

T. Anderson Keller

Machine Learning Researcher

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Git

akandykeller

Programming

Python ★★★★★
Matlab ★★★★★
C/C++ ★★★★★
SQL ★★★★★
JavaScript ★★★★★

Packages

PyTorch, Weights &
Biases, Tensorflow,
Scikit-learn, Pandas,
Numpy, SciPy

Interests

Rep. Learning,
Approx. Equivariance,
Cognitive Science

Languages

English ★★★★★
French ★★★★★

Personal

Calisthenics, Cooking,
Overseas Experience
(France - 2.5 Years)

Education

'18 - (Expected) '22 **Ph.D. Machine Learning and Deep Learning** [University of Amsterdam](#)
Supervisor: Professor Max Welling

Research Interests: Probabilistic Generative Models, Unsupervised Learned Equivariance

'15 - '17 **M.S. Computer Science** [University of California San Diego, La Jolla, CA](#)
Supervisor: Professor Garrison Cottrell

Thesis: Comparison and Fine-grained Analysis of Sequence Encoders for NLP

'11 - '15 **B.S. Computer Science w/ Honors** [California Institute of Technology, Pasadena, CA](#)
Related Coursework: Machine Learning, GPU Programming (CUDA), Stochastic Modeling

Experience

June '16 - September '18 **Deep Learning Data Scientist** [Intel Nervana, San Diego, CA](#)

- Facilitated algorithmic solutions for Intel's partnership with Ferrari Challenge North America
- Developer of Intel AI Lab NLP Architect open source repository and multiple open source computer vision model implementations. Contributed to neon and nGraph frameworks.

Summer '15 **Data Science for Social Good Summer Fellow** [University of Chicago, IL](#)

- Presented at KDD 2016 Applied Data Science Track. Project: <https://goo.gl/touSWT>
- Analyzed data related to 1.5 million Mexican home loan mortgages (>500 GB) to determine the personal and environmental influences of home abandonment in Mexico.

Summer '14 **Analytics Engineering Intern** [Lyve Minds Inc., Cupertino, CA](#)

- Developed supervised learning algorithm for automatic editing and summarization of user generated handheld video based on predicted level of interest.

Summer '12 **Undergraduate Researcher (Applied Physics)** [Caltech, Pasadena, CA](#)

- Researched the effect of interface materials on an acoustic lens in the production of "Sound Bullets", co-author of paper based on work.

Publications

Topographic VAEs learn Equivariant Capsules Under Review
T. Anderson Keller & Max Welling. 3 Sept 2021. <<https://arxiv.org/abs/2109.01394>>

Predictive Coding with Topographic VAEs Visual Inductive Priors Workshop ICCV 2021
T. Anderson Keller & Max Welling. 26 Jul 2021. (Oral)
<<https://openreview.net/pdf?id=WvUOFEEsncx>>

Self Normalizing Flows ICML 2021
T. Anderson Keller, Jorn W.T. Peters, Priyank Jaini, Emiel Hoogetboom, Patrick Forré, Max Welling. 14 Nov 2020. <<https://arxiv.org/abs/2011.07248>>

As easy as APC ArXiv Preprint 2021
Fiorella Wever, T. Anderson Keller, Victor Garcia, Laura Symul. 29 Jun 2021.
<<https://arxiv.org/abs/2106.15577>>

Fast Weight Long Short-Term Memory ArXiv Preprint 2018
T. Anderson Keller, S. Sridhar, X. Wang. Fast Weight Long Short-Term Memory. 18 Apr 2018. <<https://arxiv.org/abs/1804.06511>>

Designing Policy Recommendations to Reduce Home Abandonment in Mexico KDD '16
K. Ackermann, E. Reyes, S. He, T. Anderson Keller, P. van der Boor, R. Kahn. *Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*. 13 Aug 2016. <<http://www.kdd.org/kdd2016/papers/files/adf0913-ackermannA.pdf>>

Experimental Realization of a Nonlinear Acoustic Lens with a Tunable Focus APL '14
C. Donahue, P. Anzel, L. Bonanomi, T. Anderson Keller, C. Daraio. *Appl. Phys. Lett.*. 9 Jan 2014. <<https://arxiv.org/abs/1308.1483>>

Master's Thesis Supervision

'21 **Modeling the Emergence of Face Selective Cortical Regions** [Qinghe Gao](#)
Employing generative models combined with novel topographic priors to study the emergence of topographically organized face-selective regions in modern deep neural networks. (In Submission)

'20 **As Easy as APC** [Fiorella Wever](#)
Researching self-supervised learning and data imputation for timeseries classification of medical data with high sparsity. <<https://arxiv.org/abs/2106.15577>>

'20 **Spatio-Temporal Forecasting On Graphs w/ Incomplete Data** [Noah van Grinsven](#)
Combining graph neural networks with data imputation for spatio-temporal forecasting. <<https://scripties.uba.uva.nl/search?id=719556>>

'19 **Geometric Priors for Disentangling Representations** [Samarth Bhargav](#)
Researching the use of non-euclidean priors as a supervisory signal for disentangled representation learning of topologically equivalent generative factors. <<http://scriptiesonline.uba.uva.nl/document/676481>>

Teaching Assistant Positions

Winter '20 **Leren (Bachelor's Machine Learning)** [University of Amsterdam](#)
Designed practice problems for matrix derivatives and geometric interpretation of PCA.

Winter '19 **Machine Learning 2 (Master's)** [University of Amsterdam](#)
Ran practical labs including implementations of ICA, message passing, EM & VAEs.

Winter '16 **Data Visualization** [University of California, San Diego](#)
Designed homework assignments, demos, and class tutorials for D3.js & Bokeh.

Patents

July '20 *Training A Function To Respond Predictably to Differences*

- EPO Application number: 20173742.6-1207

March '16 *Synopsis Video Creation Based on Relevance Score*

- <http://www.patentsencyclopedia.com/app/20160071549>

Selected Projects

Summer '21 **Topographic Variational Autoencoders**

University of Amsterdam

- Developed a method for training deep generative models with topographically organized latent variables, yielding a nonlinear version of Topographic ICA.
- Demonstrated how topographic organization could be leveraged to learn approximate equivariance to sequence transformations without supervision.
- Git: <https://github.com/akandykeller/TopographicVAE>

Fall '20 **Self Normalizing Flows**

University of Amsterdam

- Derived a novel method for training unconstrained normalizing flow architectures using learned approximate gradients.
- Demonstrated significantly faster training while reaching the same likelihood as the corresponding exact gradient.
- Video: <https://www.youtube.com/watch?v=6Q3b3MergqI>
- Blog: <http://keller.org/research/2020-10-21-self-normalizing-flows/>

Summer '17 - Summer '18 **Ferrari Challenge Tracking and Classification**

Intel AI Lab

- Closely collaborated with diverse teams across Intel to deliver live-inference pipeline for tracking and fine-grained classification of race cars from few labeled examples.
- Managed collection of a novel dataset for object tracking from drone footage.
- Trained and modified SSD model to deployment level accuracy on small objects.
- Implemented Matching Network for few-shot classification of race cars to work with SSD.
- Keynote: https://youtu.be/pSZn_bYA1k?t=3990
- Blog: <https://goo.gl/PmQss8>
- TWiML Podcast: <https://goo.gl/6NeMnp>

Winter '17 **Fast Weight Long Short-Term Memory**

Intel AI Lab / Personal

- Developed and experimented with multiple novel Fast-Weight LSTM architectures to characterize synergistic effects between gated RNNs and fast weight associative memory.
- Showed faster learning and increased accuracy on associative recall tasks.
- Showed near equivalence with Memory Network attention mechanism on bAbI QA tasks.
- Git: https://github.com/akandykeller/fast_weights

May '18 **Intel AI Lab NLP Architect**

Intel AI Lab

- Implemented end-to-end memory network for question answering and goal oriented dialog systems in nGraph. Replicated published results.
- Git: <https://goo.gl/gYcJiQ>

Spring '16 **Learning Text Annotations w/ Sequence-to-Sequence Networks**

Personal

- Trained a sequence to sequence network on (song-lyric, descriptive annotation) pairs scraped from genius.com. Translated ordinary language into song lyrics.
- Git: <https://github.com/akandykeller/GeNet>