Junwei Liao

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EDUCATION

Xi'an Jiaotong University   Xi'an, China
Bachelor of Science in Artificial Intelligence   *Sep 2021 - Present*
- Cumulative **GPA**: 3.9/4.3, **Average Score**: 93.41/100 (w/ 3 bonus points), **CET6**: 602
- **Awards:** Outstanding Student (2021 - 2023), HUAWEI scholarship 2023 (1/57)

University of California, Berkeley   Berkeley, CA, USA
Visiting Student   *Aug 2023 - Dec 2023*
- Cumulative **GPA:** 4.0/4.0
- **Relevant Coursework**: Deep Reinforcement Learning, Decision Making & Control (Graduate) | Designing, Visualizing and Understanding Deep Neural Networks | Theoretical Statistics

RESEARCH EXPERIENCE

Deep Reinforcement Learning Research Assistant Intern   Sep 2023 - Present
Dept. of Computer Science and Technology, Tsinghua University   *Supervised by Ju Ren*
- Reproduced most classic RL algorithms including BC, DAGGER, DDPG, TD3, SAC, REINFORCE, REPARAMETRIZE, MBRL w/ on-policy data collection, and Random Shooting/CEM, MBPO, Random/MaxEnt Exploration and Offline RL CQL/IQL/AWAC w/ online Finetuning.
- Developed FeDPO, which combines Federated Learning and Direct Preference Optimization (a PbRL algorithm) with Ensemble-Directed Learning, where server can learn the optimal policy using pre-collected data from heterogeneous policies at clients w/o sharing the data.
- Investigated why in a small dataset (10K) setting, the performance of CQL/TD3 agent trained on expert dataset is much worse than that trained on medium-expert/random dataset, and visualized the trajectories of the original datasets and policy-collected trajectories using tSNE.
- Implemented Federated Learning frameworks, and conducted experiments on classification tasks including MNIST, CIFAR.

PROJECTS

FeDPO: Federated Direct Preference Optimization | *Python*   Jan 2024 - Mar 2024
- Implemented DPO in a federated learning setting, used entropy regularization to prevent the weights from collapsing over a few clients, and utilized the performance of final local policy to achieve ensenble-directed learning.
- Leveraged FSDP (fully sharded data parallel) to significantly speed up training using multiple GPUs.
- See more details on GitHub here.

Evaluating LLMs with Psychometrics | *Python*   Dec 2023
- Finetuned the LLM (using GPT-2 as base model) to imitate a variety of data (text styles), including Tweets, Reddit comments and news articles and observed how the psychometric results change.
- Implemented LoRA to achieve efficient finetuning, explored a series of bottleneck-sizes in our LoRA configuration, conducted an in-depth analysis of style-imitation performance and compute.
- Rated Excellent in the CS182 final project session at UC Berkeley.

Neural ODE for Dynamics Learning in Continuous-Time MBRL | *Python*   Oct 2023 - Dec 2023
- Implemented Vanilla/RNN/Augmented/Latent Neural ODE agents to learn dynamics in continuous-time MBRL using JAX.
- Considered continuous timestep governed by ODE and used NODE to model the instantaneous state change of a system.
- Discovered that using a relatively short episode length, the ODE model learns a better short-term dynamics compared to training with a longer episode length, and Neural ODEs behave quite differently from conventional model-based agents in that training them off-policy yields much better performance than training them on-policy.
- Rated 100/100 for its novelty, scope, analysis and completeness in the CS285 final project session at UC Berkeley.

NUS SoC 2023 Summer Workshop | *Python, Java, JavaScript, HTML*   Jul 2023
- Learnt AIoT related knowledge under the guidance of Prof. TAN Wee Kek.
- As the team leader, led a team of 5 to develop an AIoT fitness assistance system called IntelliFit that analyzes exercise movements, provides real-time feedback (correctness) and advice.
- Responsible for the AI/ML part. Constructed a fitness posture dataset, processed frames with OpenCV, reduced dimensionality with PCA and classified postures using SVM.
- Received an A- for innovation, technical implementation, and presentation. See our GitHub here.

Transformer-based Semantic Segmentation for LC Surgery | *Python*   Oct 2022 - May 2023
- Played a key role in data augmentation and preprocessing in this project. Researched and implemented various data augmentation/generation techniques, including GAN, dynamic data augmentation to expand effective medical dataset.
- Investigated the use of Refine-Net, Vision Transformer and U-Net in semantic segmentation, and developed innovative TransUNet for the task. The multi-organ recognition accuracy reached 84.32%.
- Special Prize (top 2) in the Tengfei Cup at Xi'an Jiaotong University, and a related patent is being processed.