

JUNMING ZHAO

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No. 4, Ruidong Lane, Qilin District, Qujing City, Yunnan Province, China

EDUCATION

Fudan University

Bachelor of Science in Data Science (expected in Sept. 2024)

CGPA: 3.68/4.00

Major GPA: 3.73/4.00

Relevant Courses: Introduction to Statistical Learning and Machine Learning, Method of Optimization, Numerical Algorithms with Case Studies, Statistics, Computational Statistics, Principle of Computer Engineering, Social Network Mining, Image Processing and Visualization, Data Structures, etc.

Shanghai, China

09/2020 - 09/2024

RESEARCH EXPERIENCE

Knowledge Works Lab, Fudan University

Research Intern

Mentor: Prof. Deqing Yang

<http://kw.fudan.edu.cn/>

04/2022 - present

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Project: Continual Few-shot Relation Extraction via Contrastive Learning

10/2022 - present

- **Role:** Core member (cooperating with another student)
- Designed a model handling the continual few-shot relation extraction via contrastive learning. The paper will be published in the first half of 2023.
- Built a memory storing the three most valuable samples for each relation, alleviating catastrophic forgetting of previous knowledge.
- Used a BERT encoder to get embeddings of all samples. For each relation r_j , we obtained the centroid feature c_j by averaging the embeddings of all samples labeled as r_j . Selected three samples closest to the centroid into memory.
- Generated negative and positive samples for query samples in memory and training data and reformulated the task as a contrastive learning task.
- Used a dropout strategy to augment positive samples.
- Developed the following three strategies to acquire hard negative samples:
 - i. Select the memory prototypes belonging to various categories with a query.
 - ii. Replace one of the entities in the query.
 - iii. Replace part of the entity with the special token, and select the negative sample most similar to the query.
- Developed a three-stage training process to train the model, and integrated samples formed by various strategies in the multi-task loss function.

Project: Deep Generative Method for Explainable Recommendation

08/2022 - 11/2022

- **URL:** <https://github.com/JumingZhao/DGMER-Deep-Generative-Model-for-Explainable-Recommendation>
- **Role:** Research lead in course research program for students
- Designed a GPT2-based model to generate textual explanations autoregressively.
- Using an *unsupervised learning method*, generated pseudo ground truth for the explanation and utilized *Moviedata-10M* ([http://moviedata. dataset.](http://moviedata.dataset.))
- Designed two scores to extract the most valuable sentences:
 - i. **Similarity score:** Leveraged BM25 algorithm to evaluate the similarity between the reviews and movie introduction document.
 - ii. **Sentiment score:** Utilized *Bayesian* classifier to assess the fitness of the user's emotions to the sentence.
- Combined the two scores to acquire the final score of each sentence. For each review, we selected three sentences

as the pseudo explanation.

- Using the *prompt learning method*, designed $S_0 = [user, item, feature]$ as prompt input of GPT2 and concatenated prompt with the pseudo explanation at the training stage. Utilized the sequence's final representation S_L in GPT2 as input for later modules.
- Used the final representation located at the end of the prompt as the input of MLP to solve the recommendation task. Moreover, we used the final representation located at the position of each explanation token as the input of a linear layer and obtained the probability distribution over the vocabulary V .
- Bridged the two tasks by sharing the same GPT2 and a multi-task learning framework and designed a multi-objective loss function.
- Designed the next-token prediction based on preceding tokens in an auto-regressive method at the generation stage.

PROJECTS IN PRACTICE

Social Network Mining on Douban Website

10/2022 – 12/2022

URL: <https://github.com/JumingZhao/Social-Network-Mining>

- Transformed the relationship on the *Douban* website into a network.
- Performed community detection using the *Louvain* algorithm.
- Evaluated the network's attributes, such as *density*, *diameter*, *degree distribution*, and *clustering coefficient*.
- Conducted various centrality measurements, including *degree*, *eigenvector*, *Katz*, *betweenness*, and *closeness*.

Attention-Based Text Matching

06/2022- 08/2022

URL: <https://github.com/JumingZhao/Attention-Based-Text-Matching>

- Utilized SNIL dataset to train model and predict the correlation between two sentences.
- Obtained input encoding using the Bi-LSTM technique.
- Performed local inference by cross attention and obtained the enhanced information of the two sentences.
- Built a model comprising a linear layer, Bi-LSTM, and MLP to leverage the enhanced information to predict the correlation.

Retail Management System

03/2022- 06/2022

URL: <https://github.com/JumingZhao/Retail-Management-System>

- Utilized *MySQL* and *OceanBase* to develop a distributed database.
- Used *Django* to build the back-end server and *VUE* to create a retail management webpage.
- Developed an automated logistics management system.
- Visualized and evaluated real-time sales performance on the webpage.

LEADERSHIP & EXTRACURRICULAR ACTIVITIES

Fudan International Student Communication Association

05/2021

- **Role:** Co-host
- Organized and hosted the *2021 Fudan Online Summit* of the *Stanford Chinese-American Student Forum* as a co-host. Invited students from renowned universities like *Fudan* and *Stanford*, *Zhejiang*, and *Tsinghua* for participation.

Fudan Winter Publicity Volunteer Team

01/2021

- **Role:** Volunteer
- As a volunteer, I visited a high school in *Yunnan* Province, China, to share my learning experience and communicate with students.

SKILLS

Programming Language: *Python* (including *PyTorch*), C, R, MATLAB, SQL.

Deep Learning: *Transformer*, CNN, RNN, LSTM, MLP, etc.

ML methodologies: Contrastive, continual, prompt, few-shot, etc.

Pretrained language model: BERT, BART, GPT, etc.

NLP methods: relation extraction, named entity recognition, sentiment analysis, etc.

Statistical learning methods: Random Forests, SVM, conditional random field, boosting method, PCA, KNN, etc.

Statistics: Statistical Inference, Regression, and Bayesian analyses

Statistical Computation Methods: Monte Carlo method, *bootstrap*, *jackknife*, Markov Chain Monte Carlo

Methods, EM algorithm, etc.

Convex Optimization: Linear programming, *Semidefinite* Programming, Second-Order Cone Programming, etc.

Numerical algorithms: Gradient descent, Newton-Raphson method, Adam, proximal gradient methods, etc.

REFERENCES

1. Prof. Deqing Yang: Associate Professor, Vice Dean of the School of Data Science, Institute for Advanced Study, Fudan University, Shanghai, China
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