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. My other interests: Machine Learning, Deep Learning, Optimization, and Operations Research.

RESEARCH EXPERIENCE

1. 2021.9 - now **Traffic Perimeter Control via Deep Reinforcement Learning**
   - Proposed a model-free deep reinforcement learning approach to minimize the traffic delay at the regional level.
   - Analyzed how traffic densities and future demand affect the control policy learned from deep reinforcement learning.
   - Generalizability and robustness test show our approach is superior than model-based approach.
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, Shaowei, Junhang Wei, **Xiaocan Li**, Rui Wang, Yu Wang, and Shuo Wang. "Generalized Visual-Tactile Transformer Network for Slip Detection." IFAC-PapersOnLine 53, no. 2 (2020): 9529-9534.
5. Li, Boyao, Tao Lu, **Xiaocan Li**, Yinghao Cai, and Shuo Wang. "An Automatic Robot Skills Learning System from Robots Real-world Demonstrations." In 2019 Chinese Control And Decision Conference (CCDC), pp. 5138-5142. IEEE, 2019.

WORK EXPERIENCE

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

- **Overview**: Built a machine learning model to analyze how different categories of promotions affect revenues and volumes, and predict the future revenues and volumes for marketing decision-making.
- **Machine Learning**: The machine learning model is updated in an online manner and realized in Python with machine learning packages like Scikit-learn, NumPy and Pandas.
- **Software Development**: Realized a software platform to extract and convert related queries from database, data cleaning, exploration, feature engineering and modelling, exception handling and logging.
- **Communication & Collaboration**: Meetings with the product manager, software engineer mentor, and UX designer are held weekly to sync the process and update the schedule.

DEVELOPMENT SKILLS

- **Programming Language**: Python, MatLab
- **Deep Learning Framework**: PyTorch, TensorFlow
- **Machine Learning Framework**: Scikit-learn
- **Database Tools**: SQL, NoSQL
- **Statistics Tools**: NumPy, Pandas, SciPy
- **Optimization Solver**: Gurobi, CVXPY
- **Traffic Simulator**: Aimsun Next

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. Academic Excellence Scholarship of Beihang University (multiple times)