Heterogeneous Graph Representation Learning

Yuxiao Dong, Ziniu Hu, Kuansan Wang, Yizhou Sun, Jie Tang

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Can we get rid of the manual design of meta paths?
Heterogeneous Graphs

academic graph

office graph
Heterogeneous Graph Mining

(a) The schema of heterogeneous academic networks

meta paths

- Classification
  ✓ RankClass, …
- Clustering
  ✓ RankClus, …
- Ranking
  ✓ PathSim, …
- Link Prediction
  ✓ PathPredict, …
- …

1. Yizhou Sun, Jiawei Han. Mining Heterogeneous Information Networks: Principles and Methodologies. M & C Publishers, 2012.
Heterogeneous Graph Representation Learning

- Classification
- Clustering
- Ranking
- Link Prediction

(a) The schema of heterogeneous academic networks

meta paths + graph representation learning

heter. graph representation learning
- metapath2vec, PTE, …
- R-GCN, HetGNN, GEM, …
Heterogeneous Graph Representation Learning

Can we get rid of meta paths?

- Classification
- Clustering
- Ranking
- Link Prediction

heter. graph representation learning
- metapath2vec, PTE, ...
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(a) The schema of heterogeneous academic networks
Heterogeneous Graph Representation Learning

Heterogeneous Graph Transformer (HGT)

- no manual design of meta paths!
- straightforward for (heterogeneous) graph pre-training, e.g., GPT-GNN

# Heterogeneous Graph Representation Learning

## Leaderboard for ogbn-mag

**[Leaderboard](https://ogb.stanford.edu/)**

(as of Dec. 13, 2020)

<table>
<thead>
<tr>
<th>Rank</th>
<th>Method</th>
<th>Test Accuracy</th>
<th>Validation Accuracy</th>
<th>Contact</th>
<th>References</th>
<th>#Params</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>HGT (LADIES Sample)</td>
<td>0.5007 ± 0.0043</td>
<td>0.5124 ± 0.0039</td>
<td>Ziniu Hu</td>
<td>Paper, Code</td>
<td>21,173,389</td>
<td>Tesla K80 (12GB GPU)</td>
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<tr>
<td>2</td>
<td>GraphSAINT (R-GCN aggr)</td>
<td>0.4751 ± 0.0022</td>
<td>0.4837 ± 0.0026</td>
<td>Matthias Fey – OGB team</td>
<td>Paper, Code</td>
<td>154,366,772</td>
<td>GeForce RTX 2080 (11GB GPU)</td>
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<tr>
<td>3</td>
<td>R-GCN+FLAG</td>
<td>0.4737 ± 0.0048</td>
<td>0.4835 ± 0.0036</td>
<td>Kezhi Kong</td>
<td>Paper, Code</td>
<td>154,366,772</td>
<td>GeForce RTX 2080 Ti (11GB GPU)</td>
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<td>4</td>
<td>Neighbor Sampling (R-GCN aggr)</td>
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<td>0.4761 ± 0.0068</td>
<td>Matthias Fey – OGB team</td>
<td>Paper, Code</td>
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<td>GeForce RTX 2080 (11GB GPU)</td>
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<td>5</td>
<td>SIGN</td>
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<td>0.4068 ± 0.0010</td>
<td>Lingfan Yu (DGL Team)</td>
<td>Paper, Code</td>
<td>3,724,645</td>
<td>Tesla T4 (15GB GPU)</td>
</tr>
</tbody>
</table>

2. Wang et al. Microsoft academic graph: When experts are not enough. Quantitative Science Studies, 2020
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- data&code: https://github.com/HeterogeneousGraph