Zichen "Charles" Zhang

1600 Grand Avenue, St. Paul, MN

☐ (+1) 651-600-5947 | ✉ zzhang4@macalester.edu | ⌂ zcczhang.github.io | ⌨ zcczhang | in charleszzz

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   **R**(ggplot, ggmap, plotly, leaflet, gganimate, rvest, shinny), **Python**(numpy, matplotlib, XGBoost, TensorFlow, PyTorch, Keras, OpenCV, OpenAI, Gym, Baselines, Paddle), **Java, MATLAB, C++, SQL, HTML, CSS, Markdown, T$_E$X, COMSOL**

Experience

Geometric Measure Theory Research   *St. Paul, MN*

Professor Lisa Naples Lab, MACALESTER COLLEGE   *Jun. 2021 - Aug. 2021*

- Summer Research for the geometric Measure theory and graph rectifiability with professor Lisa Naples at Macalester College
- 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-nets(ongoing)

Computer Vision Research Intern   *Beijing, China*

Research and Development Department, THOROUGH IMAGES   *Jan. 2021 - May. 2021*

- Mentored by Eric Wang, the chief technology officer(CTO) of Thorough Images which is a professional artificial intelligence (AI) company dedicated to complete intelligent solutions for pathological images
- 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. The paper is under revision for submission
- Use computer vision techniques realized by OpenCV, Skiamge libraries and models with various types of deep learning neural networks implemented by PyTorch, TensorFlow, and Keras libraries to preprocess, recognize, segment, and classify in the pathological images for various pathological examinations.

Deep Reinforcement Learning Researcher   *St. Paul, MN*

Professor Esra Kadioglu Urtis Lab, MACALESTER COLLEGE   *Jun. 2020 - Aug. 2020*

- Develop tabular 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 in module 4 and MATH 378 Complex Analysis in module 3 in Spring 2021, COMP 128 Data Structure in Fall 2020, and STAT/COMP 112 Intro to the Data Science at Macalester College in Spring 2020 at Macalester College
- Write code implementations for homework and class materials, and help the professor with developing homework for the topics course Reinforcement Learning
- Grade homework and hold office hours to help over 100 students in classes with class topics

Projects

Kaggle: House Price Prediction

13th 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 13th 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.

Design and Optimization of Comb Drive Accelerator for High Frequency Oscilation

PUBLISHED IN MODERN MECHANICAL ENGINEERING VOL.8 NO.1, FEBRUARY, 2018   *Apr. 2017 - Feb. 2018*

- This project is mentored by a doctor at UCLA and the final paper was published. In this work, using *COMSOL* and *MATLAB*, a finite element code was 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

PUBLISHED IN MATHEMATICAL STUDY AND RESEARCH(CHINA) VOL 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*