

# 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)
- **Relevant Coursework:** Reinforcement Learning, Database Management Systems, Signal Processing, Topology, Probability, Combinatorics, Numerical Analysis, Complex Analysis, Real Analysis, Algorithm Design and Analysis, Data Structure, Data Science, Statistics Modeling

## Skills

**Programming** Python(numpy, matplotlib, TensorFlow, PyTorch, Keras, OpenCV, OpenAI, XGBoost, Gym, Baselines, PaddlePaddle, R(ggplot, gmap, plotly, leaflet, gganimate, rvest, shiny), Java, MATLAB, C++, SQL, HTML, CSS, Markdown, TeX, COMSOL

## Experience

**Embodied AI Research**

Seattle, WA

PRIOR Group, ALLEN INSTITUTE FOR AI(AI2)

Aug. 2021 - PRESENT

- Mentored by Luca Weihs, develop, optimize and build solutions of deep embodied, multi-agent reinforcement learning algorithms for common good, especially for challenges of reset-free models.
- 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  $\delta$ -neighborhood

**Computer Vision Research Intern**

Beijing, China

Research and Development Department, 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, 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

**Automated Scoring System of HER2 in Pathological Images under the Microscope**

ZICHEN ZHANG, SHUHAO WANG, *et al.*, PREPRINT 2021

Jan. 2021 - May 2021

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

**Characterization of Rectifiable Measures that are Carried by Lipschitz Curves**

ZICHEN ZHANG, YUTONG WU, AND LISA NAPLES, PREPRINT 2021

May 2021 - Aug. 2021

Mathematical geometric measure theory research paper wrote at Macalester College

**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 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 and visualized by *Geometer Sketchpad*