Mingwei Li

Vanderbilt University
Department of Computer Science

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Experience

Vanderbilt University
Postdoctoral Scholar, Research, 2021 - 2024.

Education

University of Arizona
Doctor of Philosophy in Computer Science, 2016 - Aug 21, 2021.
Field: Data Visualization; Minor in Mathematics
Thesis: Algebraic Visual Design for Deep Learning
Advisor: Prof. Carlos Scheidegger

Hong Kong University of Science and Technology
Bachelor in Electronic Engineering, Honor Research Program, 2011 - 2015
Minor: Mathematics
Thesis: Wi-Fi based Indoor Localization
Advisor: Prof. Shenghui Song

Teaching

Department of Computer Science, University of Arizona
Teaching Assistant, CSC 245, Introduction to Discrete Structures, Summer 2018
Teaching Assistant, CSC 337, Web Programming, Fall 2016

Department of Electronic and Computer Engineering, HKUST
Student Helper, ELEC 1100, Introduction of Robotics, Fall 2012

Awards and Fellowships

GPSC Travel Grant
University of Arizona, Oct 2018

Graduate Assistantship, Department of Computer Science
University of Arizona, 2016-2021

Dean's List, School of Engineering
Hong Kong University of Science and Technology, 2011-2014

Scholarship for Continuing Undergraduate Students
Hong Kong University of Science and Technology, 2011-2014

Service

External Reviewer TVCG and IEEE VIS, CG&A, 2018-current
Session Chair Short Papers: Visual Analytics, Decision Support, and Machine Learning, IEEE VIS 2022

Tools and Skills

Python (PyTorch, Numpy, Flask, Matplotlib)
JavaScript (D3.js, WebGL)
Linux, Git, Vim
Markdown, HTML&CSS, LaTeX
C++ (PyTorch), Lua (LÖVE, LÖVR, Neovim)

Works

Thesis, 2021

I discussed the algebraic structures involved in designing visualizations for making sense of deep neural networks.

- **Algebraic Visual Design for Deep Learning** Mingwei Li. `https://repository.arizona.edu/handle/10150/661598`

Deep Learning Visualization, High-dimensional Data, 2017-Current

We study the intersection of deep learning and data visualization. We use visualization techniques, such as Grand Tour, to make sense of the internal working of neural networks. We harness the power of universal learner for visualization designs and practices, such as understanding dimensionality reduction plots or speeding up data summary in big data visualizations.

- **[Best Submission Award] Toward Comparing DNNs with UMAP Tour.** Mingwei Li, and Carlos Scheidegger. VISxAI workshop, IEEE VIS 2020. Available online `https://tiga1231.github.io/umap-tour/`
- **Visualizing Neural Networks with the Grand Tour** Mingwei Li, Zhenge Zhao, and Carlos Scheidegger. Distill.pub, 2020. Available at `https://distill.pub/2020/grand-tour/`
- **Neuralcubes: Deep representations for visual data exploration**. Zhe Wang, Dylan Cashman, Mingwei Li, Jixian Li, Matthew Berger, Joshua A Levine, Remco Chang, Carlos Scheidegger. 2021 IEEE International Conference on Big Data (Big Data), 550-561
- **UnProjection: Leveraging Inverse-Projections for Visual Analytics of High Dimensional Data.** Mateus Espadoto, Gabriel Appleby, Ashley Suh, Dylan Cashman, Mingwei Li, Carlos E Scheidegger, Erik Wesley Anderson, Remco Chang, Alexandru Cristian Telea. IEEE Transactions on Visualization and Computer Graphics (TVCG), 2021
- **ConceptLens: Visually Analyzing the Consistency of Semantic Manipulation in GANs** Sangwon Jeong, Mingwei Li, Matthew Berger, Shusen Liu. IEEE VIS 2023 Short Paper.
- **CAN: Concept-Aligned Neurons for Visual Comparison of Deep Neural Network Models** Mingwei Li, Sangwon Jeong, Shusen Liu, Matthew Berger EuroVis 2024.
- **CUPID: Contextual Understanding of Prompt-conditioned Image Distributions** Yayan Zhao, Mingwei Li, Matthew Berger EuroVis 2024.

Graph Drawing, 2020-Current

We optimized node placements for graph visualizations in node-link diagrams. We optimized multiple readability criteria (e.g. minimize number of edge crossings, preserve node neighborhoods) using gradient-based or force-directed methods.

- **[Best Paper Award] Graph Drawing via Gradient Descent, $(GD)^2$.** Ahmed R, De Luca F, Devkota S, Kobourov S, Li M. arXiv preprint arXiv:2008.05584. 2020 Aug 12. Demo: `http://hdc.cs.arizona.edu/~mwli/graph-drawing/`

- **Multicriteria Scalable Graph Drawing via Stochastic Gradient Descent, $(SGD)^2$.** R Ahmed, F De Luca, S Devkota, S Kobourov, M Li. IEEE Transactions on Visualization and Computer Graphics 28 (6), 2388-2399, 2021

- **Visualizing Evolving Trees** Kathryn Gray, Mingwei Li, Reyan Ahmed, and Stephen Kobourov. Graph Drawing and Network Visualization: 30th International Symposium, GD 2022, Tokyo, Japan, September 13–16, 2022.

- **A Scalable Method for Readable Tree Layouts** Kathryn Gray, Mingwei Li, Reyan Ahmed, Md Khaledur Rahman, Ariful Azad, Stephen Kobourov, Katy Börner. IEEE Transactions on Visualization and Computer Graphics, 2023.

Graphical Perceptions, User Studies, Algebraic Visualization, 2018-Current

We studied how human (mis-)read various types of visualization designs when reading explanations of deep learning models, or when data have certain flaws.

- **Looks Good to Me: Visualizations as Sanity Checks** M. Correll, M. Li, G. Kindlmann, and C. Scheidegger. IEEE Transactions in Visualization and Computer Graphics (Proceedings of InfoVis), 2018.

- **Graphical Perception of Saliency-based Model Explanations** Yayan Zhao, Mingwei Li, and Matthew Berger. Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23)