

KARREN D. YANG

77 Massachusetts Ave., E18-495D, Cambridge, MA 02139, USA \diamond karren@mit.edu

EDUCATION

M.S. & Ph.D. Candidate, Massachusetts Institute of Technology *Expected Summer 2022*

Overall GPA 4.9/5.0; Computer Science GPA 5.0/5.0

Thesis Advisors: Caroline Uhler & Aviv Regev

B.A., University of Pennsylvania

May 2015

GPA 4.0/4.0, Summa Cum Laude

Relevant coursework: mathematical statistics; statistical learning theory; inference and information theory; algorithms for inference; Bayesian modeling and inference; advanced algorithms; stochastic processes; statistical inference; probability; linear optimization; nonlinear optimization; linear algebra; real analysis; nonlinear dynamics; control theory; adaptive control.

Technical skills:

(Languages) Python, MATLAB, R, Java

(Tools and Libraries) PyTorch, Tensorflow, OpenCV, Scikit-Learn, Librosa, Git

EXPERIENCE

Computer Vision Research Intern, Niantic

Sept 2021 - Jan 2022

R&D Team, London

- Developed new approaches for leveraging audio sensing for visual localization tasks (i.e., relative camera pose estimation, absolute camera pose estimation, place recognition, etc.)
- Developed new task benchmarks on audio-visual 3D indoor scene datasets
- Prepared paper for conference submission (ECCV 2022)

Research Intern, Facebook

Dec 2020 - July 2021

Facebook Reality Labs, Pittsburgh

- Developed new approach for personalized audio-visual speech separation and enhancement based on generative speech coding, autoregressive modeling, and speech synthesis
- Implemented and benchmarked speech enhancement algorithms on large-scale personalized datasets
- Prepared tech demo and paper for conference submission (CVPR 2022)

Research Intern, Bosch Center for Artificial Intelligence

June 2020 - Dec 2020

Robust and Safe Deep Learning (CR/PJ-AI-R24), Pittsburgh

- Developed new algorithms to improve robustness of multimodal models to single-source errors
- Analyzed robustness and applied algorithms to multimodal models for tasks such as object detection (using RGB, LIDAR, stereo depth) and action recognition (using RGB, optical flow, audio)
- Prepared patent application and paper for conference submission (CVPR 2021)

Research Intern, Adobe Research

May 2019 - Nov 2019

Creative Intelligence Lab (CIL), San Francisco

- Developed new self-supervised algorithms for learning representations of videos with spatial audio.
- Applied representations to downstream tasks such as audio-visual alignment in 360-degree videos, audio spatialization, sound event detection and localization, source separation, etc.

- Curated large-scale dataset of Youtube videos with spatial audio
- Prepared patent application and paper for conference submission (CVPR 2020)

Graduate Research Assistant, Massachusetts Institute of Technology *April 2017 - Present*
 MIT Laboratory for Information and Decision Systems (LIDS)
 MIT Institute for Data, Systems and Society (IDSS)

- Developed conditional generative models for molecule to image synthesis
- Developed multiple deep learning approaches for “style” transfer between biological modalities based on deep autoencoders, generative adversarial networks, and optimal transport principles.
- Developed new theoretical analysis and multiple algorithms for causal inference and structure learning based on graphical models.
- Applied algorithms to solve computational biology problems in collaboration with researchers at National University of Singapore.
- Published/presented work at NeurIPS, ICML, ICLR and AISTATS

PUBLICATIONS

17. **Yang, K.**, Godard, C., Brachmann, E., & Firman, M. *Camera Pose Estimation and Localization with Active Audio Sensing*. Under review (2022)
16. **Yang, K.**, Markovic, D., Richard, A., Krenn, S., & Agrawal, V. *Audio-Visual Speech Codecs: Rethinking Audio-Visual Speech Enhancement by Re-Synthesis*. IEEE/CVF Conference on Computer Vision and Pattern Recognition 2022 (CVPR 2022)
15. **Yang, K.**, Lin, WY., Barman, M., Condessa, F., & Kolter, Z. *Defending Multimodal Fusion Models against Single Source Adversaries*. IEEE/CVF Conference on Computer Vision and Pattern Recognition 2021 (CVPR 2021)
14. **Yang, K.**, Goldman, S., Jin, W., Lu, A., Barzilay, R., Jaakkola, T., & Uhler, C. *Mol2Image: Improved Conditional Flow Models for Molecule-to-Image Synthesis*. IEEE/CVF Conference on Computer Vision and Pattern Recognition 2021 (CVPR 2021)
13. **Yang, K.***, Belyaeva A.*, Venkatachalapathy, S., Damodaran, K., Radhakrishnan, A., Katcoff, A., Shivashankar, G.V., & Uhler, C. *Multi-Domain Translation between Single-Cell Imaging and Sequencing Data using Autoencoders*. Nature Communications 12, 31 (2021)
12. Belyaeva, A., Cammarata, L., Radhakrishnan, A., Squires, C., **Yang, K.**, Shivashankar, G.V., & Uhler, C. *Causal network models of SARS-CoV-2 expression and aging to identify candidates for drug repurposing*. Nature Communications 12, 1024 (2021)
11. **Yang, K.**, Russell, B., & Salamon, J. *Telling Left from Right: Learning Spatial Correspondence between Sight and Sound*. IEEE/CVF Conference on Computer Vision and Pattern Recognition 2020 (Oral Spotlight, CVPR 2020)
10. **Yang, K.**, Damodaran, K., Venkatachalapathy, S., Soylemezoglu, A.C., Shivashankar, G.V., & Uhler, C. *Predicting cell lineages using generative modeling and optimal transport*. PLOS Computational Biology 16(4): e1007828 (2020)
9. **Yang, K.** & Uhler, C. *Multi-domain translation by learning uncoupled autoencoders*. 36th International Conference on Machine Learning Computational Biology Workshop (Oral Spotlight, ICML 2019 Workshop)
8. **Yang, K.** & Uhler, C. *Unbalanced optimal transport using generative adversarial networks*. 7th International Conference on Learning Representations (ICLR 2019)

7. Agrawal, R., Squires, C., **Yang, K.**, Shanmugam, K., & Uhler, C. *ABC-strategy: Budgeted experimental design for targeted causal structure discovery*. 22nd International Conference on Artificial Intelligence and Statistics (AISTATS 2019).
6. **Yang, K.**, Katcoff, A., & Uhler, C. *Characterizing and learning equivalence classes of causal DAGs under interventions*. 35th International Conference on Machine Learning (Oral Spotlight, ICML 2018).
5. Radhakrishnan, A., **Yang, K.**, Belkin, M. & Uhler, C. *Memorization in Overparameterized Autoencoders*. arXiv 2018
4. Wang, Y., Solus, L., **Yang, K.** & Uhler, C. *Permutation-based causal inference algorithms with interventions*. 31st Conference on Neural Information Processing Systems (Oral Spotlight, NIPS 2017).
3. Akera, T., Chmátal, L., Trimm, E., **Yang, K.**, Aonbangkhen, C., Chenoweth, D.M., Janke, C., Schultz, R.M. & Lampson, M.A. *Spindle asymmetry drives non-Mendelian chromosome segregation*. *Science*, 358(6363), pp.668-672. (2017)
2. Iwata-Otsubo, A., Dawicki-McKenna, J.M., Akera, T., Falk, S.J., Chmátal, L., **Yang, K.**, Sullivan, B.A., Schultz, R.M., Lampson, M.A. & Black, B.E. *Expanded satellite repeats amplify a discrete CENP-A nucleosome assembly site on chromosomes that drive in female meiosis*. *Current Biology*, 27(15), pp.2365-2373. (2017)
1. Chmátal, L.*, **Yang, K.***, Schultz, R. M., & Lampson, M. A. *Spatial regulation of kinetochore microtubule attachments by destabilization at spindle poles in meiosis I*. *Current Biology*, 25(14), 1835-1841. (2015) * equal contribution

AWARDS AND HONORS

National Science Foundation Graduate Research Fellowship (2017-present); University of Pennsylvania, Neysa Cristol Adams Prize (2015): the top graduating honor from the department; Phi Beta Kappa, inducted as junior (2014); National Research Council Research Press (Canadian Science Publishing) Scholarship (2014): for leadership and volunteer contributions to youth science publishing in Canada; University of Pennsylvania, University Scholar (2012-2015): independent research funding program for select undergraduate students.