The Dyson Robotics Lab at Imperial College
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Liu, Shikun

Research Interests

Self-Supervised & Meta Learning: To design learning systems which can acquire knowledge versatility and induce learning algorithms given no or minimal human prior knowledge.

Multi-task & Continual Learning: To design learning systems which can incrementally update a general representations for efficient interpretation, action and manipulation.

Education

Imperial College London ◇ *London, England*

- Ph.D. in Visual Computing and Robotics — Oct. 2019 - Sept. 2023 (expected)
  Advisor: Prof. Andrew Davison FREng & Prof. Edward Johns
  Research Direction: Self-supervised Learning, Planning and Control
- M.Res. in Advanced Computing (*with Distinction*) — Sept. 2017 - Oct. 2018
  Advisor: Prof. Andrew Davison FREng & Prof. Edward Johns
  Thesis: Universal Representations: Towards Multi-Task Learning & Beyond

The Pennsylvania State University ◇ *State College, Pennsylvania*

- B.Sc. in Mathematics & Electrical Engineering (*with Honors*) — Aug. 2013 - May. 2017
  Advisor: Prof. C. Lee Giles
  Thesis: Variational Generative Models

Experience

Research Assistant, Imperial College London ◇ *London, England*

- *Dyson Robotics Lab & Robot Learning Lab* — Oct. 2017 - present.
  - Working with Prof. Andrew Davison & Prof. Edward Johns.
  - Working on numerous projects in self-supervised learning for robotic vision and control.

Research Intern, Adobe Research ◇ *San Jose, California*

- *Imagination Lab* — June. 2019 - Sept. 2019
  - Worked with Dr. Zhe Lin.
  - Designed the Shape Adaptor – a learnable resizing module for convolutional neural networks, an alternate solution to AutoML and neural architecture search.
  - Shape adaptors achieved improved performance in image classification compared to human-designed neural architectures, learning layer-specific reshaping factors adaptive to the input dataset automatically without any prior knowledge.

Research Intern, Tencent AI ◇ *Shanghai, China*

- *Medical Analysis Group, YouTu Lab* — Jul. 2017 - Sept. 2017
  - Contributed to the Tencent Medical AI project.
  - Proposed a multi-resolution 3D feature pyramid network based on attention for early-stage lung cancer detection.
  - Improved diabetic retinopathy screening with attention visualisation.

Research Assistant, The Pennsylvania State University ◇ *State College, Pennsylvania*

- *The Intelligent Information Systems Research Lab* Jan. 2017 - May. 2017
  - Worked with Prof. C. Lee Giles & Dr. Alexander Ororbia II.
  - Proposed the Variational Shape Learner (VSL) – a hierarchical latent-variable model for 3D shape understanding.
  - VSL significantly improved the quality of voxelised shape generation and single image 3D model retrieval.

Research Intern, Carnegie Mellon University ◇ *Pittsburgh, Pennsylvania*

- *CI2CV Computer Vision Lab, The Robotics Institute* May. 2016 - Nov. 2016
  - Worked with Prof. Simon Lucey.
  - Proposed a deep generative model for pose-aware single image 3D shape reconstruction.

Publications

1. *Bootstrapping Semantic Segmentation with Regional Contrast*
   Shikun Liu, Shuaifeng Zhi, Edward Johns, and Andrew J. Davison
   ArXiv Preprint, 2021
2. *iMAP: Implicit Mapping and Positioning in Real-Time*
   Edgar Sucar, **Shikun Liu**, Joseph Ortiz, and Andrew J. Davison
   ArXiv Preprint, 2021
3. *Shape Adaptor: A Learnable Resizing Module*
   Shikun Liu, Zhe Lin, Yilin Wang, Jianming Zhang, Federico Perazzi, and Edward Johns
   European Conference on Computer Vision (ECCV), 2020
4. *Self-Supervised Generalisation with Meta Auxiliary Learning*
   Shikun Liu, Andrew J. Davison, and Edward Johns
   Conference on Neural Information Processing Systems (NeurIPS), 2019
5. *End-to-End Multi-Task Learning with Attention*
   Shikun Liu, Edward Johns, and Andrew J. Davison
   Conference on Computer Vision and Pattern Recognition (CVPR), 2019
6. *Learning A Hierarchical Latent-Variable Model of 3D Shapes*
   Shikun Liu, C. Lee Giles, and Alexander G. Ororbia II
   International Conference on 3D Vision (3DV), 2018 **[Oral Presentation]**

Profressional Activities

Reviewer (Conferences)

ICML – International Conference on Machine Learning	2021
ICLR – International Conference on Learning Representations	2021
ICCV – International Conference on Computer Vision	2021
CVPR – Conference on Computer Vision and Pattern Recognition	2021
CoRL – Conference on Robotic Learning	2020
NeurIPS – Conference on Neural Information Processing Systems	2020

Teaching

Imperial College

COMP 60019 – Robotics	Spring 2021
COMP 70015 – Mathematics for Machine Learning	Fall 2020

Technical Proficiency

Programming
C/C++, Python*, Haskell, HTML/CSS*, Javascript*

Software / Framework
Tensorflow*, PyTorch*, OpenCV, MATLAB*, Mathematica, LaTeX*

(*) implies a sufficient level of expertise.

Honors & Awards

Dyson Ph.D. Fellowship 2019 - 2023
Distinguished Thesis – Department of Computing at Imperial College 2018
Undergraduate Research Grant – Department of Mathematics at Penn State 2013