Changling (Xavier) Li

Curriculum Vitae

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EDUCATION

Colby College Waterville, ME, USA

Bachelor of Arts in Computer Science & Physics with concentration in Astrophysics 2018 - 2022

GPA: 3.96 / 4.00

- Relevant Coursework: Neural Networks, Interactive System, Data Structure and Algorithms, Data Analysis and Visualization, Analysis of Algorithms, Data Science in Astrophysics Computer Game Design, Programming Languages, Computer Organization, Real-World Database Design

Li Po Chun United World College (LPC UWC) Hong Kong

IB Diploma: 41/45 2016 - 2018

RESEARCH INTERESTS

Machine Learning, Reinforcement Learning, Data Science in Astrophysics, Robotics, Computer Vision

RESEARCH EXPERIENCE

PI: Professor Ying Li

Department of Computer Science, Colby College, Waterville, ME January 2021 - Present

- Modified deep Q-learning Network model (DQN) to multi-agent DQN and assess the model with OpenAI Gym.
- Formulated case-specific reward function and create scalable environment for drones' trajectory planning.
- Trained the model with 9 agents and the trajectories of the drones are visualized and analyzed
- Presented academic poster at 2021 Colby College Undergraduate Research Retreat.

PI: Professor Hannen(Hannah) Wolfe

Department of Computer Science, Colby College, Waterville, ME January 2020 – May 2021

- Created core workflow and implemented poly-simplification algorithm for data processing and animation using Panda, Numpy, Matplotlib.
- Modify LSTM neural network and monitor the training process with TensorBoard.
- Investigate the correlation between eye focusing and drawing and generate random sketches with the trained model.
- This project will be employed as a tool in Colby College Art Department.

PI: Professor Nora Youngs

Department of Mathematics, Colby College, Waterville, ME Spring 2019

- Analyze and document 10+ relevant research paper.
- Develop theorems with proofs on generating Euler Diagram with given abstract description.

ON-GOING RESEARCH PROJECT

- Identification of independent moving object in curvilinear self-motion
- Multi-agent reinforcement learning for energy efficient trajectory planning of drone networks with random task locations.
- Building a public digital platform providing access to digital Chinese magazine database and an interface to analyze the digital humanities data

PRESENTATION & POSTERS

- *Reinforcement Learning for Energy-Efficient Trajectory Planning of Drone Networks*, Changling Li, Jiyao Chen, Ying Li, 2021 Colby College Undergraduate Research Retreat.

PUBLICATIONS

- Under Construction…

TEACHING EXPERIENCE

CS353 Interactive System, Colby College Fall 2021
Teaching Assistant

- Grade students' reading response and projects
- Hold weekly TA session to answer course related questions and debug Arduino programs

CS251 Data Analysis and Visualization, Colby College Fall 2020 – Spring 2021
Teaching Assistant

- Hold weekly TA session to answer course related questions and debug Python programs

CS231 Data Structure and Algorithm, Colby College Spring 2019 – Spring 2021
Teaching Assistant

- Hold weekly TA session to answer course related questions and debug Java programs

CS152 Introduction to Fundamentals of Computer Science, Colby College Fall 2019 – Spring 2021
Teaching Assistant

- Grade students' projects weekly on OOD, recursion, etc.
- Hold weekly TA session to answer course related questions and debug Python programs

PH241& PH242 Modern Physics I & II, Colby College Fall 2019 – Spring 2021
Teaching Assistant

- Introduction to modern physics: Special relativity, Quantum mechanics, Atomic physics, etc.,
- Grade students' homework weekly

SKILLS

- **Python**: Extensive expertise in the language and its usage for data analysis, visualization and machine learning.
- **Java**: Proficient in OOD, data structure and algorithms
- **C, C++**: Built Arduino applications, familiar with data structure and algorithms
- **JavaScript**: intermediate level experience with website development including both frontend and backend

PROJECTS

Interactive Systems

Heart Rate Monitor

- Wired the circuit on Arduino board and connected IR emitter and receiver to detect pulse in figures.
- Implemented moving average and zero crossing to smooth the curve and estimate the heart rate.

Arduino Based Vibrotactile Watch

- Wired the circuit on Arduino board and connected potentiometer and piezo to generate vibrations.
- Implemented square wave, sine wave and sawtooth wave using wavetables to represent different time scale.

Polyphonic Parallel Piano

- Wired the circuit on Arduino board and connected various buttons with resistors and a speaker to generate notes.
- Used a timer to create and oscillator and implemented bitwise shifting code to improve the efficiency.
- Implemented additive synthesis signal generation techniques to play two notes at once.

Arduino Mouse

- Wired the circuit on Arduino board and connected accelerator and bluetooth.
- Implemented the motion of the mouse using accelerometer and the function of click using both button and accelerometer.

Cookies

- A prototype of communicational robots with simple information transmission and emotion representation to help people stay connected during pandemic.
- Wired the circuit on Arduino board and connected microphone, LED light, Bluetooth, rumble motor, and motion sensor.
- Implemented the visual representation of emotion perceived by microphone and the motion representation of user's gesture perceived by motion sensor.

Computer Organization

Simple CPU Construction

- Creation of simple CPU with a ROM for computer memory, a RAM for data memory, and a separate ALU circuit using VHDL.
- Achieved general mathematical calculation functionality.

Astrophysics

Creation of True-Color Image of Emission Nebula NGC 7635

- Planned and operated image-taking for target object using Colby College's Young Telescope.
- Performed data reduction and used color balance star SAO 20581 to deduce the proper weight for each filter.

Age Deduction of Open Cluster NGC 6866

- Planned and operated image-taking for target object using Colby College's Young Telescope.
- Performed data reduction on each image and used calibration star Tycho 3162-1348 to obtain the apparent magnitudes and color indices of stars in the cluster.
- Performed photometry to calibrate the colors and magnitude and corrected interstellar extinction.
- Created H-R diagram for target object and deduced the age through line-fitting.

HONORS AND PRIZES

- UWC Davis Scholar
- Dean's List F'18, S'19, F'19 (2020 and 2020 - cancelled due to COVID-19)

REFERENCES

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