Link Prediction

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The link prediction problem

- Identify the likelihood of the missing links in static networks and
- Predict the likelihoods of future links in dynamic networks

Similarity-based link prediction algorithms

Kumar et al., ‘Link prediction techniques, applications, and performance: A survey’, Physica A: Statistical Mechanics and its Applications, 2020: https://doi.org/10.1016/j.physa.2020.124289

- Section 2.1 Similarity-based methods

The structural perturbation method (SPM)

Kumar et al., 'Link prediction techniques, applications, and performance: A survey', Physica A: Statistical Mechanics and its Applications, 2020: https://doi.org/10.1016/j.physa.2020.124289

- From Tables 5, 6, 7, 8, we observe that SPM performs the best across most of the datasets w.r.t. all evaluation metrics.

- Please study the details of SPM from the following paper: https://www.pnas.org/doi/epdf/10.1073/pnas.1424644112

Deep learning-based link prediction

Kumar et al., 'Link prediction techniques, applications, and performance: A survey', Physica A: Statistical Mechanics and its Applications, 2020: https://doi.org/10.1016/j.physa.2020.124289

- Section 6.1: Link prediction using deep learning
  - This section outlines multiple deep learning-based algorithms. Among them the SEAL framework is one of the recent developments.
  - Please study the details of the SEAL framework from the following paper: https://papers.neurips.cc/paper_files/paper/2018/hash/53f0d7c537d99b3824f0f99d62ea2428-Abstract.html
  - The SEAL framework is based on graph neural networks (GNNs). Please find an introduction to GNNs on https://neptune.ai/blog/graph-neural-network-and-some-of-gnn-applications

References

- Kumar et al., ‘Link prediction techniques, applications, and performance: A survey’, Physica A: Statistical Mechanics and its Applications, 2020: https://doi.org/10.1016/j.physa.2020.124289
  - Selected Sections as mentioned on the previous slides
- https://neptune.ai/blog/graph-neural-network-and-some-of-gnn-applications
- An ‘Evolving Network’ lecture by Dr Suman Kundu: https://www.youtube.com/watch?v=q0iWkvJG_aA

Thank you