

Yinong (Oliver) Wang

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EDUCATION

CARNEGIE MELLON UNIVERSITY | MASTER OF SCIENCE IN ROBOTICS

Sep 2022 - Present (Graduating in Aug 2024) | Pittsburgh, PA

- Advised by Prof. Fernando De la Torre
- Research direction: responsible AI with foundation models from a data-centric perspective

UNIVERSITY OF WATERLOO | BACHELOR OF MATHEMATICS

Sep 2015 - Aug 2020 | Waterloo, CA

- Major and Minor: Computer Science & Computational Mathematics (Double Major, Honours), Statistics (Minor)
- Honours: Graduating with Distinction (90.32/100); Top 3 highest GPA in Computational Mathematics Major; Dean's Honours Lists in all terms
- Awards: Computational Mathematics Upper Year Scholarship, University President's Scholarship, Faculty of Mathematics Entrance Scholarship

RESEARCH INTERESTS

DATA-CENTRIC RESPONSIBLE AI, GENERATIVE MODELS, MULTIMODAL FOUNDATION MODELS

- **AI diagnostics** by jointly analyzing the data and the model in an explainable way, through the lens of LPMs.
- **Fairness issue mitigation** with data manipulation and synthetic data generation, powered by generative models.
- **Generative model and VLM** innovations with a focus on fairness for data-centric responsible AI.

ACADEMIC EXPERIENCES

RESPONSIBLE AI ADVISOR: PROF. FERNANDO DE LA TORRE | MASTER STUDENT

Nov 2022 - Present | Carnegie Mellon University

- Leading two projects (submitting to CVPR 2024) as first author and coordinating multiple team collaborations in the lab.
- Researching an unsupervised method for diagnosing vision models without user intervention, leading to automatic robustness enhancement.
- Inventing an unsupervised dataset generation pipeline using foundation models, offering accessible, efficient, and effective dataset synthesis.
- Implemented custom huggingface pipeline that integrates ControlNet into Stable UnCLIP, enabling new conditional img2img generation.
- Thoroughly explored and reproduced literature in generative models, multimodal models, AI trustworthiness, etc.

DNN OPTIMIZER ADVISOR: PROF. YURI BOYKOV | RESEARCH ASSISTANT IN CV

Jan 2020 - Aug 2020 | University of Waterloo

- Implemented a new DNN model with trust region optimizer and evaluated its performance on the unsupervised monocular depth estimation task.
- Designed and created a two-phase training where the low-level (stereo graph-cut) solver and the DNN optimizer alternate in optimizing the loss function, and experimented with different alternation frequency, main & auxiliary learning rates, phase-wise loss function, etc.
- Built benchmarks with state of the art DNN method and stereo graph cut method, and analyzed behaviours of all methods at various scales of training sets to understand potential underlying discrepancy among different optimizers.

ROBUST EMBEDDING ADVISOR: PROF. PASCAL POUPART | RESEARCH ASSISTANT IN NLP

Sep 2019 - Apr 2020 | University of Waterloo

- Conducted literature reviews and replicated ROVE method and commercial spell checkers in order to build evaluation pipelines for benchmarks.
- Implemented preprocessing components, Bayesian modules, and evaluation pipelines on paraphrasing, entailment detection, sentiment analysis and machine translation tasks for our modularized drop-in robust embedding layer.
- Developed a tunable synthetic noise generation algorithm and a detailed evaluation analysis CLI, enabling reproducible and easily interpretable experiments using texts generated with any level of synthetic noise.

MANUSCRIPTS

- **Yinong Oliver Wang**, Younjoon Chung, Chen Henry Wu, Fernando De la Torre.
"Domain Gap Embeddings for Generative Dataset Augmentation"
Paper under review at CVPR 2024
- **Yinong Oliver Wang**, Eileen Li, Jinqi Luo, Zhaoning Wang, Fernando De la Torre.
"Unsupervised Model Diagnosis"
Paper under review at CVPR 2024
- Selby, Kira A., **Yinong Wang**, Ruizhe Wang, Peyman Passban, Ahmad Rashid, Mehdi Rezagholizadeh, and Pascal Poupart.
"Robust Embeddings Via Distributions"
arXiv preprint arXiv:2104.08420 (2021).

WORK EXPERIENCES

AMAZON SOFTWARE DEVELOPMENT ENGINEER - ALEXA HYBRID ENGINE

Aug 2021 – Aug 2022 | Toronto, ON, Canada

- Merged and migrated two Alexa Skill Kit Android SDKs and enabled unified invocations for both cloud and local skills; enhanced and scaled cloud and local skill development experience and laid the foundation for future features.
- Led the successful packaging of Alexa Hybrid Engine for BMW's voice assistant; analyzed requirements, pinpointed oversized sources, designed deployment plans, coordinated collaborative efforts, and delivered the engine as desired and ensured a smooth customer onboarding experience.
- Developed a standalone test client that enabled integration tests for custom offline skills and bridged Alexa integration with vehicles to develop offline capabilities like car controls.

SPICY GRIT CO-FOUNDER - ENGINEERING & BUSINESS

May 2020 – Mar 2021 | Waterloo, ON, Canada

- Built numerous automated modules & tools that facilitate company operations, including a meal recommendation system, an email notification backend, a business contact information scraper, an automated stress test tool, etc.
- Increased delivery scalability and operation efficiency by programming driver modules using MongoDB and PWA.
- Established strategic partnerships with 30+ local restaurants in three months, which increased available products by over 400%.
- Launched and managed successful marketing campaigns that resulted in 30%+ monthly revenue growth for four consecutive months.

NVIDIA | SOFTWARE ENGINEER INTERN - AV MAP PERCEPTION

Jan 2019 – Apr 2019 | Redmond, WA, US

- Architected a complex data structure and end-to-end pipelines for editing conditions & rules in ground truth maps for autonomous driving.
- Improved data labeling efficiency by five times through automating and enhancing high-definition map editing features, such as automatically adjusting label positions according to voxels and associating relevant traffic elements at intersections).
- Built a fully functional 3D web app with WebGL and three.js for labeling features (traffic signs, rules, etc.) on LIDAR data for map perception.

HUAWEI MACHINE LEARNING ENGINEER INTERN - FACE DETECTION

Jan 2018 – Apr 2018 | Markham, ON, Canada

- Invented optimization in both model structures (dual-model cascade scanning) and engineering pipeline (frame-skipping scanning and continuous face tracing), which boosted the video face detection speed by 13 times while retaining accuracy.
- Trained and enhanced face detection models using Dlib, achieving a 10%+ higher recall rate than the original published Dlib model.
- Reproduced SFD in Caffe and derived new methods to predict motions during face detection, leading to potential DNN optical flows solutions.

GENESYS FRONTEND DEVELOPER INTERN - WEBPAGE DEV

May 2017 – Aug 2017 | Markham, ON, Canada

- Built a dynamic portal in AngularJS that provides visualization of the system status, multi-aspect server reports, and metric analysis.
- Refactored 5000+ lines of AngularJS code in Genesys Client Portal into a React with Redux framework in just two weeks.

FGF BRANDS FULL-STACK DEVELOPER INTERN - WEBAPP DEV

Sep 2016 – Dec 2016 | Toronto, ON, Canada

- Spearheaded the technical design and development of a cross-platform shift reporting system using ASP.NET MVC and SQL database.
- Automated the production line QA process, allowing QA leads to transition to paperless quality assurance with much higher efficiency.

HONOURS

- Computational Mathematics Upper Year Scholarship | 2020, Waterloo Ontario
- Faculty of Mathematics Entrance Scholarship | 2016, Waterloo Ontario
- University of Waterloo President's Scholarship | 2016, Waterloo Ontario
- Governor General's Academic Medal (Bronze) | 2015, Muskoka Ontario

SKILLS

MACHINE LEARNING

PyTorch | Tensorflow | Caffe | Dlib | OpenCV | VLM | Diffusion | GANs | Transformer | CNN | Regression | Bayesian Learning

DATA ENGINEERING

Numpy | Pandas | OpenCV | Neo4j | Cypher | Matlab | R | LMDB | HDF5 | MongoDB | MySQL

SOFTWARE ENGINEERING

C++ | C | C# | Python | Java | Scala | Racket | Swift | Arduino

WEB DEVELOPMENT

Typescript | JavaScript | AngularJS | React | Redux | Vue.js | NodeJS | HTML5 | CSS3 | RESTful APIs

TOOLS

Git | Docker | Vim | Android Studio | Jira | \LaTeX | Selenium | Unity | Blender

EXTRACURRICULARS

- CMU Undergrad AI Mentoring Program (mentor)
- CMU Chinese Technology Organization (CTO) (organizer)
- CMU Graduate Entrepreneurship Club
- 2024 McGinnis Venture Competition at Swartz Center for Entrepreneurship
- 2019 Velocity Fund (VFF) Pitch Competition finalist at Velocity Incubator
- 2019 Velocity 5k Pitch Competition winner at Velocity Incubator
- Polyglot aspirant: self-taught Cantonese, Japanese and Korean; studied French at school
- Urban planning enthusiast: my study notes and steam workshop about traffic engineering
- Food explorer and serious chef: cooking for people is a part of my meaning of life

PROJECTS

CRYPTO COINS TRADER

- Developed a 24/7 monitoring portal to subscribe, check, and alert about crypto-currencies in real-time.
- Wrote an automation script that records the correlation between coins' market price fluctuation and popular tweets to generate datasets.
- Performed sentiment analysis of trending tweets about crypto-currencies using a Naïve Bayesian classifier.
- Designed and built a prediction model for price changes in response to new popular tweets.

SYNAPSE MEMORIZATION HELPER

- Implemented a desktop application to help users build vocabulary using subconscious association among words.
- Integrated the graph-based database Neo4j with Cypher to capture relations that reflect implicit memorization via association of imagination.
- Utilized Levenshtein distance and SymSpell package to program an ambiguous search feature.

COURSE PROJECTS

- Performed supervised image segmentation by coding a K-means method, a graph cut method, and an encoder/decoder CNN from scratch.
- Built an A* search solution on the Traveling Salesperson Problem and a Sudoku solver using the Constraint Satisfaction Problem and backtracking.
- Implemented key features of an OS kernel in C++, such as synchronization primitives, process execution, and memory management.
- Built a regression model in R to analyze the correlation between birth weights and 17 potential factors via automated and manual model selection using PRESS, R^2 , AIC and provided in-depth model comparisons.