Structural Measures of Clustering Quality on Graph Samples

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Abstract. Due to the growing presence of large-scale and streaming graphs such as social networks, graph sampling and clustering play an important role in many real-world applications. One key aspect of graph clustering is the evaluation of cluster quality[1]. However, little attention has been paid to evaluation measures for clustering quality on samples of graphs. As first steps towards appropriate evaluation of clustering methods on sampled graphs, in this work we present two novel evaluation measures for graph clustering called δ-*precision* and δ-*recall*. These measures effectively reflect the match quality of the clusters in the sampled graph with respect to the ground-truth clusters in the original graph. We show in extensive experiments on various benchmarks that our proposed metrics are practical and effective for graph clustering evaluation.
Problem illustration: Our goal is to measure the quality of clustering processes on graph samples with respect to the original graph. The problem setting is shown in Fig. 1. For a given graph G, we sample a subgraph S. Given a clustering $\pi(S)$ of S, we want to evaluate the quality of $\pi(S)$ with respect a valid ground-truth clustering $\pi(G)$ of G.

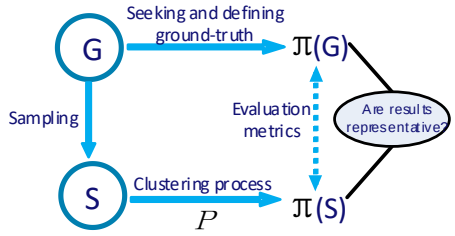

Fig. 1. Problem setting. Let S be a sampled subgraph of a graph G and $\pi(G)$ be a valid ground-truth clustering of G. Given clustering $\pi(S)$ of S induced by process P, what is the quality of $\pi(S)$ with respect to $\pi(G)$?

References

1. J. Zhang, Y. Pei, G. H. L. Fletcher, and M. Pechenizkiy, "Structural measures of clustering quality on graph samples," in *Proceedings of the ASONAM 2016(to be appeared)*. ACM, 2016, pp. –.