

Ziqiao Ma

UNDERGRADUATE · COMPUTER SCIENCE · MACHINE LEARNING

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Education

University of Michigan

Ann Arbor, U.S.

B.S.E. COMPUTER SCIENCE (DUAL DEGREE)

Aug. 2019 - May. 2021 (Expected)

- Advisors: Joyce Chai, Jie Liu, Qiaozhu Mei
- Minor in Mathematics, LSA
- 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

Shanghai, China

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

Sep. 2017 - Aug. 2021 (Expected)

- Major GPA: 3.84/4.00, Cumulative GPA: 3.81/4.00

Research Experience

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

Ann Arbor, U.S.

ADVISOR: PROF. JOYCE CHAI

Aug. 2020 - Present

- **Project: Exception Handling in Autonomous Vehicles via Human Language Collaboration**
 - **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 code to interact with the internal states of baseline imitation learning algorithm.

Liu Lab - University of Michigan

Ann Arbor, U.S.

ADVISOR: PROF. JIE LIU

Jan. 2020 - Present

- **Project: TAD Level Architectural Features Extraction in High Resolution HiC**
 - **Objectives:** This work is sponsored by Dr. Xiaotian Zhang and contributes to a paper in preparation. Higher resolution HiC data allows architectural features to be captured on TAD level. The goal is to design a TAD level features extraction pipeline.
 - **Responsibility:** Designed an efficient algorithm to extract TAD level architectural stripes from HiC, and a statistical metric to evaluate the feature quality. Prepared weekly presentations and currently writing up the paper. The pipeline will be published as a separate tool paper later and is available on GitHub.
- **Project: Spatial Cell Pattern Interpretation 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.

ADVISOR: PROF. QIAOZHU MEI

Sep. 2019 - Present

- **Project: Active Learning on Graph Neural Network via Graph Partitioning**
 - **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

Graph Attention Based Reasoning for Natural Language Inference

Ann Arbor, U.S.

TEAM LEADER. ADVISOR: DR. JOYCE CHAI

Oct. 2020 - Present

- **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 in ACL form. Will be submitted for the final project of EECS595, Natural Language Processing (Graduate), cooperated with 2 undergraduate teammates.

Application of Generative Adversarial Networks on Image-to-Image Style Translation

Ann Arbor, U.S.

TEAM LEADER. ADVISOR: DR. ANDREW OWENS

Oct. 2020 - Present

- **Objectives:** Generative Adversarial Networks are widely studied in image-to-image translation. The goal is to reproduce models from state-of-the-art GANs and apply them to artistic style transferring tasks.
- **Responsibility:** Literature reviewed for GANs on transfer learning. Reproduced CycleGAN, StarGAN v1 and v2 in PyTorch framework, and evaluated them quantitatively by FID score. Organized weekly group meeting and wrote report in CVPR form. Will be submitted for the final project of EECS442, Computer Vision, cooperated with 3 undergraduate teammates.

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
- SU. 2019 **Physics Lab I (VP141)**, Teaching Assistant, Shanghai Jiao Tong University
- SP. 2019 **Academic Writing II (VY200)**, Teaching Assistant, Shanghai Jiao Tong University
- FA. 2018 **Academic Writing I (VY100)**, Teaching Assistant, Shanghai Jiao Tong University

Selected Awards and Honors

- 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

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

Skills

- Language **Python, C/C++, Java, JavaScript, Matlab, R, Verilog, TeX**
- Framework **PyTorch, TensorFlow, NLTK, OpenCV, AirSim, Networkx, jQuery, Hadoop**