AI 530 Porject Description

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1 Team Name

The A Team

2 Members of Team

1. Ajay Krishna - krishnaj

2. Rajesh Mangannavar - mangannr

3. Ali Raza - razaa - CS

4. Irené Tematelewo - temateli

3 Project Objective

The objective of our project was to create a teaching module for the topic of graph neural networks (GNNs). To this end, we have created a set of slides that provide an in-depth explanation of GNNs, along with some experimental results to show their strengths, recent advancements and limitations.

First, the slide deck which contains all the information about the background, intuitions, inner workings of GNNs, our experimental results and the limitations of GNNs. Next,out experiments show through a series of experiments of how hyperparameters affect the performance of GNNS. Furthermore, we have discussed GNNs in the domain of chemistry, vision, Task and motion planning and anamoly detection to showcase some of the recent applications and advancements of GNNs.

4 Task Division

- Ali

    - Review of GNNs for molecular generation and property prediction.

    - Recent approaches for including geometry information in the GNNs.

    - Review of literature related to the generalization and the representational limits of GNNs.

    - Added content related to GNNs for chemistry in the teaching module

    - Worked on the final presentation

- Rajesh

- Review of GNNs for Task and motion planning
- Experiments to show expressive power of GNNs - running it on toy examples and showing how different hyperparameters affect the learning of a GNN
- Adding information about motivation, application and types of GNNs to the teaching module
- Add recent advancements of GNNs to the teaching module
- Worked on the final presentation
- Worked on the experiments and the github repo

- Irené

  - Review of GNNs in Anomaly Detection domain
  - General introduction to GNNs
  - Adding framework for GNNs (along with components) to the teaching module
  - Add training of GNNs (challenges and techniques) along with the mathematical formulations to the teaching module
  - Add recent advancements of GNNs to the teaching module

- Ajay

  - Review of GNNs for Computer Vision.
  - Experiment with GNN based feature correspondence model – SuperGLUE.
  - Compare SuperGLUE to classical approaches (FLANN and Brute Force Matching) and characterize SuperGLUE's unique differences.
  - Add content relating to GNNs for Vision to the teaching module.

5 Final submission

- A slide deck which can be used as a teaching module for Graph neural network - from introduction to experiments to applications to limitations

- A Github repository containing code on experiments performed by us :
  "https://github.com/RajeshDM/Graph_neural_network_experiment"