Tianyi (Billy) Ma

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Education

University of Notre Dame — South Bend, USA
Ph.D. in Computer Science — *Jun. 2022 – present*

- **Research Interest:** (Hyper)Graph Representation Learning, Graph Prompt Learning, Large Language Models (LLMs), Self-supervised Learning, Deep Learning, Machine Learning, Data Mining, Social Network Analysis, AI for Education.

University of Southern California — Los Angeles, USA
M.S. in Computer Science — *Aug. 2020 – Jun. 2022*

University of Colorado, Boulder — Boulder, USA
B.S. in Computer Science — *Aug. 2016 – May. 2020*

Experience

Edtera, Inc. — San Diego, USA
Project Researcher & Software Engineer (Intern) — *May. 2021 - Jun. 2022*

- **Recommendation System:** Designed and developed a model to recommend exercises for students, bridging their knowledge gap in various subjects.
- **Hate Speech Detection:** Developed an advanced hate speech detection program to avoid bad words when recognizing and reading the text embedded in images on the Edtera Collaboration Learning platform.

Tencent, Ltd. — Shenzhen, CN
Software Engineer (Intern) — *May. 2019 – Aug. 2019*

- **Leela Chess Zero (Lc0):** Implemented, deployed, and trained a deep neural network–based chess engine, called Lc0, for Chinese Chess on Tencent Lightspeed & Quantum Studio Group AI platform.
- **Happy Mahjong:** Developed a robot to autonomously play Tencent's mobile game Happy Mahjong on Android devices, encompassing mahjong tile recognition, optimal move computation, and screen interaction execution.

Baidu Institute of Technology — Beijing, CN
Lecture Assistant (Intern) — *Jun. 2018 – Aug. 2018*

- Coordinated with ML/AI lecturers, disseminated curriculum materials, and supervised students throughout the courses to ensure the successful achievement of learning outcomes.

Research Experience

University of Notre Dame — South Bend, USA
Research Assistant (Full-time) — *Jun. 2022 – present*

- **Drug Trafficking Community Detection:** To detect the drug trafficking community on social media, designed a novel hypergraph contrastive learning framework *HyGCL-DC* over the built drug trafficking hypergraph, which incorporates informative content features and complex higher-order relationships among online users. Based on *HyGCL-DC*, implemented an application called *iNetworking* to identify and visualize drug trafficking communities on social media.

  To identify darknet drug traffickers' activities on social media, developed a multi-modal learning project *iPortrait* to leverage both the style information (i.e., photography style and writing styles) and content information (i.e., image and text) to match drug traffickers between darknet markets and social media. All research projects are funded by the Department of Justice (DOJ), United States.

Carnegie Mellon University — Pittsburgh, USA
Research Assistant (Part-time) — *Jan. 2022 - Jun. 2022*

- **Student Response Prediction**: leveraged survival analysis and model to evaluate the relationship between the user response time to a problem, which reflects the level of mastery of the corresponding knowledge, and educational or psychological features in RoboTutor, an intelligent tutor platform spearheaded by Carnegie Mellon University.

Selected Conference & Publications

- **Adaptive Expansion for Hypergraph Learning**
  Tianyi Ma, Yiyue Qian, Chuxu Zhang, and Yanfang Ye
  Preprint, Under review
- **Hypergraph Representation Learning with Adaptive Broadcasting and Receiving**
  Tianyi Ma, Yiyue Qian, Chuxu Zhang, and Yanfang Ye
  Under review
- **Hypergraph Contrastive Learning for Drug Trafficking Community Detection**
  Tianyi Ma, Yiyue Qian, Chuxu Zhang, and Yanfang Ye
  ICDM'23: The 23rd IEEE International Conference on Data Mining
- **Dual-level Hypergraph Contrastive Learning with Adaptive Temperature Enhancement**
  Yiyue Qian, **Tianyi Ma**, Chuxu Zhang, and Yanfang Ye
  WWW'24: The ACM Web Conference 2024
- **Identifying the Confidential Demographic Information for Data-based Decision-making of Public Opinion**
  Tianyi Ma
  NECoPA'21: The Northeast Conference on Public Administration 2021

Skills Summary

- **Programming Languages & Platforms:** Python (PyTorch, TensorFlow, Hugging Face), C++, JavaScript, HTML, MATLAB, R, Linux, AWS, SQL, Colab, etc.
- **Soft Skills:** Problem Solving, Leadership, Critical Thinking, Creative Thinking.
- **Languages:** Mandarin, English.

Award

"What Would You Fight For (WWYFF)?" Series | *University of Notre Dame* 2023

- Fighting to combat the opioid crisis via AI and Data-driven Techniques.

Services

- **Conference Program Committee:** COLING'24, KDD'24, CIKM'24.
- **Journal Reviewer:** Transactions on Big Data, Discover Data, Transactions on Dependable and Secure Computing.
- **Outreach Program Judger:** Learning Sphere Projects at Northpoint Elementary School, 2023 & 2024.
- **Teaching Assistant Leader:** Computer Security (CSE-40567/60567).
- **Research Mentor:** ND Summer Enrichment Program, 2024.
- **Volunteer:** Purdue CDF Freedom School Program, 2023 & 2024.