LI CHENYI

436 Albee Square W, Brooklyn, 11201 NY

+1 9172037986 chenyili@nyu.edu chenyi-li.com

RESEARCH INTERESTS

Developing computational models of human flexible decision-making with AI, integrating cognitive science insights to enhance adaptive interaction design

EDUCATION

New York University | New York, USA Sept 2023 - Jan. 2025

M.S. Candidate in Computer Science, **CGPA**: 3.9/4.0

Core Course: Computational Neuroscience, Algorithmic Machine Learning and Data Science, Neuroinformatics

The Chinese University of Hong Kong, Shenzhen | Guangdong, China Sept 2019 - Jun. 2023

B.E. in Computer Engineering, **First Class Honors**

Core Course: Graduate Course Advanced Machine Learning, Computer Vision, Neural system, Machine Learning, Signal Processing, Data Structure, Linear Algebra, Operating System, Optimization

University of California, Berkeley | California, US | Visiting Student Jan. 2022 - Aug. 2022

Core Course: Computational Model of Cognition, Algorithm, Artificial Intelligence

HONORS & AWARD

Dean's List (top 25%), The Chinese University of Hong Kong, Shenzhen 2019 – 2020, 2020 - 2021

Undergraduate Research Award (top 15%), The Chinese University of Hong Kong, Shenzhen 2020

China Undergraduate Mathematical Contest in Modeling, 3rd Prize 2021

PUBLICATION

Junjie Yu, **Chenyi Li**, Kexin Lou, Chen Wei, Quanying Liu, "Embedding Decomposition for Artifacts Removal in EEG Signals", Journal of Neural Engineering, Volume 19, Number 2 (2021)

Chenyi Li, Sreejan Kumar, Marcelo Mattar (2024). Learning to Reinforcement Learn with Transformer. [Manuscript in preparation]

Chenyi Li, Guande Wu, Gromit Yeuk-Yin Chan, Xiaoan Liu, Sonia Castelo Quispe, Shaoyu Chen, Leslie Welch, Claudio Silva, Jing Qian (2024). 悟り: Towards Proactive AR Assistant with Belief-Desire-Intent User Modeling. [Manuscript in preparation]

Tianxiao He, Anna Maslarova, Mihály Vöröslakos, **Chenyi Li**, Yurong Liu, György Buzsáki, Erdem Varol (2024). Blind in vivo localization of microelectrode arrays via functional correlation patterns in the mouse hippocampus. [Manuscript in preparation]

RESEARCH EXPERIENCE

Mattar Lab | Research Assistant Sep. 2023 – present

Advisor: Marcelo Mattar, Assistant Professor of Psychology and Neural Science at New York University

- Implemented Decision-Pretrained Transformer using the GPT-2 architecture in PyTorch

- Trained the model in a maze navigation game with 100000 unique goal and wall configurations, subsequently testing the model in 20 novel maze games
- Designed and developed a set of 4x4 recurrent mazes for experiments, assessing the planning and meta-learning capabilities of a transformer-based agent.
- **Skills**: Training and inference of transformer model

This work resulted in manuscript in preparation and a poster submitted to From Neuroscience to Artificially Intelligent Systems (NAISys) meeting.

Visualization Imaging and Data Analysis Center at NYU | Research Assistant Jan. 2024 – present

Advisor: Claudio Silva, Professor of Computer Science, Engineering and Data Science at New York University

- Developed AI technologies to help users perform complex task in Perceptually-enabled Task Guidance (PTG) project
- Innovated a Belief-Desire-Intention (BDI) framework for user modeling and novel design space of user intention
- Integrated a Fast-Slow inference system with BDI model into Augmented Reality (AR) applications on HoloLens, enabling proactive task guidance at optimal times.
- Executed advanced GPT prompt engineering techniques to refine and personalize task-oriented guidance, aligning it closely with user models
- Led 2 rounds of expert interviews with 12 experts, co-designing the proactive assistance space and labeling the assistance strategies across 6 tasks.
- Designed and led within-subject user studies involving 12 participants, evaluating system hit rate and utility across 6 tasks in control and experimental groups.
- **Skills**: Large Language Model (LLM) prompting, System design, AR development, User study, Focus group

This work resulted in manuscript in preparation.

Neuroinformatics Lab at NYU | Research Assistant Jan. 2024 – present

Advisor: Erdem Varol, Assistant Professor at the Department of Computer Science & Engineering at Tandon School of Engineering, New York University

- Analyzed spike features (powerband, interspike-interval, spectrogram etc.) of electrophysiological data (Neuronexus, Neuropixel) from human and mice brains, across both private dataset (~7000 channels) and International Brain Laboratory dataset (~90000 channels).
- Applied transformer-based model LOLCAT on Neuronexus data to classify hippocampal subregion
- Conducted extensive experiments to assess cross-subject generalizability of the classifier.
- **Skills**: Neural data engineering, Signal processing, Deep learning

This work resulted in manuscript in preparation.

Liu Lab | Research Assistant Feb. 2023 – May 2023

Advisor: Yunzhe Liu, Principal Investigator at the Chinese Institute for Brain Research

- Implemented RNN Meta-Reinforcement Learning with Replay in a maze navigation game
- Parallelized RL agent training under randomly generated maze configurations
- Proposed to combine meta-RL with Tolman Eichenbaum Machine Model
- **Skills**: Train and inference of RNN-based Reinforcement learning agent

Cognitive Developmental and Learning Lab | Research Assistant Jun. 2022 – Jan. 2023

Advisor: Alison Gopnik, Professor at Department of Psychology, University of California, Berkeley

- Conducted literature research on intrinsic reward reinforcement learning and applied the unsupervised meta-learning

- Developed 2D grid world games using Python to simulate 3 kinds of environments with different stabilities
- Conducted exploratory data analysis on the *theory-based reinforcement learning* agents' behaviors on 20 games by R
- Led a behavioral coding for a pilot behavioral experiment about "play", "exploit", and "explore" with 72 subjects
- **Skills**: Reinforcement learning, Game design, Behavior coding

Neural Control and Computing Lab | Visiting Student Jun. 2021 - Dec. 2021

Advisor: Quanying Liu, Assistant Professor at School of Engineering, Southern University of Science and Technology

- Developed a novel EEG denoise solution, **D**eep**S**eparator, a deep learning model with Autoencoder and Inception block
- Conducted comprehensive experiments of deep neural network (inception network, CNN, RNN, LSTM) on 50000 single-channel noisy EEG from dataset **EEGdenoiseNet**, a benchmark dataset of EEG artifacts removal
- Implemented traditional denoise method (EEMD-ICA, HHT, Adaptive Filter) on 10000 EEG data for comparison
- Participated in writing the literature review, proposed methods and experiment results parts of the paper
- **Skills**: Neural data engineering, EEG analysis, Signal Processing, Deep learning

This work resulted in a publication in Journal of Neural Engineering.

Human-Cloud Systems Laboratory | Research Assistant Oct. 2020 - May. 2021

Advisor: Wei Cai, Assistant Professor at School of Science and Engineering, The Chinese University of Hong Kong, Shenzhen

- Implemented Advantage Actor-Critic algorithm to control in various gym games (lunar lander, mountain car)
- Enabled a city traffic light system via 2 deep RL algorithms, DQN and DDQN
- Conducted literature review on reinforcement learning applications on city digital twins and crowd-simulation
- **Skills**: Reinforcement Learning

PROJECT EXPERIENCE

CCNSS Project: Learn to Learn Successor Representation in Maze Navigation Game **J**uly 1 – 22 2023

- Proposed a novel meta-learning algorithm to learn a flexible representation learner under distributions of mazes
- Trained RNN and LSTM to learn successor representations in 7 different mazes with various reward and starting positions
- Analyzed learned representations and RNN dynamics with t-SNE and MDS

CUMCM: Raw Materials Ordering and Transportation Strategies with Mathematical Modeling Sept.9 - 12 2021

- Applied K-means and time series analysis on the supply-demand data of 402 raw material suppliers
- Utilized 0-1 programming to develop a 24-week ordering strategy based on the supply capacity model of 50 suppliers
- Solved the vector-bin packing problem to optimize the transportation strategy; ***Awarded 3rd Prize in Competition***

Leader | CE Camp Game Project: Virus Killer June 2020 - July 2020

• Formulated a creative first-person shooting game design about fighting against COVID-19 and scheduled teamwork

• Built up the main scenario with Blender and programmed the control of the main characters in Unity.

• Delivered final game demo presentation on Camp Closing Ceremony; ***Awarded 2nd Prize in Competition***

Leader | Field Study on Female Family-Work Balance in Eastern China July 2021-Sept. 2022

• Developed a comprehensive online survey for 518 subjects and conducted semi-structured interviews with 15 subjects

• Conducted analysis by R on relationship between the industry and challenges and support for female in maternity leave

• Authored a research report titled "Field Study on Female Family-Work Balance in Eastern China" which was selected for publication in the campus magazine "Pursue the Light Journey"; ***Awarded 3rd Prize in Competition***

Leader | CUHKSZ Peer Counseling Group: uBuddies Dec. 2019 – May 2023

- Created an innovative program, Final Week Program, to relieve students' negative emotions in the final exam week
- Provided peer counseling about emotion, self-development, friendship and intimate relationship over 10 hours

ACTIVITY

The 11th Computational and Cognitive Neuroscience Summer School by CSHA July 1 – 22 2023

Core Course: Dynamical System, Neural Coding, Computational Model, Low-Rank RNN

The 12th Computational Neuroscience Winter School by SJTU Jan.9 – 13 2023

Neuromatch Academy-Deep Learning Summer School 2021 Certificate of Completion Aug.2 - 20 2021

Reinforcement Learning Specialization on Coursera, University of Alberta July – August 2022

SKILLS

Programming Language: Python(NumPy, Pytorch, Tensorflow, OpenCV), Matlab, C++, R, MNE-Python (ERP analysis)

Game Creation: Unity, Blender, VR/AR development