

Graph Matching Networks for Discovering Structural Patterns

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1 Project Description

This project aims to study the retrieval and identification of structurally similar graph objects from a machine learning perspective. More specifically, the project will look into the existing works in the areas of graph neural networks and develop a graph neural network model towards solving some graph matching problem in an application area. Thus, the project includes the following task:

- Conduct a literature review on graph neural networks and the related work on applying graph neural networks on retrieval and matching of graph structured objects, e.g., Graph Matching Networks;
- Identify an application area of graph analytics that involves the graph matching problem, ideally over large-scale graphs;
- Enhance the existing models of graph neural/matching networks to solve the identified graph matching problem;
- Evaluate the enhanced model over 2-4 datasets;
- Write up a project report.

2 Learning Objectives

On the completion of the project, the following learning objectives are expected to achieve:

- Have a good understanding for the literature of graph neural networks and graph matching problems;
- Develop a graph neural network model to retrieve and identify structurally similar graph patterns;
- Be able to thoroughly conduct experiments and analyze experimental results;

- Can communicate about data and research findings understandably, using adequate indicators, tables, and graphs;
- Be able to structure a research report and write convincingly of research outcomes.

3 Related Work

- Graph Matching Networks for Learning the Similarity of Graph Structured Objects, Yujia Li, Chenjie Gu, Thomas Dullien, Oriol Vinyals, Pushmeet Kohli, ICML 2019
- Literature of Deep Learning for Graphs:
<https://github.com/DeepGraphLearning/LiteratureDL4Graph>
- Graph Matching: Theoretical Foundations, Algorithms, and Applications, Horst Bunke, Proc. Vision Interface 2000
- Knowledge-aware Graph Neural Networks with Label Smoothness Regularization for Recommender Systems, Hongwei Wang et al., KDD 2019