

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, shiny), **Java, C++, C, MATLAB, SQL, Vue, HTML, CSS, Markdown, TeX, COMSOL**

Experience

Reset-Free Deep Reinforcement Learning Research Intern

Seattle, WA

PRIOR TEAM, ALLEN INSTITUTE FOR AI (AI2)

Aug. 2021 - PRESENT

- Mentored by *Luca Weihs*, develop, optimize and build solutions of adversarial reset-free deep reinforcement learning with sink states
- Apply techniques in dynamism, recurrent models, data augmentation by MDP homomorphism under rotation invariance, visual dynamics replay storage, e.t.c.
- 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

Jan. 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

RESEARCH AND DEVELOPMENT DEPARTMENT, THOROUGH IMAGES

Jan. 2021 - May. 2021

- Mentored by co-CEO & CTO *Shuhao Wang*, 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 techniques realized by OpenCV, Skimage 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 at 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