Dayang Liang

Xiamen City, China
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Education

2022.9 – present **DMU Lab, Department of Automation, Xiamen University**
Ph.D. Student, Control Science and Engineering
Fields : Artificial Intelligence, Reinforcement Learning, Representation Learning
Advisor : *Yunlong Liu*

2020.9 – 2022.9 **DMU Lab, Department of Automation, Xiamen University**
Postgraduate Student, Control Science and Engineering (Test-free recommendation)
Fields : Artificial Intelligence, Reinforcement Learning, Medical Decision
Advisor : *Yunlong Liu*

2016.9 – 2020.7 **Department of Mechanical and Electrical, Nanchang University**
Undergraduate Student, Mechanical Design Manufacturing and Automation
GPA : 3.2/4.0 (ranking : Top 5%)

Research

2020.1 – present **Research on Generalization Representation of Reinforcement Learning** | *DMU Lab, XMU*

- **Main work :** We proposed the methods, sequential action-based behavior similarity metric, Gated Multi-attention and Return-based contrastive learning, to deal with the problem of insufficient state/relationship representation in reinforcement learning. The corresponding research is still going on.
- These works are evaluated in Mujoco, Atari visual benchmark environment, where results show significant improvements over recent baselines, e.g. an average improvement of 11.91% on Atari games. These works are submitted or accepted on **IEEE Trans on CYB, KBS, PAKDD 2022** respectively.

RL | Behavior Similarity Metric | Contrastive Learning | Multi-attention | t-SNE/Grad-CAM visualization | Mujoco/Atari Env

2022.5 – 2022.9 **Research on Reinforcement Learning in Virtual NPC Scene** | *Cognitive Intelligence Group, XVERSE Ltd.*

- **Main work :** Assist in the research and implementation of the intelligent NPC training framework, and improve the multi-target navigation and anthropomorphic behavior capabilities of Bots in the TMELAND metaverse.
- The iterative version of the RL model involved in the research was held at the virtual concert of **TMELAND** × **Pepsi**, and the number of online users exceeded 100W for the first time.

Distributed RL | Multi-objective Navi. | Reward Shaping | Feature Engineering | Virtual NPC Bots | C++ & Go & Python

2021.6 – 2022.5 **Personalized Treatment of Sepsis Based on Reinforcement Learning** | *DMU Lab, XMU*

- **Main work :** We propose an Off-RL algorithm based on episodic memory to assist decision-making, which uses Episodic Control to retrieve similar strategies in the past to assist decision-making, avoiding complex modeling and improving sample efficiency.
- This work is applied to sepsis treatment, in which the performance of the Off-Policy Evaluator (OPE) is improved by 7.39%, and mortality prediction is reduced by 5.98%. This work has been accepted by the journal **Applied Intelligence**.

Offline-RL | Episodic Control | Medical Decision | Off-Policy Evaluator | MIMIC-III Dataset | SQL & Python

Publications

- **Dayang Liang**, Qihang Chen, Yunlong Liu*. Sequential Action-Induced Invariant Representation for Reinforcement Learning. IEEE Transaction on Cybernetics, 2023. **(Submitted)**

Sequential Action | Reinforcement Learning | Representation Learning | DMC Env

- **Dayang Liang**, Yaru Zhang, Yunlong Liu*. Learning Efficient Policies with Historical Data of Episodic Memory. 2023. **(Submitted)**
  Episodic Retrieval | Real Data | Mujoco Env
- **Dayang Liang**, Huiyi Deng, Yunlong Liu*. The Treatment of Sepsis : An Episodic Memory-assisted Deep Reinforcement Learning Approach. *Applied Intelligence, 2022.* **(Q1, IF=5.0)**
  Off-Reinforcement Learning | Episodic Control | K-means Clustering | Off-Policy Evaluation
- **Dayang Liang**, Qihang Chen, Yunlong Liu*. Gated multi-attention representation in reinforcement learning. *Knowledge-Based Systems, 2021, 233 : 107535.* **(Q1, IF=8.1)**
  Reinforcement Learning | Multi-Attention | Gate Mechanism | Grad-CAM Visualization
- Qihang Chen, **Dayang Liang**, Yunlong Liu*. Hard Negative Sample Mining for Contrastive Representation in Reinforcement Learning. *Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD)*, 2022. **(19.8% acceptance rate)**
  Contrastive Learning | Mutual Information Maximization | Q-based | Mujoco Env
- Sen Liang, Sen Yang, **Dayang Liang**, Jiechao Ma, et. al. A novel matched-pairs feature selection method considering with tumor purity for differential gene expression analyses. *Mathematical Biosciences 311 (2019) : 39-48.* **(Q1, IF=3.9)**
  Feature selection | Gene expression | Tumor
- Sen Liang, Rongguo Zhang, **Dayang Liang**, Tianci Song, et. al.Multimodal 3D DenseNet for IDH Genotype Prediction in Gliomas. *Genes. 2018; 9(8) :382.* **(Q2, IF=4.1)**
  Multimodal | 3D DenseNet | Genotype Prediction | Gliomas

- American Mathematical/Interdisciplinary Contest In Modeling (MCM/ICM-2019). Contest paper : Research on Cluster Evacuation Model Based on Cellular Automata. **Dayang Liang, (Meritorious Winner Award, Top 7%)**
- American Mathematical/Interdisciplinary Contest In Modeling (MCM/ICM-2020). Contest paper : Big Data Analysis of Consumer Feedback Information. **Dayang Liang, (Honorable Mention Award, Top 22%)**

Awards

2020 American Mathematical/Interdisciplinary Contest In Modeling (MCM/ICM-2020)
- **Honorable Mention Award** (Top 22%, main contributor)

2019 The 14th National Undergraduate NXP Smart Car Competition
- **First Prize (Top 8, captain)**

2019 American Mathematical/Interdisciplinary Contest In Modeling (MCM/ICM-2019)
- **Meritorious Winner Award** (Top 7%, main contributor)

2018 The 8th China Educational Robot Competition
- **Special Prize** (Top 1, captain)

2018 The 10th School Mathematical Contest in Modeling
- **First Prize** (Top 2, main contributor)

2017-2022 Outstanding Graduate Scholarship / National Encouragement Scholarship (twice) / CCB Scholarship
- Academic Scholarship (5 times)

Service

Reviewer UAI (2022) / IJCAI (2023)/ IEEE Trans on Cybernetics/ Knowledge-Based Systems / Applied Intelligence Reviewer

Course Experiment Course of C Program Language (2021, undergraduate)