Towards Self-Explainable Graph Neural Network[1][2]

How to Build a Explainable dataset

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Catalogs

BA-Shapes

- What is BA model
- How BA-shapes was built

Syn-cora

- How to Construct the motif

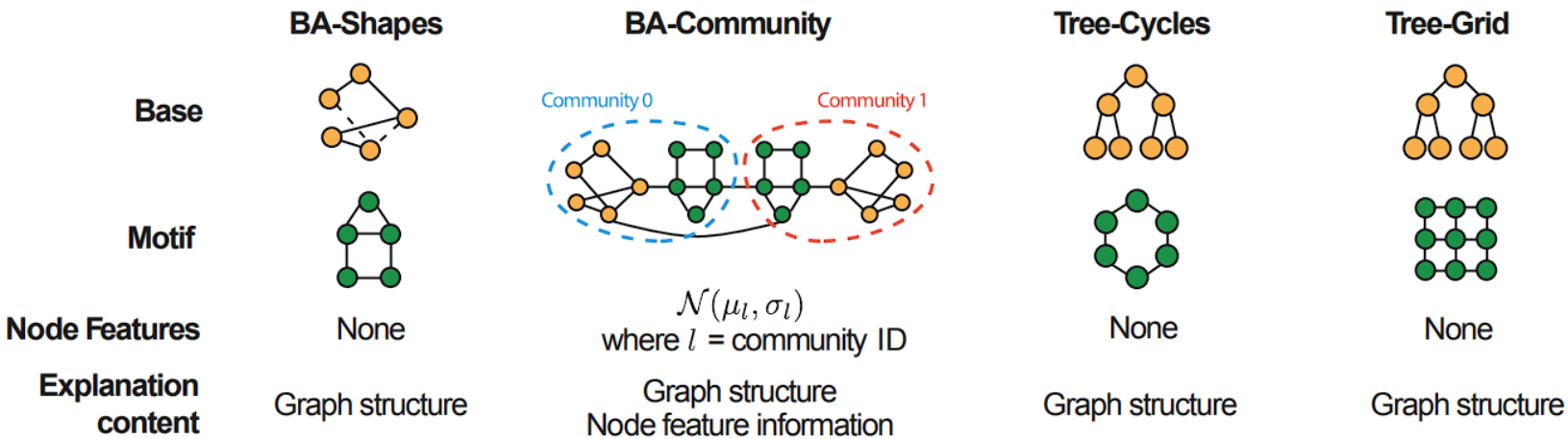
Refrence

BA model

The Barabási–Albert (BA) model is an algorithm for generating random scale-free networks using a preferential attachment mechanism. Several natural and human-made systems, including the Internet, the World Wide Web, citation networks, and some social networks are thought to be approximately scale-free and certainly contain few nodes (called hubs) with unusually high degree as compared to the other nodes of the network. The BA model tries to explain the existence of such nodes in real networks. The algorithm is named for its inventors Albert-László Barabási and Réka Albert.

In BA-SHAPES, we start with a base Barabasi-Albert (BA) graph on 300 nodes and a set of 80 five-node "house"-structured network motifs, which are attached to randomly selected nodes of the base graph. The resulting graph is further perturbed by adding 0.1N random edges. Nodes are assigned to 4 classes based on their structural roles. In a house-structured motif, there are 3 types of roles: the top,middle and bottom node of the house. Therefore there are 4 different classes, corresponding to nodesat the top, middle, bottom of houses, and nodes that do not belong to a house.

How BA-shapes was built(and other datasets like that)



Explanation

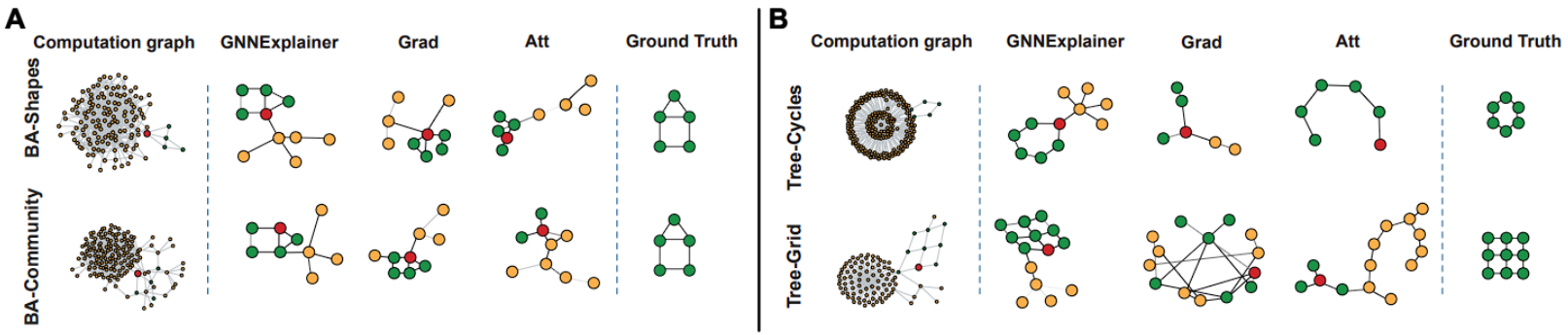


Figure 3: Evaluation of single-instance explanations. **A-B.** Shown are exemplar explanation subgraphs for node classification task on four synthetic datasets. Each method provides explanation for the red node's prediction.

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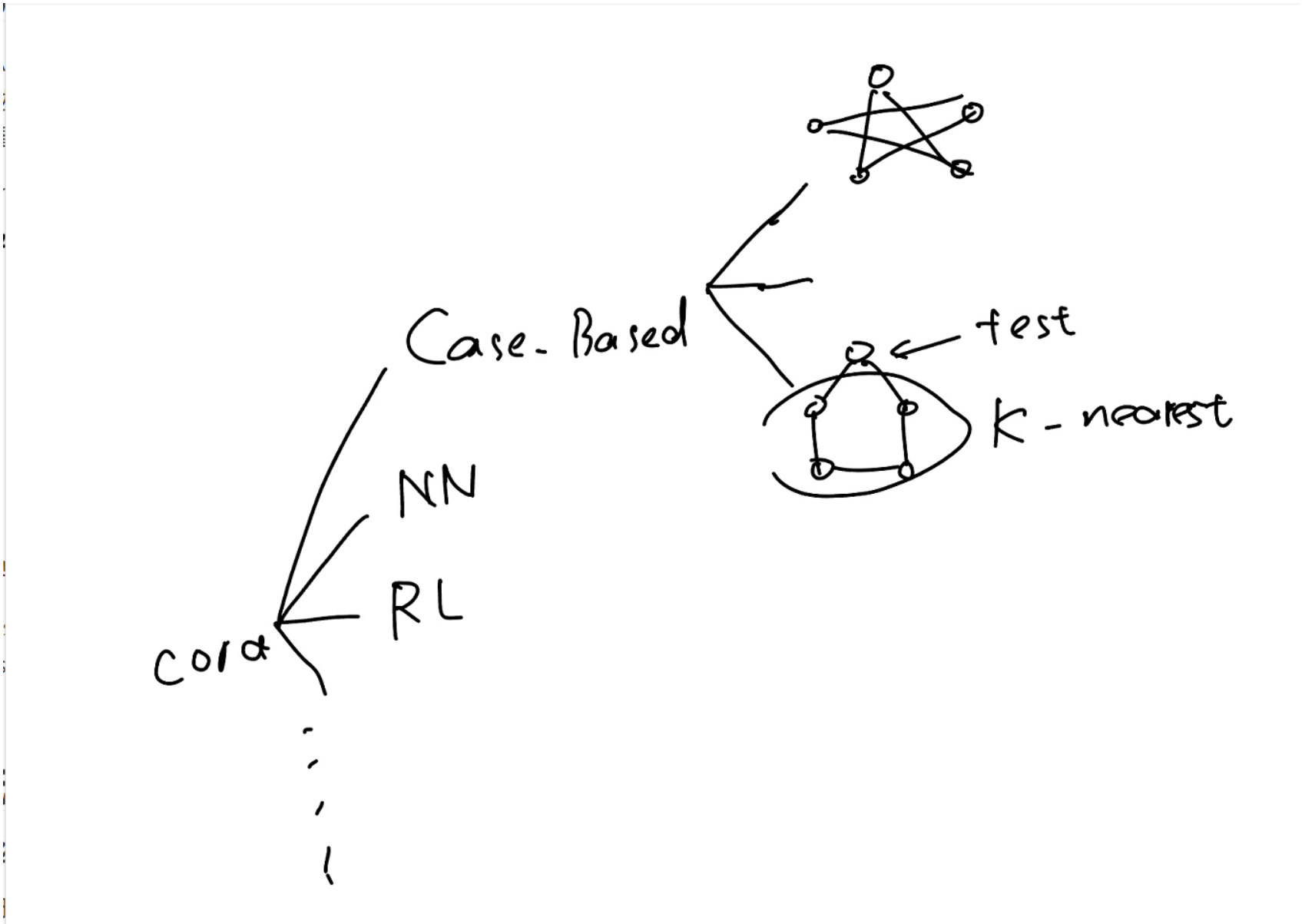
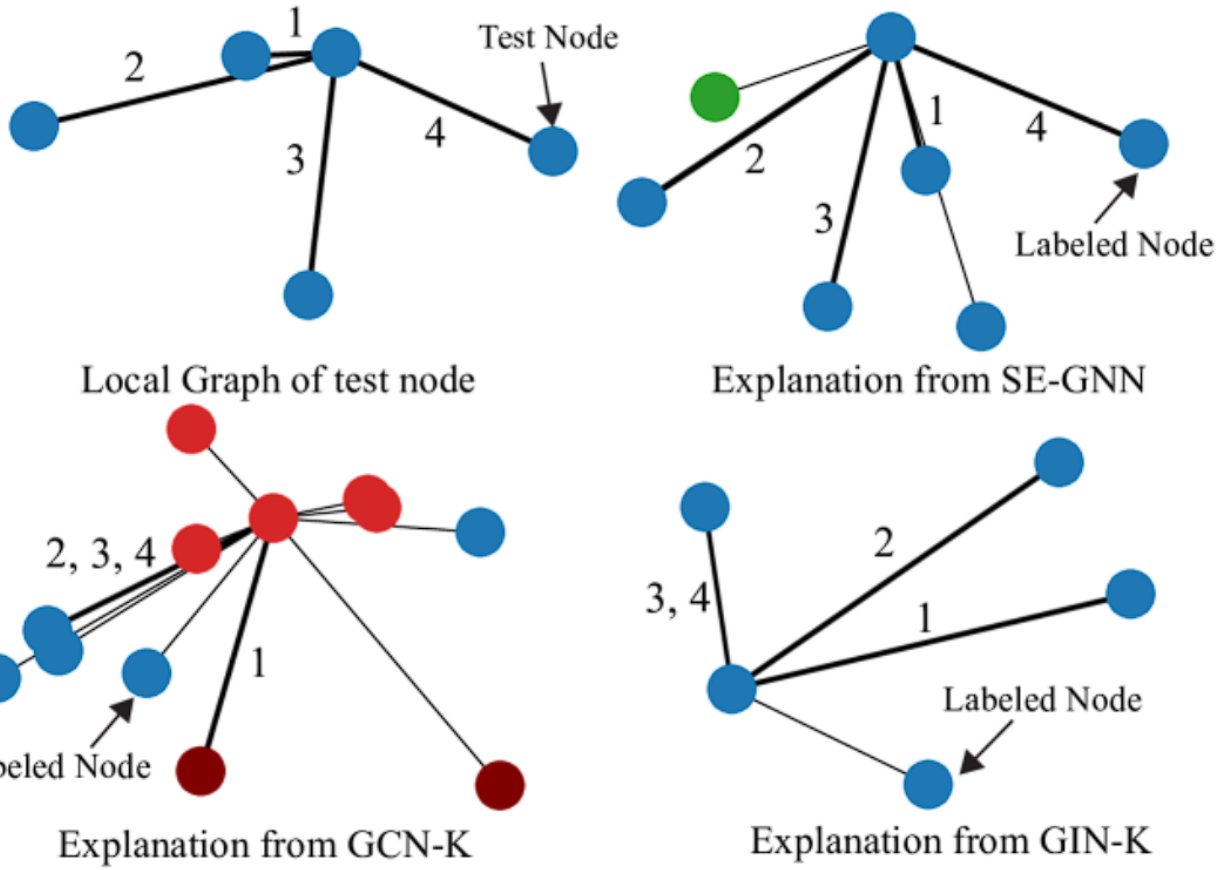
motif



Syncora

To link the synthetic local graphs together, a subgraph of Cora that have no overlap with the motifs is sampled as the basis graph. These synthetic local graphs are attached to the basis graph by randomly linking three nodes. To simulate a realistic training scenario, we randomly select 30% nodes from the motifs and basis graph as the training set. Testing is conducted on the remaining nodes in the motifs for explanation accuracy evaluation.

Explaination



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[1] Enyan Dai and Suhang Wang. *Towards Self-Explainable Graph Neural Network*. 2021. arXiv: 2108.12055 [cs.LG].

[2] Rex Ying et al. *GNNExplainer: Generating Explanations for Graph Neural Networks*. 2019. arXiv: 1903.03894 [cs.LG].