Tianzhe Chu

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Education

- **ShanghaiTech University** — Shanghai,China
  3rd year undergraduate in Computer Science and Technology;GPA:3.71/4.0(Untill Spring 2022) — *Sep 2020 - Jun 2024*
  Selected Courses: Introduction to Machine Learning, Probability and Statistics, Computer Architecture I, Data Structure and Algorithms.
- **UC Berkeley** — Berkeley, CA
  EECS, Visiting Student in GLOBE Program;GPA: 3.89/4.0 — *Aug 2022-May 2023*
  Selected Courses: Deep Learning, Deep Reinforcement Learning, Foundation of Graphics, Applications of Parallel Computing, Computer Vision.

Research Interest

- **Large Domain**: Representation Learning, 3D Vision
- **More Detailed**: Unsupervised/Self-supervised Learning, Transfer/Continual Learning, Generative Model, Neural Rendering and 3D Reconstruction

Research Experience

- **Berkeley Artificial Intelligence Research (BAIR) in UC Berkeley** — Berkeley, CA, US
  Undergraduate research assistant advised by Prof. Yi Ma — *Nov 2022-Now*
  - **Scaled Image Clustering(Target at NIPS 23)**: Pushing the boundary in scalability and effectiveness of image clustering with superior performance on CIFAR10, CIFAR100, ImageNet 1k
  - **Unsupervised Manifold Linearizing, Clustering and Regeneration via Closed-Loop Transcription**: Proposing learning frameworks for both both discriminative and generative models in unsupervised settings
  - **Interpretable Attention Mechanism**: Exploring relationships with dictionary learning and Vision Transformers
- **NeuralPets group, VRVC Lab in ShanghaiTech University** — Shanghai, China
  Undergraduate research/development assistant advised by seniors & Prof. Jingyi Yu — *Feb 2022 - Jun 2022*
  - **Demo development**: Developed demos for posture detection and virtual animal-human interaction
  - **Web development**: Developed Web page for the research group

Project Highlights

- **Scaled Image Clustering** — Berkeley, CA, US
  Mentor: Prof. Yi Ma and Dr. Benjamin David Haeffele — *Mar 2023-Now*
  - **Formulation**: We are scaling up the newly proposed image clustering algorithm via doubly stochastic optimization of rate reduction objectives.
  - **Experiments**: We've achieved near-to-supervised performance on CIFAR10, superior performance on CIFAR100 and ImageNet 1k.
- **Linearizing, Clustering and Regeneration via Closed-Loop Transcription** — Berkeley, CA, US
  Mentor: Prof. Yi Ma and Dr. Benjamin David Haeffele — *Nov 2022-Now*
  - **Formulation**: We are extending the newly proposed image clustering algorithm via doubly stochastic optimization of rate reduction objectives into Closed-Loop settings. We hope this new framework will achieve promising performance in Transfer Learning.
  - **Experiments**: We are comparing the clustering accuracy and algorithmic stability with *SOTA* methods and comparing the image generation quality with other generative models.
- **Interpretable Attention Mechanism** — Berkeley, CA, US
  Mentor: Prof. Yi Ma — *Feb 2023 - Now*
  - **Formulation**: We are trying to explore the relationship between Rate Reduction & Attention via tackling down the problem into several parts.
  - **Experiments**: We are exploring the invariance and manifold structures of the modified Vision Transformer model.
- **Reward Transformer** — Berkeley, CA, US
  Course Project for Deep Reinforcement Learning — *Fall 2022*
  - **Formulation**: We proposed a novel method to learn the reward distribution in a given environment. It's based on a supervised training procedure via transformer-style structures.
  - **Experiments**: Our method has equivalent performance and higher efficiency compared to some classic Inverse Reinforcement Learning methods i.e. MaxEnt IRL.
- **Survey of Modern CNNs and Classic Regression Methods** — Shanghai, China
  Course Project for Machine Learning — *Spring 2022*
  - **Formulation**: We reimplemented a bunch of novel CNNs and classic clustering methods and applied them on a tricky leaf-recognition task.
  - **Experiments**: We compared them in computational cost, time cost and clustering accuracy and summarized our findings.

Activities and Awards

- **Outstanding Individual Award as Leader of Social Practice Group**: I led a group of 30 students focusing on social investigation and rural revitalization in Enshi, Hubei Province, China. We did a series of investigation for the local industry, agriculture, tourism and medical facilities. We proposed several advice for the future development of Quankou Village in Enshi. (July 2021)
- **Outstanding Individual Award as Member of Industrial Practice Group**: I joined a industrial practice group, visited and investigated 2 companies in the area of medical instruments. The group mainly focused on their software design and function. We did analysis for their business and provided some feedback and advice. (July 2022)
- **Provincial First Prize for 35-th National Physics Olympics Competition**: I joined and won the Provincial First Prize for the 35-th National Physics Olympics Competition in Jiangsu Province. (Sep 2018)
- **Keyboard Player in band Plasma**: Playing the keyboard, as well as the piano.(Feb 2021 - Jun 2022)