Nanbo Li

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Research Interests

I am generally interested in *probabilistic machine learning*, *causality*, and *computer vision*, particularly *generative models* and *causal representation learning*. My PhD focused on developing machine learning models that learn to disentangle spurious correlations and identify modular generative structures within data, thus enabling interventional reasoning [1-4]. As my research closely connects to multiple well-established AI/ML/CV topics like *world models* [1-3,5], *uncertainty estimation* [1,7], and *visual scene understanding* [1-4], I am also excited about researching fundamental problems in these areas and their broad applications in healthcare, finance, and physics.

Education

The University of Edinburgh — *Edinburgh, UK*
Ph.D. in Machine Learning and Computer Vision — *2018–2022*
- Thesis Title: Generative Factorization For Object-Centric Representation Learning
- Supervisors: Prof. Robert B. Fisher (principal) and Prof. Chris Williams (second)

The University of Edinburgh — *Edinburgh, UK*
*M.Sc. in Artificial Intelligence (**with Distinction**)* — *2016–2017*

Wuhan University of Technology — *Wuhan, China*
*B.Eng. in Automation Engineering (**Outstanding Engineer**)* — *2012–2016*

Work Experience

Research Intern — *Zurich, Switzerland*
Facebook Reality Labs — *Fall 2021*

Research Intern — *San Jose, CA, USA*
NEC Laboratories America. Inc — *Summer 2021*

Researcher/Engineer — *UK &. EU*
Trimbot2020 (European Union Horizon 2020 Programme) — *2018–2020*

Research Assistant — *Edinburgh, UK*
Prof. Fisher's Computer Vision Lab at The University of Edinburgh — *2017–2018*

Skills

- **Expertise:** Machine Learning, Computer Vision, Generative Models, Causal Representation Learning
- **Programming:** Python, PyTorch, Tensorflow, Matlab, C++, Blender
- **Language:** English, Chinese (Mandarin)

Scholarships and Awards

School of Informatics Scholarship — *Edinburgh, UK*
School of Informatics, The University of Edinburgh — *2018*

Publications

1. Learning Object-Centric Representations of Multi-Object Scenes from Multiple Views
   Li Nanbo, Cian Eastwood, Robert B. Fisher
   Advances in Neural Information Processing Systems (NeurIPS), 2020 (**Spotlight, top 3%**)

2. Object-Centric Representation Learning with Generative Spatial-Temporal Factorization
   Li Nanbo, Muhammad Ahmed Raza, Hu Wenbin, Zhaole Sun, Robert B. Fisher
   Advances in Neural Information Processing Systems (NeurIPS), 2021

3. Duplicate Latent Representation Suppression for Multi-Object Variational Autoencoders
   Li Nanbo, Robert B. Fisher
   The British Machine Vision Conference (BMVC), 2021

4. Align-Deform-Subtract: An Interventional Framework for Explaining Object Differences
   Cian Eastwood[1†], **Li Nanbo[1†]**, CKI Williams
   International Conference on Learning Representations (ICLR) Workshop: Objects, Structure and Causality, 2022

5. Controllable Video Generation by Learning the Underlying Dynamical System with Neural ODE
   Yucheng Xu, **Li Nanbo**, Arushi Goel, Zijian Guo, Zonghai Yao, Hamidreza Kasaei, Mohammadreze Kasaei, Zhibin Li
   arXiv preprint arXiv:2303.05323, 2023

6. Hybrid Multi-Camera Visual Servoing to Moving Target
   Hanz Cuevas-Velasquez[1†], **Nanbo Li[1†]**, Radim Tylecek, Marcelo Saval-Calvo, Robert B. Fisher
   IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2018

7. DUGMA: Dynamic Uncertainty-Based Gaussian Mixture Alignment
   Can Pu, **Nanbo Li**, Radim Tylecek, Robert B. Fisher
   International Conference on 3D Vision (3DV), 2018 (**Oral presentation**)

8. *SDF-MAN: Semi-Supervised Disparity Fusion with Multi-Scale Adversarial Networks*
   Can Pu, Runzi Song, Radim Tylecek, **Nanbo Li**, Robert B Fisher
   Remote Sensing, 2019