Henry Kvinge

Office Address: Mathematics Department
Colorado State University
Fort Collins, CO 80523-1874

Email Address: henry.kvinge@colostate.edu
Homepage: https://hkvinge.github.io
Date of Resume: February 2019

in: https://www.linkedin.com/in/henry-kvinge/
: https://github.com/hkvinge

PROFESSIONAL EXPERIENCES

- **Postdoctoral fellow**, Data Science *June 2017-Present*
  Pattern Analysis Lab, Colorado State University
  - Currently building deep learning models to better understand and predict different types of immune responses in mice.
  - Collaborated with industrial partner Physical Sciences Inc. to develop innovative single pixel cameras for low-cost hyperspectral and LIDAR imaging.
    - Developed and implemented compressive sensing algorithms for fast ($\times$100 from prior baseline), GPU-based reconstruction of images from a very small number of samples.
    - Designed a stable data pipeline taking noisy image samples and reconstructing and post-processing them in real time on a portable device.
    - Produced a software package in C++/CUDA to run these algorithms on a device in the field which was delivered ahead of schedule and well-below reconstruction timing specifications.
  - Discovered a new class of light-weight *secant-based* dimensionality reduction algorithms which permit efficient analysis of high-dimensional datasets.
  - Preprocessed and cleaned different types of real world noisy data, from hyperspectral images to weather data.
- **Consultant**, *September 2018-Present*
  Human Virtual Anatomy Project, Colorado State University
  - Devised image processing algorithms to remove distracting artifacts from virtual reality environments, making virtual reality more informative to healthcare professionals.
- **Machine learning/data engineer** *July 2016*
  Revon Systems, Inc.
  - Cleaned and preprocessed physician triage decision data and used this to build a machine learning model that predicted triage decisions for asthma patients as part of a math-to-industry bootcamp capstone project.
  - This project was later used as the basis for a new product by Revon.

EDUCATION

University of California, Davis (June 2017) GPA: 4.00
PhD, Mathematics

University of Washington, Seattle (March 2010) GPA: 3.90
BS, Mathematics, BA, Biochemistry
Magna Cum Laude

TECHNICAL SKILLS

Languages: Python, C++, CUDA, Matlab, Git, LaTeX.
Technical tools: Machine learning, deep learning, dimensionality reduction, high dimensional data, data visualization, image processing, compressive sensing, GPU-computing, hyperspectral imaging, virtual reality.

SELECTED PUBLICATIONS AND PREPRINTS

- Henry Kvinge, Michael Kirby, Chris Peterson, Chad Eitel, and Tod Clapp, ***Walking through spectral bands: Using virtual reality to better visualize hyperspectral data***, submitted 13th International Workshop on Self-Organizing Maps and Learning Vector Quantization, Clustering and Data Visualization (2019).
- Henry Kvinge and Elin Farnell, ***Rare geometries: revealing rare categories via dimension-driven statistics***, submitted to ICML 2019.
- Henry Kvinge, Elin Farnell, Michael Kirby, and Chris Peterson, ***More chemical detection through less sampling: amplifying chemical signals in hyperspectral data cubes through compressive sensing***, to appear in Proceedings of SPIE: Defense + Commercial Sensing, 2019.
- Henry Kvinge, Elin Farnell, Michael Kirby and Chris Peterson, ***Monitoring the shape of weather, soundscapes, and dynamical systems: a new statistic for dimension-driven data analysis on large data sets***, 2018 IEEE International Conference on Big Data (Big Data), Seattle, WA, USA, 2018, pp. 1045-1051. doi: 10.1109/BigData.2018.8622365. arXiv:1810.11562
- Henry Kvinge, Elin Farnell, Michael Kirby and Chris Peterson, ***A GPU-Oriented Algorithm Design for Secant-Based Dimensionality Reduction***, 2018 17th International Symposium on Parallel and Distributed Computing (ISPDC), Geneva, Switzerland, 2018, pp. 69-76. doi: 10.1109/ISPDC2018.2018.00019. arXiv:1807.03425
- Elin Farnell, Henry Kvinge, Michael Kirby and Chris Peterson, ***Endmember Extraction on the Grassmannian***, 2018 IEEE Data Science Workshop (DSW), Lausanne, Switzerland, 2018, pp. 71-75. doi: 10.1109/DSW.2018.8439109. arXiv:1807.01401

Volunteer

Mentor (2013-2016): Women in Science and Engineering Mentoring Program at UC Davis.
Mentor (2011-2016): STEM Café, a tutoring center at UC Davis that serves women and other underrepresented groups in math.