Facheng Yu

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School of Mathematics and Statistics, Wuhan University

EDUCATION

Wuhan University - Wuhan, Hubei, China   Graduation: June 2023

- **Basic information:** Bachelor of Science in Mathematics, GPA: 3.84/4.00 (90.3/100), rank: 3/30.
- **Key courses:** Mathematical Analysis, Advanced Algebra, Abstract Algebra, Differential Equations, Topology, Real Analysis, Complex Analysis, Differential Geometry, Probability Theory, Functional Analysis, Numerical Analysis, Optimization Theory and Methods.
- **Elective courses:** Quantum Information and Quantum Computation, Machine Learning, Multi-scale Analysis.
- **Awards:**
  - Third prize of Asia and Pacific Mathematical Contest in Modeling   Jan. 2022
  - Third prize of The Chinese Mathematics Competitions   Dec. 2021
  - Second class scholarship   Oct. 2021
  - Third class scholarship   Oct. 2020

RESEARCH EXPERIENCE

Undergraduate innovation project in Wuhan Univeristy   Apr. 2021 - Sept. 2022

- **Project:** A precipitation prediction system based on machine learning and multi-source data
- **Task:** Currently, I have made some research on the threshold method with the water vapor, including analysing the related work in the rain nowcast, proposing ideas for the improvement and testing the effects. For better validation, I gave a clear description of the rain events so as to help define the evaluation indexes. Besides, I contributed to the paper writing in the introduction and validation as well.
- **Output:** one paper (under review) about rain nowcast based on the traditional three-predictor threshold method.

Computer Vision & Remote Sensing Lab, Wuhan University   Oct. 2021 - Jan. 2022

- **Project:** The Application of deep learning in multi-view commodity recognition
- **Task:** the project, based on the scene of vending cabinet, aimed to use deep learning to automatically recognize the commodities taken out of the container in the video. In this project, I tried to transfer the models for face recognition into commodity recognition, and then the supervised contrast learning, which achieved a high accuracy for a single image while a low Top-1 accuracy when processing a video with several goods. To improve the poor effects for videos, I took up the dictionary established in MOCO and proposed a weighted method for the retrieval in the embedding space. This helped to achieve a Top-5 accuracy of nearly 100% for the recognition in videos.

ONLINE PROJECTS

Yau Mathematical Sciences Center, Tsinghua University - Beijing, China
Online summer school | Completed   Jun. - Aug. 2020
  - **Course:** examples and exercises of big data analysis (Prof. Xiaoming Zhang)
  - **Content:** This course was mainly about the basic process and technology of data analysis. In the course, I finished several projects including the crowd simulation with agent-based modeling, the tickets prediction with multiple linear regression, ingredient proportion recommendation with adjacent interpolation, and industrial quality control with support vector machine for the product classification.

University of Cambridge - Cambridge, U.K.
Theoretical neuroscience online project | Score: A   Jan. - Feb. 2021
  - **Course:** Theoretical Neuroscience (Prof. Guillaume Hennequin)
  - **Project:** Balanced network models of cortical circuits
  - **Content:** This course introduces the basic models of nerve and network of cortical circuits, as well as the knowledge of perception, decision-making, vision and so on. The final project is to build a digital balanced network of cortical circuits, and my work was to solve the linear system to get the theoretical mean and variance of the neurons' spiking based on the leaky integrate-and-fire model, as well as to implement the code to simulate the interactions of the excitatory neuron population, the inhibitory neuron population and the external neuron population.

University of Cambridge - Cambridge, U.K.
Artificial intelligence online project | Score: A-   July - Oct. 2021
  - **Course:** Artificial Intelligence (Prof. Pietro Liò)
  - **Project:** Video summarization with flexible multi-agent reinforcement learning
  - **Content:** This course introduces some state-of-the-art models of deep learning, mainly graph neural network and multi-agent reinforcement learning. My group chose the video summarization as the final project. In this project, I helped to explain the model structures and corresponding formulas to group mates, and tried to build a model with multi-agent reinforcement learning. Concretely, I built a network consisting of CNN layers, LSTM layers and the FNN layers to receive the context and generate the policy. With the assumption that all agents worked independently and shared the same policy, the model worked well after optimized with the Monte Carlo method.

SKILLS

English
  - College English Test Band 4: 575; College English Test Band 6: 517.
  - Have English paper reading ability.
  - Ability to adapt to English environment.

Coding
- Good at Python and MATLAB. Finished several projects with PyTorch.

Sport
- Interested in swimming and jogging.
- Participate in several mini-Marathon competitions in Wuhan University.

SCHOOL ACTIVITY

New Media Center, Wuhan University   Sept. 2019 - Jun. 2021
- Journalist
- My work was to interview standouts and record big events in Wuhan University and write articles on the WeChat official account.