Runcheng Liu

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Education

Tsinghua University, Beijing, China   09/2018 – present
B.S. in Mathematics and Physics, GPA: 3.67/4(40%)

Research Experience

Undergraduate Research Assistant in THUNLP Group   09/2020 – present
Supervisor: Prof. Zhiyuan Liu, Tsinghua University
Project I: Network representation learning under multi-source heterogeneous data(Tencent Marketing Solution Project)
Objective: Combine the user data and multi-dimensional features, and use the maching learning algorithm to establish an end-to-end model which is able to recommend the ads to the right users automatically.
Achievement:

- Designed and implemented a base model that combines a feature converter and the Heterogeneous Graph Transformer(HGT, the SOTA model on heterogeneous graph representation learning).
- Pretrained the model on the training data, and fine-tuned the model on the downstream task(link prediction), obtained a better performance than the baseline(HGT).

Project II: Pretrained language models(PLMs) for data-to-text generation
Objective: Investigate the impact of large PLMs in data-to-text generation.
Achievement:

- Demonstrated that PLMs such as BART achieved the state-of-the-art result on DocRED dataset without explicitly encoding the graph structure.
- Applied PLMs on the Open Domain Event Text Generation(ODETG) task, and achieved better performance than the baseline. Demonstrated that PLMs is able to generate more informative text than the traditional encoder-retriever-decoder framework on this ODETG task.

Undergraduate Research Assistant in Institute for Advanced Study (IASTU)   04/2019 – 09/2019
Supervisor: Prof. Xuening Bai, Tsinghua University
Project I: Numerical method for the electron magnetohydrodynamics(EMHD) equations(an Open Problem)
Objective: Design an effective numerical approach for the EMHD equations.
Achievement:

- Designed an effective numerical algorithm under the Contrained Transport(CT) framework to capture the evolution of hall drift mode in the EMHD equations in 2 and 3 dimensions.

Course Projects

Tsinghua - Tsinghua, Beijing

Artificial Neural Networks: **Exploration on the pre-trained representation of BERT and the selection of its significant subspace**

- Conducted the experiment in Information-Theoretic Probing with MDL paper by replacing ELMo with BERT, and justified the conclusions obtained in this paper successfully.
- Proposed an effective and simple method which selects the significant subspace of pre-trained representation based on gradients.

Big Data in Experimental Physics: **Classification of the types of OGLE Cephieds**

- Obtained a simple and effective way using an external package to classify the types of OGLE Cephieds in a data-contest hosted on crowdAI.

Programming Fundamentals: **Simulation of temperature based on heat transfer**

- Simulated the evolution of temperature based on heat transfer in three dimensioanl space with boundary conditions, and visualized the distribution of temperature using C language.

Selected Honors & Awards

1. Successful Participant, The Mathematical Contest in Modeling(MCM), 2020
2. Tsinghua Alumni-1997 Scholarship, Tsinghua University, 2019

3. The First Prize, Chinese Physics Olympiad, 2017
4. The First Prize, Chinese Physics Olympiad, 2016

SKILLS

1. **Programming Languages & Tools:** Python, C/C++, Bash, Mathematica, MATLAB, R, Git, LaTeX, PyTorch, TensorFlow
2. **Language:** Chinese, Japanese, English
3. **Sports:** Tennis