MICHELLE ZHAO

Contact Information

Michelle Zhao
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Research Interests

Theory and applications of machine learning with a focus on reinforcement learning and interactive machine teaching with robotic applications.

Education

California Institute of Technology — Pasadena, CA
Bachelor of Science – Computer Science — June 2020
Minor: Information and Data Science — GPA: 3.8

Research Experience

Caltech Aerospace Robotics and Control Lab — May 2017 – Oct 2017
UNDERGRADUATE RESEARCH FELLOW

- Designed a computer-vision based approach to aerial navigation in GPS-denied environments using road extraction and designed a novel docking mechanism for multi-agent robot formations.
- Programmed a multi-agent swarm robot system and with an offline distributed control algorithm.

Caltech, Department of Computing and Mathematical Sciences, Professor Yisong Yue — Nov 2018– June 2020
UNDERGRADUATE RESEARCHER

- Implemented multiresolution sequence imputation baselines MaskGAN and Hierarchical Multiscale Recurrent Neural Networks
- Modeled machine teaching as an explanation scheduling problem as part of my machine teaching senior thesis

Teaching Experience

UNDERGRADUATE TEACHING ASSISTANT

Course: CS11
Java Computer Programming Lab — Fall 2017
Professor Donnie Pinkston

- Graded sets, held office hours

Course: CS156a
Machine Learning Systems — Fall 2018
Professor Yaser Abu-Mostafa

- Head TA, held office hours, performed administrative tasks

Course: CS155
Machine Learning and Data Mining — Winter 2019
Professor Yisong Yue

- Graded sets, held office hours, wrote new mini-projects and solutions.

Course: CS144
Networks: Structure and Economics Winter 2020
Professor Adam Wierman

Professional Experience

Virtualitics Los Angeles, CA
MACHINE LEARNING INTERN June 2020 – Sept 2020

- Developed a named entity recognition pipeline for processing natural language datasets
- Built an outlier and error detection system using a voting-based model of several anomaly detection techniques.
- Developed a classifier for breast cancer data.
- Analyzed runtimes and capabilities of six graph visualization software (whitepaper)

Goldman Sachs New York City, NY
SUMMER ANALYST June 2019 – Aug 2019

- Predicted intraday trade volume and distribution using spline regression and autoregressive techniques.
- Improved a multi-armed bandits algorithm to model client tiering as a reinforcement learning problem.
- Analyzed usage of internal applications in order to propose directions for the upcoming update.

Vectra Networks San Jose, CA
DATA SCIENCE INTERN June 2018 – Sept 2018

- Developed machine-learning based algorithms to predict normal, recurrent behavior in network traffic anomaly patterns, using random forests and logistic regression models.
- Engineered predictive models for detecting anomalies in the timing of network authentication requests.

Technical Skills

LANGUAGES:
Python, C++, C, Java, MySQL, SQL, R, Arduino, MATLAB

TOOLS:
Scipy/Numpy, Scikit-Learn, Pytorch, Tensorflow, Keras, Pandas, NLTK, Matplotlib, OpenAI Gym, ROS, Mathematica, Apache Spark, RStudio

COURSEWORK:
Machine Learning, Data Mining, Relational Databases, Data Science, Statistics, Algorithms, Operating Systems, Game Theory, Networking, Probability, Linear Algebra, Economics, Discrete Mathematics, Statistical Inference, Signal Processing, Computational Photography

Honors and Awards

George W. Housner Student Discovery Award 2019
- Funding for research and scholarly activities

Beckman Coulter Scholarship Recipient 2016
- Scholarship for STEM study and research

Intuit Scott Cook Award Recipient 2016
- Undergraduate scholarship

Dollars for Scholars Scholarship 2016
- Undergraduate partial-tuition scholarship

Publications

Foust, Rebecca C. and Zhao, Michelle and Oliver, Suzanne and Chung, Soon-Jo and Hadaegh, Fred Y. (2017) *Distributed Control Of An Evolving Satellite Assembly During In-Orbit Construction.* — In: 68th International Astronautical Congress, 25-29 September 2017, Adelaide, Australia.

Zhao, M., Chen, Y., Yue, Y. *Submodular Surrogate for Structured Machine Teaching*. — Currently submitting to AISTATS 2021

Presentations

Distributed Control of Swarm Robot Formation and Assembly; Methods for Navigation in GPS Denied Environments — Sept. 2017
Caltech Summer Undergraduate Research Fellowship Seminar

Projects

SACHACKS HACKATHON 2018:
Created machine learning APIs for strategy analysis of NBA 2K18 game; First Place.
GOLDMAN SACHS INTERN DATATHON 2019:
Prediction toolkit for futures, FX, and options pricing; First Place.
YAHTZEE-PLAYING ROBOT:
Built a robot that plays Yahtzee with a human using computer vision and game strategies.
MOVIE RECOMMENDATION SYSTEM:
Created a movie recommendation engine using singular vector decomposition and a variety of machine learning algorithms.
TEXT SUMMARIZATION:
Implemented learning based text summarization algorithms for summarizing research.
IMAGE CLASSIFICATION USING RL:
Used reinforcement learning to reframe image classification approaches.
KAGGLE COMPETITIONS:
Sentiment analysis of Amazon reviews; Predicting survival on the Titanic.

Campus Activities

NCAA Women's Cross Country 2016-2017
NCAA Women's Water Polo 2018-2020
Caltech Y, *Executive Committee, Board Member* 2016-2020
Caltech Aftermath Ultimate Frisbee Team 2019-2020