Zichen "Charles" Zhang

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Education

Macalester College, Saint Pual, MN *B.A. Expected Dec 2022*

Major GPA 4.0/4.0 *Mathematics, Computer Science*

- Charles J. Turck Presidential Honor Scholarship(Four-year scholarship), School Dean's List (2019 - PRESENT)
- **Programming Skills: Python**(numpy, matplotlib, PyTorch, TensorFlow, Keras, Paddle, OpenCV, AllenAct, XGBoost, Gym, Baselines, nltk), **R**(ggplot, ggmap, plotly, leaflet, gganimate, rvest, shinny), **Java, MATLAB, C++, SQL, Vue, HTML, CSS, Markdown, TEX, COMSOL**

Experience

Reset-Free Deep Reinforcement Learning Research *Seattle, WA*

Mentored by Luca Weihs, Allen Institute for AI(AI2) *Aug. 2021 - PRESENT*

- Mentored by Luca Weihs, develop, optimize and build solutions of reset-free deep reinforcement learning models in adversarial settings
- Contribute codes and tutorials for baseline experiments and pretrained models of MuJoCo environments to the project of the modular and flexible learning framework *AllenAct*

Geometric Measure Theory Research *St. Paul, MN*

Professor Lisa Naples Lab, Macalester College *Jun. 2021 - Aug. 2021*

- After answering the Traveling Salesman Problem(TSP) in mathematics, develop and prove theorems and lemmas to extend the characterization of measures that are carried by rectifiable curves in the dyadic cube system
- Present algorithms for the construction of a rectifiable curve using appropriately chosen δ-neighborhood

Artificial Intelligence in Pathology Research Intern *Beijing, China*

Mentored by co-CEO & CTO Shuhao Wang, R&D, Thorough Images *Jan. 2021 - May. 2021*

- Apply the National Invention Patent as the inventor of an automated scoring system for human epidermal growth factor receptor 2(HER-2) after immunohistochemical(IHC) staining, and will be deployed in Chinese hospitals.
- Use computer vision techniques realized by OpenCV, Skiamge libraries and models with various types of deep learning neural networks implemented by PyTorch and TensorFlow libraries to preprocess, recognize, segment, and classify in the pathological images for various pathological examinations.

Deep Reinforcement Learning Research *St. Paul, MN*

Professor Esra Kadioglu Urtis Lab, Macalester College *Jun. 2020 - Aug. 2020*

- Develop Q learning based algorithms with simulations for UAVs coverage building in Gym or by graph.
- Create a Gym environment for the coverage path planning for multiple drones using Actor Critic using Kronecker-Factored Trust Region (ACKTR) deep reinforcement learning method provided by Stable Baselines(OpenAI) in Python, and compare the stability and convergence with Deep Q Network(DQN), Deep Deterministic Policy Gradient (DDPG), Asynchronous Advantage Actor Critic(A3C), and Advantage Actor Critic (A2C).

Teaching Assistant *St. Paul, MN*

Mathematics, Statistics and Computer Science Department, Macalester College *Jan. 2020 - PRESENT*

- Teaching Assistant(Preceptor) in COMP 394 Reinforcement Learning, MATH 378 Complex Analysis, COMP 128 Data Structure, and STAT/COMP 112 Intro to the Data Science from Spring 2020 until PRESENT.
- Write class materials and code implementations for homework; help the professor develop homework for the COMP 394 *Reinforcement Learning*
- Grade homework and hold office hours for students in classes

Scripts

Characterization of Rectifiable Measures Carried by Lipschitz Curves

Zichen Zhang, Yutong Wu, and Lisa Naples, JMM AMS Contributed Paper Session, AMS-PME Poster Session, 2022 *May 2021 - Aug. 2021*

Accepted for Joint Mathematics Meeting(JMM) 2022, AMS Contributed Paper Session on Functions of Complex Variables, Measure and Integration Theory(**1** of **6** presenters), and America Mathematical Society-Pi Mu Epsilon(AMS-PME) Poster Session

Automated Scoring System of HER2 in Pathological Images under the Microscope

Zichen Zhang, Lang Wang, and Shuhao Wang, arXiv 2021 *Jan. 2021 - May 2021*

Research Intern paper for automatically recognizing and classifying HER-2 status under pathological images with interpretable procedures.

Area Coverage with Unmanned Aerial Vehicles Using Reinforcement Learning

Zichen Zhang, Elisabeth Landgren, Fan Zhang, Aaron Gould, and Esra Kadioglu Urtis, Preprint 2020 *May 2020 - Aug. 2020*

Research paper for summer research at Macalester mentored by Esra Kadioglu Urtis(now in Wake Forest University)

Design and Optimization of Comb Drive Accelerator for High Frequency Oscillation

Zichen Zhang Modern Mechanical Engineering 8.01 (2018): 1. *Apr. 2017 - Feb. 2018*

Mentored by Doc. Albert Chen(UCLA), a finite element code is used for the design, optimization, and visualization of a comb drive accelerator.

Generalizations of Trajectory about Fixed Points and Lines Moving to Magnify and Shrink

Zichen Zhang Mathematical Study and Research(China) (19), 2017 *Sep. 2016 - Feb. 2017*

This Chinese geometrical paper is for mathematical Olympics competitions, generalized series of problems of locus by an elegant method, wrote at junior high school