

2019-1 Deep Learning Homework #4

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(Deadline : May 13)

In this homework, we practice various graph neural networks using deep graph library (<https://www.dgl.ai/>).

1. Go through the following tutorial for Graph Convolutional Network [1]. Perform experiments in the tutorial and prepare a report.

https://docs.dgl.ai/en/latest/tutorials/models/1_gnn/1_gcn.html

For another implementation, refer https://github.com/dbusbridge/gcn_tutorial.

2. Go through the following tutorial for Relational Graph Convolutional Network [2]. Perform experiments in the tutorial and prepare a report.

https://docs.dgl.ai/en/latest/tutorials/models/1_gnn/4_rgc_n.html

For more information and original implementation, please refer

<https://github.com/tkipf/relational-gcn>.

3. Go through the following tutorial for Line Graph Neural Network [3]. Perform experiments in the tutorial and prepare a report.

https://docs.dgl.ai/en/latest/tutorials/models/1_gnn/6_line_graph.html

For more information and original implementation, please refer

https://github.com/joanbruna/GNN_community.

4. Go through the following tutorial for Stochastic Steady-state Embedding (SSE) [4]. Perform experiments in the tutorial and prepare a report.

https://docs.dgl.ai/en/latest/tutorials/models/1_gnn/8_sse_mx.html

For another implementation, refer <https://github.com/dmlc/dgl>, which is Python package built to ease deep learning on graph, on top of existing DL frameworks.

5. Go through the following tutorial for Graph Attention Network [5]. Perform experiments in the tutorial and prepare a report.

https://docs.dgl.ai/en/latest/tutorials/models/1_gnn/9_gat.html

For more information and original implementation, please refer <http://petar-v.com/GAT/>.

Write a detailed report for all the experiments above and send the report to dkkang@gmail.com. The report has to be as detailed as possible.

References

- [1] Thomas N. Kipf and Max Welling. Semi-Supervised Classification with Graph Convolutional Networks. In *5th International Conference on Learning Representations, ICLR 2017, Toulon, France, April 24-26, 2017, Conference Track Proceedings*, 2017.

- [2] Michael Schlichtkrull, Thomas N. Kipf, Peter Bloem, Rianne van den Berg, Ivan Titov, and Max Welling. Modeling Relational Data with Graph Convolutional Networks. In Aldo Gangemi, Roberto Navigli, Maria-Esther Vidal, Pascal Hitzler, Raphaël Troncy, Laura Hollink, Anna Tordai, and Mehwish Alam, editors, *The Semantic Web*, pages 593–607. Springer International Publishing, 2018.
- [3] Zhengdao Chen, Xiang Li, and Joan Bruna. Supervised Community Detection with Line Graph Neural Networks. *arXiv e-prints*, page arXiv:1705.08415, May 2017.
- [4] Hanjun Dai, Zornitsa Kozareva, Bo Dai, Alex Smola, and Le Song. Learning Steady-States of Iterative Algorithms over Graphs. In Jennifer Dy and Andreas Krause, editors, *Proceedings of the 35th International Conference on Machine Learning*, volume 80 of *Proceedings of Machine Learning Research*, pages 1106–1114, Stockholmsmässan, Stockholm Sweden, July 2018. PMLR.
- [5] Petar Veličković, Guillem Cucurull, Arantxa Casanova, Adriana Romero, Pietro Liò, and Yoshua Bengio. Graph Attention Networks. *International Conference on Learning Representations*, 2018.