Evaluation of Cross-silo Federated Graph Learning under Data Heterogeneity

Jin YU, Junping DU, Zhe XUE, Yi LIU

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Problems & Ideas

- Problems of conventional stereo matching approaches:
  - Current federated graph learning research has predominantly focused on idealized settings.
  - There is limited systematic investigation of cross-silo scenarios where institutional graphs exhibit pronounced structural and distributional divergence.
- Ideas: Explicitly construct realistic cross-silo FGL environments by perturbing edge relationships and regulating label and quantity distributions.

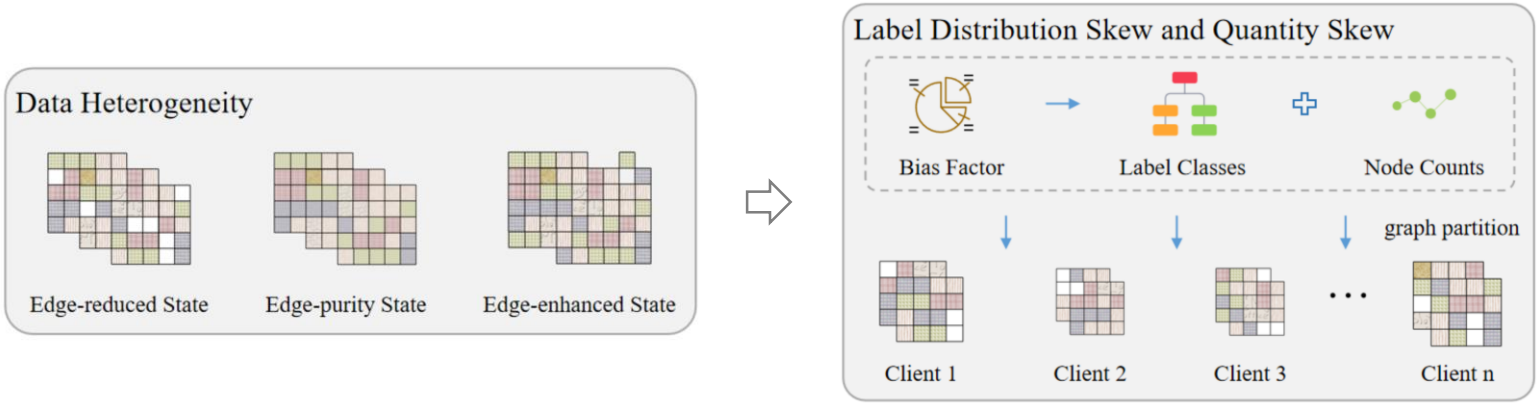
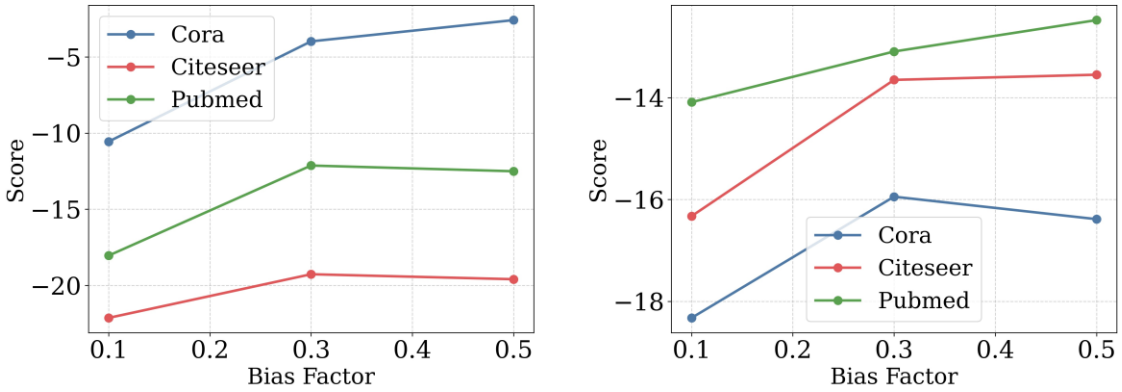


Illustration of heterogeneous data construction in cross-silo FGL. Left: three structural states representing edge-reduced, edge-purity, and edge-enhanced graph conditions; Right: bias-driven graph partitioning process that regulates label classes and node counts across clients, resulting in non-IID subgraphs for cross-silo evaluation.

Main Contributions

- Contributions:
  - Construct multiple complex cross-silo federated graph learning scenarios by simulating structural heterogeneity through modifications in edge relationships;
  - Incorporate label distribution and node quantity-based partitioning strategies to more realistically capture data heterogeneity in cross-silo federated graph environments;
  - Evaluate the impact of data heterogeneity on model performance under various cross-silo federated graph scenarios using three public datasets.



Presents the parameter sensitivity analysis of the proposed bias partitioning strategy. As the bias factor increases, the scores in both Purity and Reduction states show consistent improvements, indicating that partition quality benefits from stronger bias control.