Liu, Anji

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Education

Beihang University, School of Automation Science and Electrical Engineering   Sep. 2015 – Jun. 2019

- ➢ **Bachelor of Science in Automation**
- ➢ **General GPA:** 3.86/4.00, **Rank:** Top 2/175
- ➢ **Standardized Test Scores: TOFEL**: 103 (Speaking 21), **GRE**: 324
- ➢ **Honors:** Merit Student (ranked 3/120) 2016-2017, Major Award 2015-2017
  Excellent Student Scholarship from Aviation Industry Corporation of China 2016-2017
- ➢ **Key courses:** Single Variable Calculus: 99, Multivariable Calculus: 100
  Principles of Automation Control (I): 97, Principles of Automation Control (II): 98,
  Applied Discrete Mathematics: 93, Probability and Statistics A: 100

Experiences

University of California, Los Angeles   Aug. 2019 – Present

- ➢ **Visiting Researcher**
- ➢ **Research topic:** Inference on tractable probabilistic models, and its combination with reinforcement learning.

Kwai Inc., Seattle AI Lab   Dec. 2018 – Jul. 2019

- ➢ **Machine learning intern**
- ➢ **Project:** User pass rate prediction system for a level-oriented mobile game "joy city". The system is powered by a game AI using reinforcement learning (RL) and Monte Carlo tree search (MCTS) that achieves master-level performance in the mobile game.

Papers

[1] Liu A, Laili Y. Balance Gate Controlled Deep Neural Network. Neurocomputing 320 (2018) 183-194.
https://www.sciencedirect.com/science/article/pii/S0925231218310567?via%3Dihub

[2] Liu A, Laili Y. Finding Good State Representations for Reinforcement Learning. IEEE Transacions on Cybernetics, 2018. Status: revising paper

[3] Liu A, Liang Y, Van den broeck G. Reinforcement Learning with Disentangled Exploration Control. In *Thirty-Third AAAI Conference on Artificial Intelligence*, 2020. Status : under review

[4] Liu A, Chen J, Yu M, Zhai Y, Zhou X, Liu J. Watch the Unobserved: A Simple Approach to Parallelizing Monte Carlo Tree Search. In *Eighth International Conference on Learning Representations*, 2020. Status: under review
https://arxiv.org/pdf/1810.11755.pdf

Research Experience

Research on Parallelizing Monte Carlo Tree Search   Jan. 2019 – Aug. 2019

Seattle AI Lab, Kwai Inc.   *Advisor: Ji Liu, Jianshu Chen*

- ➢ Designed a novel parallelization algorithm for Monte Carlo Tree Search as well as a practical system implementation to achieve linear speed up while suffering negligible performance degradation. The key idea is to make use of the information from unobserved samples to guide the node selection process in the tree search. This algorithm has been successfully deployed in a level-oriented mobile game to predict user pass rate, significantly reducing the game design cycle.

Research on Exploration Strategy of Continuous Control Tasks   Jan. 2019 – Aug. 2019

Statistical and Relational Artificial Intelligence (StarAI) lab   *Advisor: Guy Van den Broeck*

- ➢ Disentangled the policy learning and exploration process in continuous control reinforcement learning tasks by

separately design two policies that maximize their respective objectives, which offers policy optimality as well as effective exploration. The resultant model outperforms state-of-the-art approaches in various benchmarks.

Research on Improving State Representations for Reinforcement Learning   **Jul. 2017 – Sep. 2017**

Simulation Center of Automation College at Beihang University   *Advisor: Yuanjun Laili*

➢ Built a learning model to extract the location of moving objects in visual RL tasks automatically without the need for supervision or labeled samples, which provide high-level state-representations that accelerate reinforcement learning significantly.

Research on Improving Fully Connected Neural Networks   **Jan. 2017 – May. 2017**

Simulation Center of Automation College at Beihang University   *Advisor: Yuanjun Laili*

➢ Studied the fundamentals of neural networks and programmed a neural network package from scratch in MATLAB. The package contains commonly used layers in neural networks and it is easy to modify.

➢ Proposed a balance gate controlled neural network that out-performs traditional fully-connected neural networks in both regression tasks and classification tasks.

Practical Projects

User pass rate prediction system powered by game AI   **Dec. 2018 – Jul. 2019**

➢ Designed a user pass rate prediction system for the "joy city" mobile game (a 9*9 board game) using reinforcement learning (RL) and Monte Carlo tree search (MCTS). It is used to help level designers to fine-tune the game design to meet the expected difficulty before the game is released online.

Improving Heartbeat Detection Algorithm   **Jan. 2018**

➢ Modified an ECG data processing package to improve its detection accuracy.

➢ Made some improvements: reduced misdetection of R wave, decreased the false detection of ST wave, and able to detect high frequency and low frequency noise robustly.

SIFT Parallelization   **Oct. 2016**

➢ Parallelized the SIFT (Scale Invariant Feature Transform) algorithm using CUDA.

Skills

Programming languages: skilled in C, C++, Python, MATLAB, Julia