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, Paddle) **R**(ggplot, ggmap, plotly, leaflet, gganimate, rvest, shinny), **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 δ-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, 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

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*

Kaggle: House Price Prediction

13^{th} PLACS(0.06%) OUT OF 19506 TEAMS *Jan. 2020 - Feb. 2020*

- Using Ridge, Lasso, LGBM, XGB, and Stacking CV Regressor, and series of data visualization and analytical techniques to reach 0.10643 root mean squared logarithmic error and 12449.19063 mean absolute error, got 13^{th} place, 0.06% out of 10506 teams(individual)

Mathematical Modeling for Drone Light Show

HONORABLE MENTION OUT OF 938 TEAMS IN MATHEMATICAL CONTEST IN MODELING *Jan. 2018 - Feb. 2018*

- Using *MATLAB*, I built models to determine the required number of drones and every drone's initial location during the process.
- Any simple pictures or icons could be designed for the drone show by my *MATLAB* program.