CONTACTS

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EDUCATION

- 2020.9 - 2024.8 Ph.D. candidate in Industrial Engineering, University of Toronto, Canada
- 2017.9 - 2020.6, MSc in Control Theory and Control Engineering, Chinese Academy of Sciences, Institute of Automation, Beijing, China
- 2013.9 - 2017.6, Bachelor in Flight Vehicle Design and Engineering, Beihang University (a.k.a. Beijing University of Aeronautics and Astronautics), Beijing, China
- 2015.9 - 2015.12, exchange student with full scholarship, Concordia University, Montreal, Canada

RESEARCH INTERESTS

My research focuses on the Intelligent Transportation Systems with Deep Reinforcement Learning and Deep Neural Networks. I am supervised by Prof. Scott Sanner and Prof. Baher Abdulhai.

RESEARCH EXPERIENCE

1. 2021.9 - now **Traffic Perimeter Control via Deep Reinforcement Learning**
   - Goal: Minimize the total traffic delay by controlling the traffic signals on the perimeter.
   - Built a platform for interactions between control algorithms and Aimsun traffic simulation software at microscopic and mesoscopic level.
   - Control the inflow to a protected region by the cycle-based metering via deep reinforcement learning.
   - Research Challenges: (1) Traffic demand nonstationarity. (2) High stochasticity in vehicle interactions. (3) Large exploration action space of heterogeneous control. (4) Generalization of reinforcement learning models to different scenarios.
2. 2020.9 - 2021.8 **Spatiotemporal Prediction: Traffic Flow Prediction using Graph Neural Networks**
   - Proposed using Graph Attention to learn spatial relations among traffic links, and use gated recurrent units (GRU) to extract temporal relations of traffic demands.
   - Integrated Graph Attention and GRU into the input layer and hidden layer with shared or independent weights for each traffic link.
   - Extensive comparative results show that our model improved around 20% over baselines.
3. 2018.8 - 2020.7 Master Degree Thesis **6D Object Pose Estimation and Robot Grasping**
   - Proposed a self-supervised category-level object rotation representation learning model based on denoising autoencoder.
   - Integrated deep metric learning to autoencoder to leverage the relations between training samples.
   - A pipeline of object detection - rotation estimation - grasp pose is tested on real UR5 robot arm.
4. 2016.12 - 2017.6 Bachelor Degree Thesis **Airfield Segmentation and Airplane Recognition**

- Removed noises in the remote sensing images with preprocessing algorithms such as median filters, Otsus threshold and morphological operations.
- Detected the location of airplanes with Fourier Frequency Response algorithm.
- Performed Feature engineering to find rotation-, scale- and translation-invariant features for airplane bounding box images.
- Classified airplane types with Support Vector Machine and neural networks.

PUBLICATIONS

1. **Xiaocan Li**, Ray Coden Mercurius, Ayal Taitler, Xiaoyu Wang, Mohammad Noaeen, Scott Sanner, and Baher Abdulhai (2023). Perimeter Control Using Deep Reinforcement Learning: A Model-free Approach towards Homogeneous Flow Rate Optimization. In: 2023 IEEE International Intelligent Transportation Systems Conference (ITSC).
2. Ta Jiun Ting, **Xiaocan Li**, Scott Sanner, and Baher Abdulhai (2021). Revisiting Random Forests in a Comparative Evaluation of Graph Convolutional Neural Network Variants for Traffic Prediction. In: 2021 IEEE International Intelligent Transportation Systems Conference (ITSC). IEEE, pp. 1259-1265.
3. **Xiaocan Li**, Yinghao Cai, Shuo Wang, Tao Lu: Learning Category-level Implicit 3D Rotation Representations for 6D Pose Estimation from RGB Images. The IEEE International Conference on Robotics and Biomimetics 2019: 2310-2315.
4. Cui S, Wei J, **Li X**, et al. Generalized Visual-Tactile Transformer Network for Slip Detection[J]. IFAC-PapersOnLine, 2020, 53(2): 9529-9534.
5. Li B, Lu T, **Li X**, et al. An automatic robot skills learning system from robots real-world demonstrations[C]//2019 Chinese Control And Decision Conference (CCDC). IEEE, 2019: 5138-5142.

WORK EXPERIENCE

2018.11 - 2019.2 **IBM Intern: Data Analysis and Modelling**

- Built an omni-channel cognitive engine by implementing regression model to analyze how different kinds of promotions affect revenues and volumes, and predict the future revenues and volumes for marketing decision making.
- The regression model is updated in an online manner and realized in Python with machine learning packages like Scikit-learn, NumPy and Pandas.
- Realized an interface to extract and convert related queries from database, data cleaning, exploration, feature engineering and modelling, exception handling and logging.
- Meetings with the product manager, software engineer mentor, and UX designer are held weekly to sync the process and update the schedule.

HONORS & REWARDS

1. Third Prize of Beihang University Physics Contest
2. Second Prize of Beihang University Mathematics Contest
3. First Prize of National Physics Contest, Municipal Level
4. Third Prize of National Mathematics Contest, Provincial Level

5. Second Prize of Academic English Speech Contest held by Institution of Engineering and Technology, Chinese Academy of Sciences Level
6. Academic Excellence Scholarship of Beihang University (multiple times)
7. Second Prize of International Collegiate Design and Innovation Competition
8. Scholarship of exchange student offered by China Scholarship Council

SOCIAL ACTIVITIES

1. Volunteer of helping the retired people visiting Horti-Expo in Beijing
2. Leader of a class: event organization, team building
3. Delivering English speech as a representative of the host in the opening ceremony of International Collegiate Design and Innovation Competition
4. Clothing donation event advertising, clothing collecting and packaging