Qian Luo

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EDUCATION

Georgia Institute of Technology, Atlanta, GA **08/2019-08/2021**
M.S. in Electrical and Computer Engineering GPA: 3.5/4.0 Advisor: Sehoon Ha
Huazhong University of Science and Technology (HUST). Wuhan, China **09/2015-06/2019**
B.S. in Electrical Engineering and Automation GPA: 3.8/4.0

PUBLICATIONS

Qian Luo, Maks Sorokin, Sehoon Ha, **A Few Shot Adaptation of Visual Navigation Skills to New Observations using Meta-Learning**, IEEE International Conference on Robotics and Automation (ICRA), 2021 paper video
Naoki Yokoyama*, Qian Luo*, Dhruv Batra, Sehoon Ha, **Learning Robust Agents for Visual Navigation in Dynamic Environments: The Winning Entry of iGibson Challenge 2021**, submitted to ICRA 2022 paper video
Qian Luo*, Jing Wu*, Matthew Gombolay, **A Generalized Robotic Handwriting Learning System based on Dynamic Movement Primitives (DMPs)**, under submission (*: co-first author) paper video

WORK EXPERIENCE

NLP Algorithm Engineer in AI security (AAIG), Alibaba Group, Hangzhou **10/2021-Present**

- Generate adversarial texts (similar pronunciation, glyph, and semantics) based on various attack methods (PWWS, TextBugger) on BERT models. (adversarial attack)
- Build up Chinese adversarial relationship knowledge graph, which contains all frequently used Chinese characters and their relations (pronunciation, glyph, and semantics). Generate graph embeddings using OpenKE and inject them into ChineseBERT models. Apply the method in real business scenarios (anti-fraud, anti-spam in Mobile Taobao, Xianyu, Wangwang, …), and greatly reduce the amount of complaints from users. (adversarial defense)
- (Ongoing) Use meta GCN to acquire embeddings of new (unknown) Chinese characters and words, to deal with the few-shot/zero-shot word variation problem

RESEARCH EXPERIENCE

Research Assistant at Computer Animation & Robotics Lab, Georgia Tech **01/2020-08/2021**

- Built up robotic navigation baseline using Deep Reinforcement Learning based on Facebook Habitat platform, enabling the robot to navigate to a given target in indoor scenes
- Applied Model-Agnostic Meta-Learning (MAML) to learn the latent features between perception and inference networks, enabling the robot to navigate to new targets with new sensor configurations based on a few shots

Research Assistant at Bio-Interfaced Translational Nanoengineering Group, Georgia Tech **10/2020-08/2021**

- Classified different diseases based on electrocardiogram(ECG) and electroencephalogram(EEG) data collected by wearable devices using Convolutional Neural Networks (CNNs), achieving 95% classification accuracy
- Greatly improved the sleep stage classification accuracy(from 40% to 92%) using Long Short Term Memory
- Trained an adaptive neural network to classify unseen diseases with limited amount of ECG/EEG data, based on Meta Learning

COMPETITION EXPERIENCE

CVPR 2021 iGibson Challenge **03/2021-06/2021**

- **1st place** in Interactive Navigation track challenge link video
- Based on Facebook Habitat platform, trained agents via large-scale parallelized reinforcement learning (DD-PPO)
- Applied various data augmentation strategies, including adding dynamic models to the simulation environment and adding noise to the input images. Trained agents with stronger generalization ability
- Transferred the agent trained in Habitat to iGibson. Studied zero-shot sim-to-sim transfer gap and submitted a paper to ICRA 2022

SELECTED PROJECTS

Multi-robot Formation Control and Collision Avoidance using Deep Reinforcement Learning

- Applied Deep Deterministic Policy Gradient (DDPG) algorithm in the Gatech Robotarium multi-robot simulation environment to enable the robots to achieve fixed locations while avoiding collision with other robots
- Applied Multi-Agent Deep Deterministic Policy Gradient (MADDPG) in the OpenAI Multi-agent environment to perform formation control(making the robots form a given shape)

Machine Learning Based Space Saving Strategy

- Used Teris environment to simulate the Space Saving problem, where we have to fill out most of the room of a given space using randomly-created shapes of blocks.
- Applied Deep Q-Learning to determine where the blocks should be placed, achieving 90%+ space utilization

Transient Prediction of Voltage Fluctuation in Power System based on Deep Learning

- Added neural network to DMD (Dynamic Mode Decomposition) algorithm to linearize the nonlinear system more efficiently
- Applied the method to power systems, and analyzed the transient process to predict and control the voltage of certain nodes in a power grid with higher efficiency

TECHNICAL SKILLS

Programming Languages: C/C++, Python, Java, MATLAB
Machine Learning framework: TensorFlow, PyTorch, Scikit-Learn