FID3018 Advanced Course in Data Mining and Analytics

6. Task 6

6.1 Introduction

On Nov 05, 2020, Lodovico presented the following research papers:

[1] Palash Goyal, Sujit Rokka Chhetri, and Arquimedes Canedo. **dyngraph2vec: Capturing Network Dynamics using Dynamic Graph Representation Learning**. In *Knowledge-Based Systems*, 187, 2020;

[2] Aravind Sankar, Yanhong Wu, Liang Gou, Wei Zhang, and Hao Yang. **DySAT: Deep Neural Representation Learning on Dynamic Graphs via Self-Attention Networks**. In *Proceedings of the 13th International Conference on Web Search and Data Mining*, 2020; and

[3] Ahmed Fathy and Kan Li. **TemporalGAT: Attention-Based Dynamic Graph Representation Learning**. In *Advances in Knowledge Discovery and Data Mining*, 2020.

All research papers are on dynamic Graph/Network Representation Learning (GRL/NRL), which has received significant attention in recent years, even though the majority of the literature is still about static GRL. However, relationships between entities as observed from the world change in time. Thus, it is important to be able to take advantage of the temporal information available. As mentioned, there are several ways to do it. In this presentation, Lodovico focused on how to learn node embeddings from graph snapshots with Graph Neural Networks (GNNs) and Auto-Encoders (AEs).

6.2 Presentation

Lodovico started from a gentle introduction to a topic that was not familiar to all participants, which came from distinct backgrounds. It also helped him to position the research papers. Furthermore, Lodovico reviewed the concepts necessary to evaluate the contributions made by the research papers before each of them.

I liked the order in which Lodovico presented the research papers, which were all published in 2020. However, *dyngraph2vec* [1] was on arXiv.org already in 2018; as a matter of fact, it was presented first, followed by *DySAT* [2], which cites it. [3], which cites *DySAT* [2], was presented last. Time was equally distributed among the research papers.

Slides were very good, supporting Lodovico in giving the presentation. However, some slides were mainly graphical. Thus, in the absence of the speaker, it could be difficult to grasp all concepts. Since I read the research papers in advance, I did not have issues following, but at the same time, while I appreciated how much time Lodovico left for the

discussion, I think Lodovico could have added more slides with more details. On a minor note, slide numbers would have made it easier to later refer to certain parts.

6.3 Conclusion

Overall, I think Lodovico did a very good job. He showed a good knowledge of such a dynamic topic; as a matter of fact, he cited past work by the authors of the research papers. Furthermore, he filled the gaps in the research papers due to confusing word choices. I appreciated that Lodovico shared the opinions he formed about the research papers as well as the limits he recognized reading between the lines.

I think the research papers fit with the content of the course. Although they address a common issue, they present distinct answers to research questions that all contribute to extending GRL from static to dynamic graphs too. In general, NRL is a topic relevant to data mining and analytics, but at the same time, algorithms designed for dynamic graphs are still in the minority.