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Education

Ph.D. in Applied Mathematics 2012-2018
Brown University, Advisor: Stuart Geman
B.S. in Statistics and Probability 2008-2012
Peking University
B.A. in Economics 2009-2012
Peking University

Work Experiences

Senior Research Scientist, Google DeepMind 2024.5-present
Research Scientist, Google DeepMind 2023.4-2024.4
Research Scientist, DeepMind 2022.5-2023.4
Staff Research Scientist, Vicarious AI 2021.10-2022.5
Researcher, Vicarious AI 2019.7-2021.9

- *Compositional generative models for robot vision.*
- *PGMax for scalable loopy belief propagation on discrete probabilistic graphical models in JAX.*

Postdoctoral Associate, Applied Math, Brown University 2018.9-2019.6

- *Semester Postdoc at ICERM Spring 2019 Semester program on Computer Vision*
- *Organizer of the ICERM Generative Models Discussion Group*

Applied Scientist Intern, Amazon Lab126 2017.5-2018.8

- *Collaborators: Achi Brandt and Eran Borenstein, Computer Vision Team*
- *Research on multiscale optimization methods for stochastic ill-conditioning in deep neural networks*

Consulting for Quantitative Finance Firms

- *Consultant, Qsemble Capital Management* *2018.9-2019.6*
- *Consultant, Engineers Gate* *2015.8*

Publications

- **Guangyao Zhou**, Antoine Dedieu, Nishanth Kumar, Wolfgang Lehrach, Miguel Lázaro-Gredilla, Shrinu Kushagra, and Dileep George. PGMax: Factor Graphs for Discrete Probabilistic Graphical Models and Loopy Belief Propagation in JAX. *Accepted at Journal of Machine Learning Research, conditioned on minor revisions*, 2024

- Mel Vecerik, Carl Doersch, Yi Yang, Todor Davchev, Yusuf Aytar, **Guangyao Zhou**, Raia Hadsell, Lourdes Agapito, and Jon Scholz. RoboTAP: Tracking Arbitrary Points for Few-Shot Visual Imitation. In *IEEE International Conference on Robotics and Automation*. IEEE, 2024

- Antoine Dedieu, Wolfgang Lehrach, **Guangyao Zhou**, Dileep George, and Miguel Lázaro-Gredilla. Learning cognitive maps from transformer representations for efficient planning in partially observed environments. In *International Conference on Machine Learning*. PMLR, 2024

- Rajkumar Vasudeva Raju, J Swaroop Guntupalli, **Guangyao Zhou**, Miguel Lázaro-Gredilla, and Dileep George. Space is a latent sequence: Structured sequence learning as a unified theory of representation in the hippocampus. *Accepted, Science Advances*, 2024
- **Guangyao Zhou***, Nishad Gothoskar*, Lirui Wang, Joshua B Tenenbaum, Dan Gutfreund, Miguel Lázaro-Gredilla, Dileep George, and Vikash K Mansinghka (* indicates equal contribution). 3D Neural Embedding Likelihood: Probabilistic Inverse Graphics for Robust 6D Pose Estimation. In *Proceedings of the IEEE/CVF International Conference on Computer Vision*, 2023
- J Swaroop Guntupalli, Rajkumar Vasudeva Raju, Shrinu Kushagra, Carter Wendelken, Danny Sawyer, Ishan Deshpande, **Guangyao Zhou**, Miguel Lázaro-Gredilla, and Dileep George. Graph schemas as abstractions for transfer learning, inference, and planning. *arXiv preprint arXiv:2302.07350*, 2023
- Antoine Dedieu, Guangyao Zhou, Dileep George, and Miguel Lázaro-Gredilla. Learning noisy or bayesian networks with max-product belief propagation. In *International Conference on Machine Learning*, pages 7426–7448. PMLR, 2023
- **Guangyao Zhou**. Metropolis Augmented Hamiltonian Monte Carlo. In *Symposium on Advances in Approximate Bayesian Inference*, pages 1–10. PMLR, 2022
- **Guangyao Zhou**, Wolfgang Lehrach, Antoine Dedieu, Miguel Lázaro-Gredilla, and Dileep George. Graphical Models with Attention for Context-Specific Independence and an Application to Perceptual Grouping. *arXiv preprint arXiv:2112.03371*, 2021
- Miguel Lázaro-Gredilla, Wolfgang Lehrach, Nishad Gothoskar, **Guangyao Zhou**, Antoine Dedieu, and Dileep George. Query training: Learning a worse model to infer better marginals in undirected graphical models with hidden variables. *AAAI Conference on Artificial Intelligence (AAAI)*, 2021
- **Guangyao Zhou**. Mixed Hamiltonian Monte Carlo for Mixed Discrete and Continuous Variables. *Advances in Neural Information Processing Systems (NeurIPS)*, 2020
- Dileep George, Miguel Lázaro-Gredilla, Wolfgang Lehrach, Antoine Dedieu, and **Guangyao Zhou**. A detailed mathematical theory of thalamic and cortical microcircuits based on inference in a generative vision model. *bioRxiv 2020.09.09.290601*, 2020
- Jackson Loper*, **Guangyao Zhou***, and Stuart Geman (* indicates equal contribution). Capacities and efficient computation of first passage probabilities. *Phys. Rev. E 102, 023304*, 2020
- **Guangyao Zhou**, Jackson Loper, and Stuart Geman. Base-pair ambiguity and the kinetics of RNA folding. *BMC Bioinformatics*, 20(1):666, December 2019
- **Guangyao Zhou**, Stuart Geman, and Joachim M Buhmann. Sparse feature selection by information theory. In *2014 IEEE International Symposium on Information Theory*, pages 926–930, June 2014
- **Guangyao Zhou**, Zhiwu Lu, and Yuxin Peng. L1-graph construction using structured sparsity. *Neurocomputing*, 120:441–452, November 2013

Services

Reviewer for ICML, NeurIPS, ICLR, AISTATS, AABI.