TIANJI CONG

Phone (734)-680-3985 **Email** congtj@umich.edu

SUMMARY

Tianji Cong is a Ph.D. pre-candidate in the EECS Department at the University of Michigan. His research interest is broadly at the intersection of deep learning and data science. His current work is spinning around the manipulation of unstructured data like texts and videos with some security flavor.

EDUCATION

University of Michigan, Ann Arbor, MI Sept. 2020 - Aug. 2025 (Expected)
Ph.D. Pre-candidate in Computer Science and Engineering GPA: 4.00/4.00
Co-advised by Prof. Atul Prakash and Prof. H. V. Jagadish

University of Michigan, Ann Arbor, MI Sept. 2017 - Apr. 2020
Bachelor of Science in Computer Science Cumulative GPA: 3.82/4.00
Bachelor of Science in Honor Math

Course Highlights: Deep Learning for Computer Vision, Introduction to Operating Systems, Web Systems, Database Management Systems, Introduction to Machine Learning, Computer Vision, Introduction to Computer Security, Foundations of Computer Science, Introduction to Computer Organization, Mobile App Development for Entrepreneurs

SKILLS

Programming Languages: Python, C/C++, SQL, JavaScript
Framework: PyTorch, TensorFlow, Flask, React

PUBLICATION

Can Attention Masks Improve Adversarial Robustness? February 2020
Pratik Vaishnavi, **Tianji Cong**, Kevin Eykholt, Atul Prakash, Amir Rahmati
In AAAI-2020 Workshop on Engineering Dependable and Secure Machine Learning Systems

RESEARCH EXPERIENCE

Security Research Group, University of Michigan Ann Arbor, Michigan
Research Assistant, advised by Prof. Atul Prakash May 2020 - Dec. 2020
Guaranteeing AI Robustness against Deception (GARD) Program

- Assisted in developing defense models for two threat-model scenarios (image classification and object detection)
- Identified and reported bugs in open source libraries including Adversarial Robustness Toolbox (IBM), ARMORY Adversarial Robustness Evaluation Test Bed (Two Six Labs) , and Foolbox (Bethge Lab)
- Reimplemented ATTA, an efficient adversarial training algorithm, and enabled it for larger datasets on a single GPU

Designing and Evaluating Digital Adversarial Attacks and Defenses for DNN Models May 2019 - Dec. 2019

- Investigated the hypothesis that background elimination could make the adversarial attack harder by reducing the attack surface, and empirically showed that masking the background could help defend against l_∞-bounded attack
- Developed an end-to-end pipeline that leverages attention masks to enhance the robustness of DNN models
- Benchmarked DNN models on various datasets including GTSRB, Masked MS-COCO, CIFAR-10, and MNIST
- Collected a classification dataset Masked MS-COCO from MS-COCO dataset using Mask R-CNN

Database Research Group, University of Michigan Ann Arbor, Michigan
Research Assistant, advised by Prof. H. V. Jagadish Aug. 2020 - Present
TurboCurator

- Building AI-empowered algorithms to assist and automate tasks required for a depositor to complete the deposit form and submit the deposit in colloration with a software engineer team in ICPSR

Database Research Group, University of Michigan Ann Arbor, Michigan
Research Assistant, advised by Prof. Michael Cafarella May 2019 - Dec. 2019
TAHOMA Video Analytic System

- Refactored and extended a hierarchical video analytic system in PyTorch, which generates and evaluates many potential classifier cascades that jointly optimize the CNN architecture and input data representation
- Led the work of optimizing CNN model search space and built classifiers for various video content query tasks

- Improved the data storage method that reduces preprocessing costs and query time with space tradeoff

Economic Product Price Predictor

- Built a category classifier that takes in retail product descriptions and achieves 96% accuracy across 113 categories
- Built a price predictor on top of the category classifier that achieves 75% accuracy in price range classification and average absolute error of about 6 dollars per product (225000 products tested in total)

WORK EXPERIENCE

Inter-university Consortium for Political and Social Research (ICPSR) Ann Arbor, Michigan
Research Collaborator, TurboCurator project advised by Prof. H. V. Jagadish Aug. 2020 - Present

English Language Institute, University of Michigan Ann Arbor, Michigan
Program Assistant July 2018 - Aug. 2018

- Facilitated a teacher preparation course for international students who speak English as an additional language
- Provided oral and written feedback for prospective graduate student instructors on the quality of their instruction

TEACHING EXPERIENCE

Electrical Engineering and Computer Science Department, University of Michigan Ann Arbor, Michigan
Graduate Student Instructor, EECS 598 Adversarial Machine Learning Jan. 2021 - Present

- Designed and co-organized a brand new seminar-based course for about forty graduate students
- Facilitated virtual office hours to navigate students through paper reading, final project design and development

Instructional Aide, EECS 484 Database Management Systems Sept. 2019 - Apr. 2020

- Prepared homework/lab/exam materials and instructed a weekly lab for about twenty students
- Facilitated both physical and virtual office hours to prepare students for homework, projects, and exams

PROJECTS

Operating Systems Projects, University of Michigan Ann Arbor, Michigan
Concurrent Programming in C++ (Proudly accomplished by a team of two) Sept. 2020 - Dec. 2020

- Developed a thread library that implements threads, mutexes, and conditional variables on multi-processor systems
- Designed and implemented a pager that manages resources on behalf of application processes and provides system calls for creating, copying, and destroying address spaces, allocating space in an existing address space, switching between address spaces, and handling memory faults
- Built a multi-threaded file system with socket programming, remote procedure call, and dynamic mutex management

Major Design Project, University of Michigan Ann Arbor, Michigan
Advised by Prof. Elliot Soloway Jan. 2020 - Apr. 2020
CarpoolCruise (Full-stack project deployed on AWS using Flask and React)

- Developed a centralized open forum that enables UM students to find carpool partners to the airport
- Set up the infrastructure for teammates and iterativly implemented features like the email address confirmation

Intergalactic Mobile Learning Center, University of Michigan Ann Arbor, Michigan
Advised by Prof. Elliot Soloway July 2018 - Aug. 2018
Google Drive Traffic Signal (Published in Chrome Web Store for K-12 education usage)

- Developed a Chrome extension that detects Google Drive connection in real time and logs anomalous activities
- Evaluated several collaborative web applications developed by previous members on various devices and platforms

AWARDS AND HONORS

Awarded Blue Ribbon in UROP's Annual Spring Symposium (2018)
University Honors (2017 Fall - 2020 Winter)

VOLUNTEERING

EECS PhD Student-Applicant Support Program (2020)