github.com/ericmfischer
linkedin.com/in/ericmfischer
emfischer712@ucla.edu
(310) 408 - 0200

Eric M. Fischer

Natural Language Processing Engineer
ericmfischer.com

Background

Purpose: I am a first-year Statistics Ph.D. student with a specialization in artificial intelligence, advised by Dr. Song-Chun Zhu at UCLA. My emphasis is in natural language processing and generative modeling. I obtained a Master of Science in Computer Science with a specialization in artificial intelligence and a Bachelor of Arts in Philosophy with an emphasis in philosophy of language, both from UCLA. Before my Masters, I worked as a Full Stack Software Engineer in San Francisco for 3 years.

Research Interests: natural language processing (NLP), generative modeling, computer vision, Markov chain Monte Carlo (MCMC), energy-based models (EBM), reinforcement learning, philosophy of language

Education

University of California, Los Angeles | Ph.D. Statistics **2020 - current**
- Specialization: Artificial Intelligence; emphasis: natural language processing and generative modeling

University of California, Los Angeles | M.S. Computer Science, with Thesis | 3.5 GPA **2018 - 2020**
- Specialization: Artificial Intelligence; emphasis: generative modeling
- Thesis: *Deep Generative Classifier with Short Run Inference*
- GRE: quantitative reasoning: 168/170, verbal 161/170, analytical writing: 5.5/6

Hack Reactor | San Francisco, CA **2015**
- Advanced Software Engineering Immersive Program; full stack software engineering, data structures, and algorithms

University of California, Los Angeles | B.A. Philosophy | 3.9 Major GPA **2009 - 2013**
- Emphasis: philosophy of language, first-order logic
- Cum Laude honors; philosophy departmental honors; dean's honor roll; Phi Beta Kappa honors society

Universidad Complutense de Madrid | Madrid, Spain **2011 - 2012**
- Philosophy coursework conducted in Spanish with host university students

Publications

Deep Generative Classifier with Short Run Inference | MS Thesis | https://escholarship.org/uc/item/8kx4z8qw
- Deep generative classifier exploits Short Run MCMC inference with Langevin dynamics and backpropagation through time, exhibiting (1) comparable accuracy to a traditional ConvNet classifier and (2) robustness to adversarial attacks, due to the stochasticity of the Langevin equation and the top-down architecture of the generator network

Learning Multi-Layer Latent Variable Model with Short Run Inference Dynamics | under review
- Ran experiments for a project in which a Short Run MCMC residual network outperforms a variational autoencoder (VAE) and generative adversarial network (GAN) for image synthesis, interpolation, and reconstruction

Research

Exact and Cluster Sampling of Ising Model | github.com/EricMFischer/exact-and-cluster-sampling-markov-chains
- Convergence analysis of exact sampling with the Gibbs sampler and coupled Markov chains vs. cluster sampling with the Swendsen-Wang algorithm

First-Order Optimization Methods for CNN | github.com/EricMFischer/first-order-nn-optimization
- Python implementations and convergence analysis of first-order methods SGD, SGD with momentum, SGD with Nesterov momentum, RMSprop, and Adam

Variational Lower Bound Formulation and App. of VAE | github.com/EricMFischer/variational-autoencoder
- Formulation of the evidence lower bound (ELBO) for the VAE and an application to the MNIST dataset

T-Snake Model for Generative Inpainting | github.com/CS269-Capstone/t-snake-mask-generation

- Employed a topology adaptive snake (T-snake) deformable model to improve generative inpainting mask preprocessing

Advanced Lane Finding for Self-Driving Cars | github.com/EricMFischer/self-driving-car-nano-degree
- Built lane-finding algorithm with distortion correction, image rectification, and gradient thresholding

Vehicle Detection for Self-Driving Cars | github.com/EricMFischer/self-driving-car-nano-degree
- Created vehicle detection and tracking pipeline with OpenCV, histogram of oriented gradients, and SVM

Technical Skills

Statistics, Linear Algebra, Calculus: Bayesian statistics, Monte Carlo methods, linear algebra, matrix algebra, optimization, applied probability, multivariable calculus
Machine Learning: CNN, RNN, LSTM, GRU, SVM, neural network optimization, transformers, decoders
Software Engineering: Operating Systems (Linux, macOS, Ubuntu), Languages (Python, C, C++, R, JavaScript, PHP), Frameworks (Pytorch, Tensorflow, React, Angular), DevOps (Git, AWS, Cloudflare)

Coursework

UCLA Graduate Coursework
STATS 200A - *Applied Probability* (audited)
STATS 201C - *Advanced Modeling and Inference*
STATS 202B - *Matrix Algebra and Optimization*
STATS 202C - *Monte Carlo Methods for Optimization*
STAT M231A - *Pattern Recognition and Machine Learning*
STATS M232A - *Statistical Modeling and Learning in Vision and Cognition* (audited)
STATS M232B - *Statistical Computing and Inference in Vision and Cognition*
COM SCI 247 - *Advanced Data Mining*
COM SCI 251A - *Advanced Computer Architecture*
COM SCI 269 - *Seminar in Artificial Intelligence: Deformable Models*
EC ENGR 236C - *Optimization for Large-Scale Systems*
EC ENGR 239AS - *Neural Networks and Deep Learning*

Independent Coursework
CS 224n: Natural Language Processing with Deep Learning, Stanford University on web.stanford.edu
CS 231n: Convolutional Neural Networks for Visual Recognition, Stanford University on cs231n.stanford.edu
Self-Driving Car Engineer Nanodegree - *I) Computer Vision, II) Deep Learning, III) Sensor Fusion, IV) Localization, V) Planning, VI) Control, VII) System Integration*, Nvidia et al. on Udacity
Digital Signal Processing, École Polytechnique Fédérale de Lausanne
Mathematics for Machine Learning - *I) Linear Algebra, II) Multivariate Calculus, III) PCA*, ICL on Coursera
Algorithms Specialization - *I) Divide and Conquer, Sorting and Searching, and Randomized Algorithms, II) Graph Search, Shortest Paths, and Data Structures, III) Greedy Algorithms, Minimum Spanning Trees, and Dynamic Programming, IV) Shortest Paths Revisited, NP-Complete Problems,* Stanford University on Coursera

Free Reading
Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville
Causality: Models, Reasoning, and Inference, Judea Pearl

Experience

Center for Vision, Cognition, Learning, and Autonomy | Graduate Researcher | UCLA **2018 - current**
- Contribute to several NLP and generative modeling research projects with PhD students and other engineers

NatureBox | Full Stack Software Engineer | Redwood City, CA **2016 - 2018**
- Main architect of new Flux/React web application after company added direct-to-consumer business
- Led the following projects: Stripe payment processor migration, Login and Pay with Amazon, API v2

Cinemagram | Software Engineer | San Francisco, CA **2015 - 2016**
- Worked with JavaScript, Ruby, SQL, and Redis to construct internal data tools

Veritas Prep | SAT, ACT, and GRE Instructor | Malibu, CA **2011 - 2016**
- Instructed students privately and in classes for the SAT, ACT, and GRE; first instructor to teach live online course

Socratic Prep | SAT, ACT, and GRE Instructor **2009 - 2018**

- Have tutored hundreds of students privately and in classes for the SAT, ACT, GRE, and other subjects

Honors, Scholarships, and Interests

- Significant contributor to two textbooks summarizing over 20 years of artificial intelligence research at UCLA: *Statistical Models for Marr's Paradigm* and *Stochastic Grammars for Scene Parsing*
- Cum Laude Honors, philosophy departmental honors, dean's honor roll, Phi Beta Kappa honors society
- 2nd place in LA County science fair for research project *Mechanical Exfoliation and Characterization of Graphene via Raman Spectroscopy*, conducted at UCLA in 2009
- Awarded Bristol-Myers Squibb $20,000 college scholarship based on academic merit
- Previously a registered investment adviser in California; passed Series 65 exam (Uniform Investment Adviser Law Examination) in 2014 while working as Wealth Advisor Associate
- Currently hold a California Real Estate License
- Member of Society of Latino Engineers and Scientists and UCLA
- Other interests: philosophy of language, learning languages (fluent in Spanish and Portuguese), fishing, basketball, backpacking, gardening, cooking, spearfishing, piano, built my own PC for machine learning