

Ziqiao "Martin" Ma

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Skills

Language **Python, C/C++, C#, Java, JavaScript, Matlab, R, Verilog, TeX**

Framework **PyTorch, TensorFlow, Networkx, DGL, NLTK, OpenCV, AirSim, jQuery, Hadoop**

Education

University of Michigan

PH.D. COMPUTER SCIENCE AND ENGINEERING

Ann Arbor, U.S.

Sep. 2021 - Present

- Advisor: Joyce Chai

- Affiliation: Situated Language and Embodied Dialogue (SLED) Lab @ Michigan AI

- Research Interests: Grounded NLP, Human-Robot Communication, Commonsense Inference, Language Acquisition

University of Michigan

B.S.E. COMPUTER SCIENCE (DUAL DEGREE) | MINOR. MATHEMATICS

Ann Arbor, U.S.

Aug. 2019 - May. 2021

- Cumulative GPA: 4.00/4.00

- Course Highlights: Natural Language Processing (*grad, A+*), Deep Learning for CV (*grad, A+*), Machine Learning (*A+*)

Shanghai Jiao Tong University

B.S.E. ELECTRICAL AND COMPUTER ENGINEERING (DUAL DEGREE)

Shanghai, China

Sep. 2017 - Aug. 2021

- Cumulative GPA: 3.77/4.00, Ranking: 16/260

Research Experience

Situated Language and Embodied Dialogue (SLED) Lab - University of Michigan

Ann Arbor, U.S.

Aug. 2020 - Present

ADVISOR: JOYCE CHAI

• Project: Language Communication and Collaboration with Autonomous Vehicles Under Unexpected Situations

- **Objectives:** Traditional autonomous driving algorithms are slow in learning to handle exceptions. The goal is to develop a smart interface that collaborates with human language instructions and learns to handle the exceptions efficiently.

- **Responsibility:** Reviewed existing autonomous driving algorithms and their ability in handling exceptions. Developed simple interface code to interact with the API of CARLA simulator. Updated the progress report weekly and presented to group members. Currently developing a set of grammar to interact with the internal states.

Liu Lab - University of Michigan

Ann Arbor, U.S.

Jan. 2020 - Aug. 2021

ADVISOR: JIE LIU

• Project: Spatial Cell Pattern Anomaly in T2D Islets via GNN Prediction Explanation

- **Objectives:** Graph Neural Network Explainers did well on node-wise explanation, but the class-wise community pattern interpretation is yet to be researched. The goal is to design a GNN interpreter that captures predictive spatial patterns on graph data for each class, and apply the model on T2D islet samples.

- **Responsibility:** Literature reviewed of existing explaining models, and reproduced baselines. Proposed and designed a novel GNN Explainer that generalized to class-wise interpretation. Validated the model on T2D islet samples and extracted predictive spatial cell patterns. The preliminary result was submitted for grant and is in review.

Foreseer Group - University of Michigan

Ann Arbor, U.S.

Sep. 2019 - May. 2021

ADVISOR: QIAOZHU MEI

• Preprint: Partition-Based Active Learning for Graph Neural Networks

- **Objectives:** Active learning on GNNs focuses on propagated feature density or graph centrality, yet graph information is not fully exploited. We aim at proposing a new query strategy that exploits graph information and deriving a tighter loss bound.

- **Responsibility:** Mathematically formulated the problem in the perspective of Balanced Graph Partitioning. Literature reviewed for existing works on active learning and graph partitioning. Developed source code for our model and baselines. Validated our model and observed a 0.5-3% better accuracy on Cora, Pubmed and Citeseer datasets for different budgets. Currently finalizing the experiments and preparing for paper write up.

• Project: Correlational Information Utilization in Spatial Temporal GCN on Traffic Data

- **Objectives:** Experiments showed that GNNs are incapable of fully exploit correlational graph information. We want to validate this on real-world traffic data and improve the performance ST-GCN by capturing the covariance.

- **Responsibility:** Performed synthetic simulation studies on GNN models, and confirmed the incapability of GNNs to capture correlational information. Better performance of ST-GCN models is validated by experiments on traffic data with gaussian copula loss. The team later extended this work into the CopulaGNN model and a preprint.

Acemap - Shanghai Jiao Tong University

ADVISOR: PROF. XINBING WANG

Shanghai, China
Feb. 2019 - Dec. 2019

- **Projects: Unsupervised Keyphrase Extraction in Scholar Publications**

- **Objectives:** Current keyphrase extraction model under-perform on Acemap datasets. The goal is to investigate and compare state-of-the-art unsupervised keyphrase extraction models and perform well on Acemap dataset.
- **Responsibility:** Reviewed existing unsupervised keyphrase extraction methods including TextRank, PositionRank and EmbedRank, and performed experiments on Kp20k datasets.

Selected Projects

Contracts

CAPSTONE. ADVISOR: DR. AUSTIN YARGER

Ann Arbor, U.S.

Jan. 2020 - May. 2020

- **Description:** A turn-based puzzle game. In Contracts, the player controls an assassin who has been recruited by The Agency, finishes contracts by taking advantage of your surroundings. The player must get past guards, dogs, and obstacles by engaging in combat, stealth maneuvering, or causing distractions. Traverse rooms in different locations by sequencing actions together, planning the next turns by seeing enemy intents, and taking note of items you can utilize.
- **Release (itch.io):** <https://jjrp.itch.io/contracts>

Graph Attention Based Reasoning for Natural Language Inference

TEAM LEADER. ADVISOR: DR. JOYCE CHAI

Ann Arbor, U.S.

Sep. 2020 - Dec. 2020

- **Objectives:** Graph-structured knowledge is powerful in Natural Language Inference (NLI) tasks. We propose to use Graph Attention Networks to exploit knowledge graphs, and develop a graph-based reasoning framework to perform NLI tasks.
- **Responsibility:** Literature reviewed for graph-based models on NLI. Reproduced the Graph-based Reasoning model on Question Answering, and adapted it for Text Entailment and Plausible Inference benchmarks. Organized weekly group meeting and wrote report. Submitted for the final project of EECS595, Natural Language Processing (Graduate), cooperated with 2 undergraduate teammates.

Recent Teaching Experience

Win. 2021 **Artificial Intelligence (EECS492)**, Instructional Aide, University of Michigan

SU. 2020 **Artificial Intelligence (VE492)**, Teaching Assistant, Shanghai Jiao Tong University

SU. 2020 **Programming & Data Structure (VE280)**, Teaching Assistant, Shanghai Jiao Tong University

Selected Funding, Awards and Honors

2021 **James B. Angell Scholar**, University of Michigan

2020, 2019 **University Honors**, University of Michigan

2020, 2019 **Dean's List**, University of Michigan

2019, 2018 **Undergraduate Academic Excellence Scholarship**, Shanghai Jiao Tong University

2018 **National Scholarship**, Ministry of Education of China

2017 **John Wu & Jane Sun Excellence Scholarship**, Shanghai Jiao Tong University
Undergraduate Volunteer Scholarship, Shanghai Jiao Tong University

Selected Service and Activities

OUTREACH

2020 **Michigan Student Artificial Intelligence Lab**, Active Member

2019 **SJTU Student Science and Technology Innovation Association**, Minister

SERVICE

2019 **Young Volunteers Association**, Assistant Student Adviser

2018 **Joint Institute Student Union**, Project Leader of Liaison Department

VOLUNTEERING

2018 **Bangladesh Poverty Reduction Challenge**, Active Member

2018 **Yunnan San He Junior High School Volunteer Teaching Team**, Volunteer Math Teacher