John Thickstun

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Current Position

- **Stanford University** — Palo Alto, CA
  Postdoctoral Scholar - Stanford Artificial Intelligence Laboratory — *September 2021 - Present*
  - Advised by Percy Liang (joint Computer Science & Statistics).

Education

- **University of Washington** — Seattle, WA
  Ph.D. in Computer Science and Engineering — *August 2021*
  - Advised by Sham M. Kakade (joint Computer Science & Statistics) and Zaid Harchaoui (Statistics).
  - Doctoral Committee: Sham M. Kakade, Zaid Harchaoui, Noah A. Smith, Sewoong Oh, Lalit Jain.
  - Dissertation: Leveraging Generative Models for Music and Signal Processing.

- **University of Washington** — Seattle, WA
  M.Sc. in Computer Science and Engineering — *December 2017*
  - Coursework in Optimization, Algorithms, Learning Theory, Information Theory, Reinforcement Learning.

- **Brown University** — Providence, RI
  Sc.B. Magna cum Laude with Honors in Applied Mathematics — *May 2013*
  - Advised by Björn Sandstede and Eugene Charniak.
  - Coursework in Machine Learning, Computer Vision, Natural Language Processsing, Probability Theory, Stochastic Processes, Real and Complex Analysis, Operator Theory.

- **Hamilton College Bridge Program** — Clinton, NY
  (High School Credit) — *2005-2007*
  - Coursework in Programming Languages, Computer Architecture, Operating Systems, Abstract Algebra.

Major Grants and Awards

- Stanford HAI Google Cloud Credits Grant: $15,000 (2022).
- Neurips Outstanding Paper Award: 6 / 9122 paper submissions (2021).
- Qualcomm Innovation Fellowship: $100,000 (2020).
- NSF Graduate Research Fellowship: $138,000 (2017-2019).
- Brown University Distinguished Senior Thesis Award (university-wide award, 2013).
- Sigma Xi Scientific Honor Society (2013).

Teaching

- Predoctoral Instructor (Instructor of Record). CSE599i: Generative Models (Autumn, 2020).
  - Created a new course offering covering advances in generative modeling from 2010-2020.
  - Developed course materials from scratch including lecture notes, slides, and homework.
  - Top-decile teaching reviews: 4.9/5.0 overall course quality with a 53% response rate (16/30 students).
- Teaching Assistant
  - CSE547: Machine Learning for Big Data (Spring, 2016).
  - CSE546: Machine Learning (Autumn, 2015).
- Guest Lecturer
  - STAT558: Statistical Machine Learning for Data Scientists (Spring 2020).
  - CSE490: An Introduction to Deep Learning (Autumn, 2018).
  - STAT558: Statistical Machine Learning for Data Scientists (Spring 2018).
  - CSE546: Machine Learning (Spring 2018).
  - CSE547: Machine Learning for Big Data (Spring, 2016).

Research Advising and Mentoring

- Vivek Jayaram, (PhD Student) University of Washington.
  - Vivek and I co-authored two papers together appearing at ICML 2020, and ICML 2021.
- Harsh Verma, (undergraduate) University of Washington, Class of 2019.
  - Current Masters student at Concordia University.
  - Harsh and I co-authored a paper appearing at ISMIR 2019.

Professional Experience

- **Clear Ventures** - Technology Venture Capital   Palo Alto, CA
  DeepTech Fellow   *September 2022 - Present*

- **Human Exploratorium** - Music Therapy and Recommendation   San Francisco, CA
  Advisor   *May 2021 - Present*
  - Provided introductions, employee mentoring, and advice on hiring and technical strategy.

- **Panjandrum.ai** - Virtual Avatar Music   Seattle, WA
  Advisor   *October 2019 - Present*
  - Provided advice and technical strategy for applications of machine learning to music and visual production.

- **University of Washington**   Seattle, WA
  Graduate Researcher - Computer Science and Engineering   *September 2015 - August 2021*
  - Built a track-record of machine learning research with publications at ICML, Neurips, ICLR, ICASSP, ISMIR.
  - Created the current best music transcription model in the MIREX Multi-F0 Challenge.
  - Designed, built, and administered a GPU computing cluster to support two research groups ($\sim$ 40 GPUs).

- **Amazon**   Seattle, WA
  Applied Science Intern - Amazon Music Machine Learning   *June 2019 – Aug. 2019*
  - Hosts: Ted Sandler, Ben London.
  - Built a recommendation model using deep contextual bandits to sequence tracks on Amazon Music stations.
  - Used counterfactual risk minimization to train models off-policy from logged user interaction data.

- **Bracebridge Capital** - Fixed Income Arbitrage Hedge Fund   Boston, MA
  Quantitative Developer (Lead Developer) - Quantitative Research   *July. 2013 – May 2015*
  - Led and mentored a team of three software engineers developing C++ software infrastructure.
  - Maintained models governing a billion dollar asset backed structured product portfolio.
  - Organized front-office data acquisition, coordinating between research, vendors, the trading floor, and IT.
  - Built in-house models of implied volatilities and sensitivities, with applications to rates products.

- **Bracebridge Capital**   Boston, MA
  Summer Analyst - Quantitative Research   *June 2012 – Aug. 2012*
  - Rebuilt a legacy Excel product model using modern technologies: C#, Postgres, and JavaScript.
  - Completed a quant training course on valuation and risk models, with a focus on fixed income products.

- **Sirius Software** - Database Vendor   Cambridge, MA
  Software Engineer - Systems Software Engineering   *Jan. 2008 – May 2012*
  - Wrote compiler extensions for a database bytecode query language used by 1000+ developers worldwide.
  - Developed core system libraries for reporting, parsing, and web, supporting applications with millions of users.
  - Delivered international on-site programmer training and product demonstrations.
  - Linux systems administration: DNS, backups, software updates, security, documentation wiki.

Academic Service

- Journal Reviewer:
  - Transactions of the International Symposium on Music Information Retrieval 2021, 2022.
  - Journal of Creative Music Systems 2022.
  - IEEE Signal Processing Letters 2022.

- Conference Reviewer:
  - Advances in Neural Information Processing Systems 2016, 2020, 2021, 2022.
  - International Conference on Machine Learning 2018, 2021, 2022.
  - International Conference on Learning Representations 2022, 2023.

- Workshop Reviewer:
  - NeurIPS ML Safety Workshop, 2022.

- Panelist:
  - June 2021: Howard University Karsh STEM Scholars Research Panel for Incoming First-Year Students
  - March 2021: UW CSE PhD Student Experience Panel for Admitted Graduate Students
  - February 2020: CSE 142 Careers in Research Panel for First-Year Computer Science Students

- Stanford Student-Applicant Support Program (SASP) 2022.
  - Provided feedback to Stanford undergraduates from under-represented groups on their CS PhD applications.

- Stanford CS Undergraduate Mentoring, 2021-2022.
  - This program provides early research mentoring to undergraduate students from underrepresented groups.
  - Met regularly with my mentee during the 2021-2022 academic year.

- UW CSE Pre-Application Mentorship Service (PAMS) 2021.
  - Mentored prospective applicants to the UW PhD program from historically marginalized groups.

- UW CSE Application Reader, PhD Admissions: 2018, 2019, 2020.
- UW ML Graduate Student Recruiting Activities Coordinator: 2018, 2019.
  - Planned and organized on-campus recruiting events and activities for 100+ current and prospective students.

- UW CSE Graduate Social Co-Chair, 2017.
  - Organized weekly student social events for the Allen School graduate student community.
  - Worked to create inclusive activities that are accessible and appealing to our diverse community of students.

- Co-founder and organizer of the UW Machine Learning and Optimization Reading Group.
  - Organized and scheduled speakers for a weekly seminar for 5 years (2015-2020).
  - In 2020, this seminar grew into the regular meeting of ADSI/ IFDS, funded by an NSF Tripods grant.

Publications and Preprints

- *Melody Transcription via Generative Pre-Training.*
  In International Symposium on Music Information Retrieval (ISMIR) 2022.
  Chris Donahue, John Thickstun, Percy Liang.

- *Diffusion-LM Improves Controllable Text Generation.*
  In Advances in Neural Information Processing Systems (Neurips) 2022.
  (Selected for Oral Presentation)
  Xiang Lisa Li, John Thickstun, Ishaan Gulrajani, Percy Liang, Tatsunori B. Hashimoto.

- *Reconstruction of Visual Images from Murine Retinal Ganglion Cell Spiking Activity using Convolutional Neural Networks.*
  Preprint Report, 2022.
  Tyler Benster, Darwin Babino, John Thickstun, Matthew Hunt, Xiyang Liu, Zaid Harchaoui, Sewoong Oh, Russell N. Van Gelder.

- *MAUVE: Measuring the Gap Between Neural Text and Human Text using Divergence Frontiers.*
  In Advances in Neural Information Processing Systems (Neurips) 2021.
  (Outstanding Paper Award: 6 / 9122 paper submissions)
  Krishna Pillutla, Swabha Swayamdipta, Rowan Zellers, John Thickstun, Sean Welleck, Yejin Choi, Zaid Harchaoui.

- *Parallel and Flexible Sampling from Autoregressive Models via Langevin Dynamics.*
  In International Conference on Machine Learning (ICML) 2021.
  Vivek Jayaram, John Thickstun (equal contribution).

- *Faster Policy Learning with Continuous-Time Gradients.*
  In Learning for Dynamics & Control (L4DC) 2021.
  Samuel Ainsworth, Kendall Lowrey, John Thickstun, Zaid Harchaoui, Siddhartha Srinivasa.

- *Rethinking Evaluation Methodology for Audio to Score Alignment.*
  ArXiv Preprint Report 2009.14374, 2020.
  John Thickstun, Jennifer Brennan, Harsh Verma.

- *An Information Bottleneck Approach for Controlling Conciseness in Rationale Extraction.*
  In Empirical Methods in Natural Language Processing (EMNLP) 2020.
  Bhargavi Paranjape, Mandar Joshi, John Thickstun, Hannaneh Hajishirzi, Luke Zettlemoyer.

- *Source Separation with Deep Generative Priors.*
  In International Conference on Machine Learning (ICML) 2020.
  Vivek Jayaram, John Thickstun (equal contribution).

- *Convolutional Composer Classification.*
  In International Symposium on Music Information Retrieval (ISMIR) 2019.
  Harsh Verma, John Thickstun.

- *Coupled Recurrent Models for Polyphonic Music Composition.*
  In International Symposium on Music Information Retrieval (ISMIR) 2019.
  John Thickstun, Zaid Harchaoui, Dean P. Foster, Sham M. Kakade.

- *Invariances and Data Augmentation for Supervised Music Transcription.*
  In International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2018.
  John Thickstun, Zaid Harchaoui, Dean P. Foster, Sham M. Kakade.

- *Frequency Domain Convolutions for Multiple F0 Estimation.*
  MIREX Abstract (Technical Report) 2017.
  John Thickstun, Zaid Harchaoui, Dean P. Foster, Sham M. Kakade.

- [MusicNet]: *Learning Features of Music from Scratch.*
  In International Conference on Learning Representations (ICLR) 2017.
  John Thickstun, Zaid Harchaoui, Sham M. Kakade.

- *Statistical Inference on Music with Applications to the Transcription Problem.*
  Brown University Senior Thesis, 2013.
  Supervisor: Eugene Charniak, Computer Science. Second Reader: Hui Wang, Applied Mathematics.

Invited Talks and Presentations

- Controlling Generative Models for Content Creation - CLEAR Ventures - Palo Alto, CA - 10/24/2022
- Controlling Generative Models in Diverse Media Domains - Meta - New York, NY - 10/18/2022
- Audio Source Separation with Deep Generative Priors - Mila - Quebec, Canada - 8/19/2022
- Classifier-Guided Controllable Text Generation with Diffusion-LM - AI2 - Seattle, WA - 8/3/2022
- Generative Modeling of Classical Western Music - SAIL - Stanford University - 12/4/2020
- Source Separation with Deep Generative Priors - ICML - Vienna, Austria - 7/14/2020
- Convolutional Composer Classification - ISMIR - Delft, Netherlands - 11/6/2019
- Autoregressive Modeling of Musical Scores - ISMIR - Delft, Netherlands - 11/5/2019
- Robust Generative Modeling in Generic Problem Domains - CSE Colloquium - UW Seattle - 10/31/2019

- Neural Music Transcription - ICASSP - Calgary, Canada - 4/18/2018
- MusicNet: Learning Features of Music from Scratch - ICLR - Toulon, France - 4/25/2017
- Automatic Music Transcription - CS Department - Brown University - 5/1/2013
- Introducing the Janus XmlParser - Sirius User Group - St. Louis, MO - 5/2/2010
- Tokenization and Collection Objects - Centrelink - Canberra, Australia - 3/23/2010

Media Coverage

- TechCrunch - MusicNet aims to give machine learning algorithms a taste for Beethoven.
- The Times of London - Bach to the future: computer will finish composer's work.
- A Tempo with Rachel Katz (WWFM Radio) - Computers and music.
- CNET - Bach to the future: AI, meet classical music.
- CIFAR - Learning algorithms find a new music teacher.
- RouteNote - How do you advance machine learning? Teach them Beethoven and Bach.
- UW Today - What makes Bach sound like Bach? New dataset teaches algorithms classical music.

Open Source Contributions

- Stanford CRFM Mistral
  - https://github.com/stanford-crfm/mistral
  - A framework for replicable training of GPT-2 scale Transformer models.
  - I contributed abstractions for training models over non-text datasets including, for example, music.

- HuggingFace Transformers -
  - https://github.com/huggingface/transformers
  - A Python library of natural language processing models and utilities.
  - I contributed model evaluation metrics that implement the Mauve algorithm for measuring the quality of machine-generated text.

- FIFE Engine
  - https://github.com/fifengine/fifengine
  - A multi-platform isometric game engine written in C++ with Python bindings for scripting.
  - I was an early core contributor from 2007-2008 with 241 commits touching all aspects of the engine.