Shangzhe Li

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RESEARCH INTERESTS

Reinforcement Learning, Generative Models, AI for Physics, Continual Learning, Robotics.

EDUCATION

South China University of Technology, Guangzhou, China 2021.09—present
Bachelor of Science in Artificial Intelligence Cumulative GPA: 3.87/4.00 Rank: 3/80

Technical University of Munich, Munich, Germany 2023.10—present
Exchange student in Department of Informatics

ACADEMIC EXPERIENCE

Data Augmentation for Offline Reinforcement Learning Supervisor: Prof. Xinhua Zhang
Research intern (remote) 2023.05—2024.01

- Propose a novel data augmentation method for offline RL.
- Utilize conditional diffusion model to generate high-reward trajectories with observation-only interactions.
- Achieve state-of-the-art performance on D4RL datasets.

Research on the Control Approach for Two-way Coupled Fluid Simulation Supervisor: Prof. Nils Thuerey
Dr. Patrick Schnell
Research intern 2023.10—2024.03

- Explore difficult settings of obstacle control tasks in fluids.
- Analyze the control approach of coupling a controller neural network with a differentiable solver.
- Apply techniques of gradient clipping to stabililize the training process.

Research on the Fast Adaptation Methods on Reinforcement Learning Supervisor: Prof. Marco Caccamo
Dr. Hongpeng Cao
Visiting student 2024.01—present

- Explore offline-to-online fast adaptation approach on reinforcement learning settings.
- Develop a new method of continual learning via trajectory stitching.
- Deploy the new algorithm to actual robotics environments.

Knowledge Distillation for LLMs Supervisor: Prof. Xinhua Zhang
Dr. Zishun Yu
Research intern (remote) 2024.03—present

- Explore the probability of using inverse reinforcement learning for LLM knowledge distillation.
- Provide theoretical analysis for the optimality of the method.
- Currently doing evaluations for our method.

Neural Networks Compression and Acceleration Research Supervisor: Prof. Ye Liu
Undergraduate research 2022.09—2023.04

- Accelerate the process of convolutions in the Neural Networks and reduce the amount of parameters during inference by quantizing matrix multiplication process.
- Deploy our method on VGG-16 and DenseNet network.
- Achieve 10-15% parameter size shrinkage.

PUBLICATIONS

Conference paper
Augmenting Offline Reinforcement Learning with Observation-only Interactions

- Author: **Shangzhe Li**, Xinhua Zhang
- Conference: Conference on Neural Information Processing Systems (NeurIPS 2024) *under review*
- Main Contributions: We proposed a novel data augmentation method DITS for offline RL, where state-only interactions are available with the environment. The generator based on conditional diffusion models allows high-return trajectories to be sampled, and the stitching algorithm blends them with the original ones. The resulting augmented dataset is shown to significantly boost the performance of base RL methods.

PROJECTS

EDCV Project Undergraduate engineering project
Mobile APP designer, Head detection algorithm designer 2021.09 — 2021.12

- Create a mobile APP to provide the waiting time estimation and queuing suggestions in the school canteen.
- Use trained convolutional neural networks to detect number of people in a queue.
- Transfer real-time data from the canteen camera to a server for processing.

SELECTED COURSES

Bachelor Courses:

- **Mathematics:** Calculus II(1) (4.0/4.0), Calculus II(2) (4.0/4.0), Complex Variable (4.0/4.0).
- **CS:** Deep Learning and Computer Vision (4.0/4.0), Machine Learning (4.0/4.0), Data Structures (4.0/4.0), C++ Programming Foundations (4.0/4.0), Python Programming (4.0/4.0), Advanced Language Programming (4.0/4.0), Introduction to Artificial Intelligence (4.0/4.0).
- **EE:** Signal and System (4.0/4.0), Digital Signal Processing (4.0/4.0), Digital Image Processing (4.0/4.0).
- **Others:** General Physics(1) (4.0/4.0), General Physics(2) (4.0/4.0), Introduction to Engineering (4.0/4.0), Engineering Drawing (4.0/4.0).

AWARDS

Asia and Pacific Mathematical Contest in Modeling(APMCM) International competition
First Prize 2022

National Contemporary Undergraduate Mathematical Contest in Modeling(CUMCM) National competition
Second Prize 2022

Baidu "Paddle Paddle" Cup Enterprise competition
Second Prize 2021

Mathematical Contest in Modeling(MCM) International competition
Successful Participant 2022

Mathematical Contest in Modeling(MCM) International competition
Successful Participant 2023

SCHOLARSHIPS

Taihu Academic Innovation Scholarship Enterprise scholarship (CNY 8000)
First Prize 2022

Taihu Science Innovation Scholarship Enterprise scholarship (CNY 5000)
Second Prize 2022

OTHER EXPERIENCES

Baidu Songguo Artificial Intelligence Elite Class Baidu Online Network Technology
Outstanding student 2022.05 — 2023.05

- Top 3 in total score of online judge (OJ) programming competition.
- Build a convolutional neural network to achieve ImageNet dataset classification.
- Build a neural network based on Yolo architecture for object detection.
- Build a transformer based model for news topics classification.

Presentation: Application of Diffusion Model on Offline RL Artificial Intelligence Association of SCUT
2023.09

- Link to talk video: video

Presentation: Application of Diffusion Model on Offline RL Doctoral Seminar of Thuerey's Group, TUM
2023.12

ENGLISH Proficiency

- **TOEFL iBT: 100** (overall score)
- **CET6: 584** (overall score)

SKILLS

- **Programming:** C/C++ (Mainly used), Java, Python (Mainly used), C#, VHDL, Verilog.
- **Deep Learning Framework:** Pytorch (Mainly used), TensorFlow.
- **Software:** MATLAB, AutoCAD.
- **Platform:** Linux, Windows.

REFERENCES

Prof. Xinhua Zhang
Associate Professor, Department of Computer Science, University of Illinois Chicago, Chicago, USA
Link: Homepage

Prof. Nils Thuerey
Associate Professor, Department of Informatics, Technical University of Munich, Munich, Germany
Link: Homepage

Prof. Marco Caccamo
Associate Professor, Chair of Cyber-Physical Systems in Production Engineering, School of Engineering and Design, Technical University of Munich, Munich, Germany
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Prof. Ye Liu
Assistant Professor, School of Future Technology, South China University of Technology, Guangzhou, China
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Prof. Kai Wu
Professor, School of Biomedical Engineering, South China University of Technology, Guangzhou, China
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Dr. Patrick Schnell
Ph.D. student, Department of Informatics, Technical University of Munich, Munich, Germany
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Dr. Hongpeng Cao
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