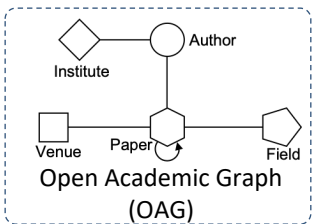


Heterogeneous Graph Representation Learning

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meta path based feature engineering:

- RankClass / RankClus / PathSim ...

meta path based graph rep. learning:

- metapath2vec, PTE ...
- GEM, HetGNN, GT, HAN ...

heter. applications:

- classification
- clustering
- ranking
- link prediction
- ...

can we avoid manually designing meta paths for each dataset?

Open & Reproducible Graph Research

- Open Graph Benchmark

Rank	Method	Test Accuracy	Validation Accuracy
1	HGT (LADIES Sample)	0.5007 ± 0.0043	0.5124 ± 0.0039
2	GraphSAINT (R-GCN aggr)	0.4751 ± 0.0022	0.4837 ± 0.0026

https://ogb.stanford.edu/docs/leader_no_deprop/#ogbn-mag

- Open Academic Graph (OAG)

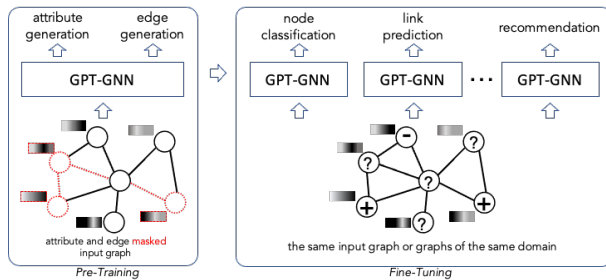
<https://www.aminer.cn/oag-2-1>

- <https://github.com/HeterogeneousGraph>

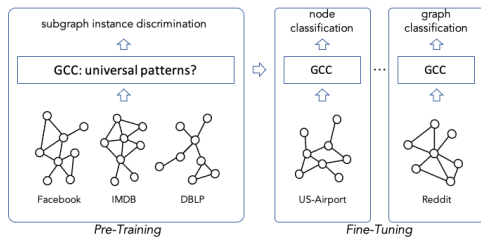
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Generative Pre-Training of One (Heter.) Graph

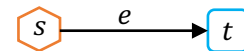


Contrastive Pre-Training across Heter. Graphs



Heterogeneous Graph Transformer (HGT)

- it uses attention to model each type of nodes and edges, so **NO meta paths**



$$\text{Attention}_{HGT}(s, e, t) = \text{Softmax}_{\forall s \in N(t)} \left(\parallel_{i \in [1, h]} \text{ATT-head}^i(s, e, t) \right)$$

$$\text{ATT-head}^i(s, e, t) = \left(K^i(s) W_{\phi(e)}^{ATT} Q^i(t)^T \right)$$

$$K^i(s) = K\text{-Linear}_{\tau(s)}^i \left(H^{(l-1)}[s] \right)$$

$$Q^i(t) = Q\text{-Linear}_{\tau(t)}^i \left(H^{(l-1)}[t] \right)$$

- it can automatically output the **importance** of implicit meta paths
- it is straightforward for heterogeneous graph pre-training & fine-tuning
- it can also support dynamic heter. graphs