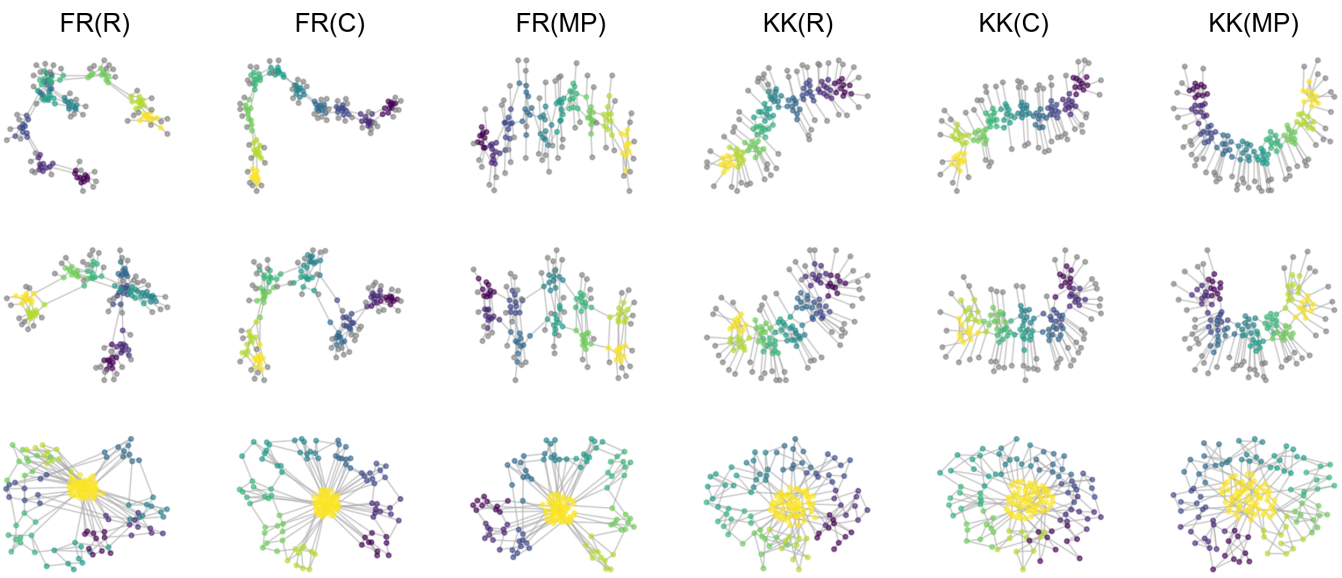

Fig. 1: We experimented with how the force-directed layout method affects the mixup results. The Fruchterman-Reingold layout algorithm and the Kamada-Kawai layout algorithm, which both consider edge weights as forces, were applied in the experiments using different initial coordinates. We experimented three initialization schemes: random layout, circular layout (nodes are evenly distributed on a circle), and multipartite layout (treating each cluster as a disjoint subset, sequentially connecting them, and using a multipartite graph layout). Three striped graphs were used as experimental data, which have been mixed with a graph featuring linearly connected clusters (the same as the mixed results on the left half of Tab. 1), with node colors preserved to illustrate clustering relationships. As shown in the results, each row contains six layouts of a mixed graph. FR and KK stand for Fruchterman-Reingold layout algorithm and Kamada-Kawai layout algorithm, respectively. The R, C, and MP in the brackets stand for using a random, circular, or multipartite initialization for the force-directed model, respectively. Overall, both layout algorithms were capable of expressing the mixed graph structure that is implicitly represented in the edge weights. Regarding initialization, randomly chosen coordinates can impair the layout results, while circular and multipartite initializations can produce comparable outcomes.

Table 1: We varied the inter-connections and analyze the mixing results to demonstrate the effects of mixup. We present the results of mixing a striped-shaped graph with two types of graphs at a 40% coefficient: one featuring linearly connected clusters (as depicted on the left side of the table) and another with randomly connected clusters (illustrated on the right side). The node colors signify the inter-connections between nodes. To simplify comparisons, we maintained consistent coloration for the nodes in the two cluster graphs and only altered the node color of the striped graph. All mixed graphs are laid out through force-directed model with edge weights as forces. In addition, we draw the original edges rather than the mixed edges to clarify variations. In the first row, the striped graph functions as a line to connect with the cluster graph. Conversely, in the second row, the two lines of the striped graph separately connect with the cluster graph, which widens the distance between them in the mixing results. In the third row, nodes with distinct structural features are connected, resulting in mixed outcomes significantly different from the original layouts.

Original graph	Mixed graph	Original graph	Mixed graph