

QIAO GU

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EDUCATION

University of Toronto (U of T) <i>Ph.D. in Computer Science</i> <i>GPA: 4.0 / 4.0</i>	Toronto, Canada 09/2021-present
Carnegie Mellon University (CMU) <i>M.S. in Robotics</i> <i>GPA: 4.24 / 4.33</i>	Pittsburgh, U.S. 08/2019-08/2021
Hong Kong University of Science and Technology (HKUST) <i>B. Eng in Electronic Engineering and Computer Science</i> <i>GPA: 4.15 / 4.30</i>	Hong Kong 09/2015-06/2019

RESEARCH INTERESTS

3D Computer Vision, Robot Learning, Lifelong Learning, Detection and Pose Estimation

PUBLICATIONS

(* indicates equal contribution)

- **ConceptFusion: Open-set Multimodal 3D Mapping**
Krishna Murthy Jatavallabhula, Alihusein Kuwajerwala*, **Qiao Gu***, Mohd Omama*, Tao Chen, Shuang Li, Ganesh Iyer, Soroush Saryazdi, Nikhil Keetha, Ayush Tewari, Joshua B. Tenenbaum, Celso Miguel de Melo, Madhava Krishna, Liam Paull, Florian Shkurti, Antonio Torralba
Under Review in Robotics: Science and Systems (RSS) 2023 [Paper](#) [Webpage](#)
- **Preserving Linear Separability in Continual Learning by Backward Feature Projection**
Qiao Gu, Dongsub Shim, Florian Shkurti.
Conference on Computer Vision and Pattern Recognition (CVPR) 2023
- **OSSID: Online Self-supervised Instance Detection by (and for) Pose Estimation**
Qiao Gu, Brian Okorn, David Held.
Robotics and Automation Letter (RA-L)
International Conference on Robotics and Automation (ICRA) 2022 [Paper](#) [GitHub](#)
- **ZePHyR: Zero-shot Pose Hypothesis Rating**
Brian Okorn*, **Qiao Gu***, Martial Hebert, David Held. (*equal contribution)
International Conference on Robotics and Automation (ICRA) 2021 [Paper](#) [GitHub](#)
- **Deep Video Matting via Spatio-Temporal Alignment and Aggregation**
Yanan Sun, Guanzhi Wang*, **Qiao Gu***, Chi-Keung Tang, Yu-Wing Tai. (*equal contribution)
Conference on Computer Vision and Pattern Recognition (CVPR) 2021 [Paper](#)
- **iQUANT: Interactive Quantitative Investment Using Sparse Regression Factors**
Xuanwu Yue, **Qiao Gu**, Deyun Wang, Huamin Qu, Yong Wang.
EG Conference on Visualization (EuroVis) 2021 [Paper](#)
- **LADN: Local Adversarial Disentangling Network for Facial Makeup and De-Makeup**
Qiao Gu*, Guanzhi Wang*, Mang Tik Chiu, Yu-Wing Tai, Chi-Keung Tang. (*equal contribution)
International Conference on Computer Vision (ICCV) 2019 [Paper](#) [GitHub](#)
- **Characterizing Fluid Response and Sepsis Progression in Emergency Department Patients**
Qiao Gu, Varesh Prasad, Thomas Heldt.
International Engineering in Medicine and Biology Conference (EMBC) 2019 [Paper](#)

- **PreserVis, a Visual Analytic System for Traffic and Pollution Patterns**
Qiao Gu, Hang Yin, Lian Chen, Haotian Li, Chengzhong Liu, Xuanwu Yue, Huamin Qu.
IEEE Conference on Visual Analytics Science and Technology (VAST) 2017 [Paper](#)

RESEARCH EXPERIENCE

University of Toronto

09/2021-Present

Supervisor: [Prof. Florian Shkurti](#)

Open-set Multimodal 3D Mapping

- Proposed and implemented a pipeline to project and fuse 2D foundation features into 3D.
- Conducted ablation studies on feature fusion methods and evaluations on 3D semantic segmentation.
- Demonstrated that the 3D mapping can be queried in multiple modalities and used for downstream tasks.

Continual Learning on Image Classification

- Integrated neural network fusion with continual learning to improve image classification.
- Designed dataset condensation method to improve experience replay for continual learning.
- Proposed backward feature projection and regularization to reduce catastrophic forgetting.

Carnegie Mellon University

10/2019-08/2021

Supervisor: [Prof. David Held](#) and [Prof. Martial Hebert](#)

Online Self-supervised Instance Detection

- Developed a zero-shot instance detector based on template matching, trained over a large synthetic dataset.
- Developed an online self-supervised pipeline to improve detection results using our zero-shot pose estimator.
- Achieved state-of-the-art results on instance detection and zero-shot pose estimation on two challenging datasets.

Zero-shot Pose Hypothesis Rating

- Implemented a pipeline to estimate 6D object pose using a single matched pair of oriented SIFT features.
- Designed a deep object pose scoring network to aggregate simple point-wise errors into a robust fitness score.
- Improved the performance over the baseline surface matching method, achieved state-of-the-art among zero-shot object pose estimators, and demonstrated generalization ability to lab-captured data.

Hong Kong University of Science and Technology

05/2018-08/2019

Supervisors: [Prof. Chi-Keung Tang](#) and [Prof. Yu-Wing Tai](#)

Deep Video Matting

- Collected a large-scale video matting dataset with ground truth alpha mattes for training deep networks.
- Designed a deep neural network to aggregate image features both spatially and temporally across video frames, significantly outperforming the deep image matting and other video matting methods.

Deep Learning for Facial Makeup and De-Makeup

- Designed and developed the Local Adversarial Disentangling Network to remove cosmetic makeup of an after-makeup face and transfer the makeup style to another before-makeup face while preserving identity.
- Incorporated multiple overlapping local discriminators and asymmetric losses in the network to improve the quality of the generated image and achieved extreme/dramatic makeup transfer at a state-of-the-art level.
- Collected a high-quality dataset of unpaired images of human faces before and after makeup.

WORK EXPERIENCE

Tencent Youtu Lab

12/2018-02/2019

Research and Development Intern

Shenzhen, Guangdong, China

- Developed a CNN-based facial landmark detection system running on mobile platforms.
- Implemented a cascaded regression model for face alignment and reduced the Normalized Mean Error by 20%.

ACADEMIC SERVICES

- Reviewer for RA-L, NeurIPS, CVPR, ICLR, ICCV, ICRA, IROS, ECCV, ICML and WACV.
- Co-organized the [Toronto AI in Robotics Seminar](#).

AWARDS & HONORS

- Ontario Graduate Scholarships 2022-2023
- Acres Productive Technologies Inc./Joseph Yonan Memorial Fellowship 2022-2023
- HKUST Academic Achievement Medal (**Top 1%**) 2019
- HKSAR Government Scholarships 2017-2019
- Dean's List 2015-2019
- Second Runner-up, Mr. Armin and Mrs. Lillian Kitchell Undergraduate Research Award 2018
- High Fashion Charitable Foundation Exchange Scholarships 2017/2018
- HKSAR Government Scholarship Fund - Reaching Out Award 2017/2018
- HKSAR Government Scholarship Fund - Talent Development Scholarship 2017/2018

TEACHING

- Teaching Assistant for CSC384: Intro to Artificial Intelligence, Fall 2022, U of T
- Teaching Assistant for CSC384: Intro to Artificial Intelligence, Winter 2022, U of T
- Teaching Assistant for CSC110: Foundations of Computer Science I, Fall 2021, U of T