QI YAN

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EDUCATION

Swiss Federal Institute of Technology in Lausanne (EPFL)   Sep. 2019 - Present
MSc in Mechanical Engineering   Lausanne, Switzerland
GPA: **5.4/6.0**
Courses: Applied machine learning, Artificial neural network, Computer vision, Convex optimization, Deep learning for autonomous vehicles, Image analysis and pattern recognition, etc.

Shanghai Jiao Tong University (SJTU)   Sep. 2015 - June 2019
B.E. in Nuclear Engineering, School of Mechanical Engineering (Honors Degree)   Shanghai, China
GPA: **3.7/4.0 (88/100)**, Ranking: **2/33**

RESEARCH INTERESTS

I am generally interested in machine learning **robustness and interpretability**, where the practice and theory could elegantly converge. In addition, my research interests include learning-based planning and perception algorithms in **robotics** such as deep reinforcement learning and visual localization.

PUBLICATIONS & SUBMISSIONS

Y. Liu, **Q. Yan**, A. Alahi. "Social NCE: Contrastive Learning of Socially-aware Motion Representations", **under review**, also presented in *NeurIPS 2020 Workshop.* [arXiv] [code]

Q. Yan, L. Jiang and S. S. Kia. "Measurement Scheduling for Cooperative Localization in Resource-Constrained Conditions", *IEEE Robotics and Automation Letters*, vol. 5, no. 2, April 2020 (also selected for *ICRA 2020* conference presentation). [arXiv] [code] [video]

Q. Yan, R. Li, and X. Meng. "Tribo-Dynamic Simulation and Motion Control of a Rotating Manipulator Based on the Load and Temperature Dependent Friction", *Proceedings of the Institution of Mechanical Engineers, Part J: Journal of Engineering Tribology*, September 2020. [paper] [code]

PROJECT EXPERIENCES

Contrastive Learning for Socially-aware Robot Navigation
Research assistant, EPFL, Switzerland   July. 2020 - Mar. 2021
Advisor: *Prof. Alexandre Alahi*, Lab of Visual Intelligence for Transportation, EPFL
· Aimed to address the distributional shift between training and testing domains for DRL-based robotic navigation policy in multi-agent social scenarios, which is crucial to improve model robustness.
· Employed contrastive learning to formulate an auxiliary task to learn socially-aware motion representations, and used prior knowledge on unfavorable events to create negative samples.
· Considerably boosted off-policy RL sample efficiency and offline RL performance in recovering optimal policy from static data, and proved its efficacy in trajectory forecasting and imitation learning tasks.

Application of Computer Vision Algorithms for Elevator
Intern, Schindler Elevator AG, Switzerland   Feb. 2021 - Present
· Built a multithreaded PyQt program to track passenger's gaze, integrating multiple proprietary APIs.
· Developed an image processing tool for automatic machine condition monitoring in elevator shaft.

Visual Absolute Localization in a priori Known Environments

Research assistant, EPFL, Switzerland   Feb. 2020 - Present

Advisor: *Dr. Iordan Doytchinov*, Laboratory of Geodetic Engineering, EPFL

- Intended to develop a vision-only 6D pose estimation scheme for flying systems w/o GNSS signals, in large-scale a priori known environment with available aerial photogrammetry data.
- Adopted Cesium Ion to synthesize point cloud and RGB data from the terrain LiDAR model and the satellite orthophotos, and collected real-world equivalent images w/ geo-tags by drones.
- Proposed a 3D structure learning method based on scene coordinate regression, and achieved an accuracy of ∼10 m and ∼5 deg in a single domain, which was comparable to the consumer GNSS.
- Utilized supervised contrastive learning to regularize the representation space for sim-to-real transfer.

Cost-effective Cooperative Localization Algorithm Design

Research student, UC Irvine & SJTU   Jul. 2018 - Sep. 2019

Advisor: *Prof. Solmaz S. Kia*, UC Irvine & *Prof. Li Jiang*, SJTU

- Investigated a novel optimization strategy to reduce cost for multi-robot cooperative localization (CL) algorithms in terms of communication and computation overhead.
- Proposed a sub-optimal communication free algorithm for the NP-hard multi-robot CL measurement selection problem, by minimizing the upper bound of a posterior uncertainty.
- Relaxed further the full-observability requirement to make it practical for CL systems with pure relative measurements. Paper accepted by *IEEE RA-L* (also presented at *ICRA 2020*).

Friction Dynamics Analysis and Control of Manipulator

Research assistant, SJTU, China   Dec. 2017 - Dec. 2018

Advisor: *Prof. Xianghui Meng*, School of Mechanical Engineering, SJTU

- Conducted complete dynamics modeling for the friction torque at a manipulator joint, and designed a new adaptive sliding mode controller with provable convergence, which did not require prior knowledge of system uncertainty and disturbance. Paper accepted by *Journal of Engineering Tribology*.

SKILLS

Programming	proficient: Python, MATLAB; intermediate: C/C++, Java
Technical Tool	PyTorch, Git, Linux, PyQt, LaTeX, Solidworks, 3D-printing Microcontrollers: Intel MSC-51 (8051), STM32
Language	English: TOEFL-(formerly 109, to be refreshed), GRE-322(V154,Q168,AW3.0)

HONORS & AWARDS

Outstanding Graduate of Shanghai Jiao Tong University	2019
Excellent Design Award for Undergraduate Thesis (12/133)	2019
Scholarship of Nuclear Power Institute of China (2/33)	2017, 2018
Scholarship of Shanghai Nuclear R&D Institute (2/33)	2016

OTHERS

Reviewer: IEEE Sensors Letters, 2020