

MARTIN (ZIWEN) MA

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EDUCATION

University of Waterloo

BASc Chemical Engineering with Option in AI

University of Waterloo

Sept 2016 - Apr 2021

- Cumulative GPA: 95%, Rank: 1/50, Dean's Honours List
- **Relevant Courses:** Intro to Machine Learning, Advanced Optimization, Intro to AI, Data Mining, Autonomous Vehicles, Game Theory, CNN for Computer Vision (Stanford CS231n), Reinforcement Learning (Stanford CS234), Methods and Tools for Software Engineering, Algorithms & Data Structures, Algorithm Design & Analysis

AWARDS & HONOURS

Vice President of Chemical Engineering Student Society (2018-present)

First-in-class Scholarship (2019, 2020)

Engineering Faculty Upper Year Scholarship (2019)

President's Scholarship (2017)

RESEARCH EXPERIENCE

University of Waterloo - Professor George Shaker

Undergraduate Research Assistant

Waterloo, Canada

Sept 2020 - Present

- Currently building a Temporal Convolutional Network (TCN) to localize passengers and classify occupancy types using in-car radar sensors.

University of Waterloo - Professor Krzysztof Czarnecki

Autonomous Vehicle Engineer

Waterloo, Canada

May 2020 - Aug 2020

- Co-designed and implemented an active learning framework for LiDAR-based 3D object detection.
 - Enabled training on multiple datasets (KITTI, NuScenes, CADC) and models (PointPillars, SECOND) by building dataloaders and abstraction layers.
 - Increased sample training efficiency by 5% through designing uncertainty-based acquisition functions.
- Enhanced model robustness and increased performance by 3% through training with epistemic and aleatoric uncertainty calculated from Monte Carlo dropout in PointPillars network with PyTorch and CUDA.
- Minimized expected calibration error by calibrating network output using temperature scaling.
- Generated explanation for 3D object detection and collected meaningful trend between True Positive and False Positive using saliency and integrated gradient with Captum.

WORK EXPERIENCE

Suncor Energy

Production Engineer

Calgary, Canada

Sept 2019 - Dec 2019

- Reduced unreachable underground oil field temperature prediction error by over 60% through constructing a regression neural network with PyTorch.
- Enabled refinery system malfunction alert 1-3 days in advance with 83% precision using an autoencoder for anomaly detection in operating data with Keras.
- Automated tasks of calculating oil sample saturation level from lab pictures, with normalization for different lighting conditions using OpenCV.

Petro-Canada Lubricants

Process Engineer

Mississauga, Canada

Jan 2019 - Apr 2019

- Reduced plant power consumption by 12% through optimizing the plant controller operating functions based on the cost/benefit analysis.
- Predicted QC results with 90+% accuracy by designing a greedy selection algorithm and optimized parameters using dynamic simulation in Python.

PROJECTS

Tetris.ai *Python, PyTorch, PyGame* github.com/martinzwm/tetris-ai
Trained an RL agent from raw pixels with Double Deep Q-Learning and Prioritized Experience Replay to achieve super-human performance in Tetris.

E-Commerce Product Classification *Python, PyTorch* github.com/martinzwm/kaggle_e-commerce
Designed a multimodal deep learning network to combine images, text descriptions, and categorical features and achieved 97.7% test accuracy and top 5% in Kaggle competition.

Style Transfer *Python, PyTorch* github.com/martinzwm/stanford-cs231n
Trained a model to artistically integrate any 2 pictures, output image contains the content of one image and the style of the other.

Lane Detection *Python, OpenCV* github.com/martinzwm/lane-detection
Pipeline: Gaussian blur, Canny edge detection, RoI identification, Hough transform, Lane classification

Path Planner *C++* github.com/martinzwm/path-planner
Designed vehicle path planning algorithm to achieve lane following/changing, smooth trajectory, and collision avoidance.

Robust Shortest Path *Python, CPLEX* github.com/martinzwm/robust-shortest-path
Applied Benders decomposition to solve for shortest path problem when arc length is a random variable within an upper and lower bound.

SKILLS

Languages: Python, Java, C++, C, MATLAB, SQL, HTML, CSS, JavaScript
Tools: Linux, Git, Docker, CPLEX, ROS, Simulink
ML Libraries: PyTorch, Tensorflow, Keras, Scikit-Learn, Captum

EXTRA CURRICULARS

Champion of intramural hockey
Assistant soccer coach for U15
Intramural basketball
Guitarist in a band
Rock climbing