Joseph McDonald, Ph.D.

jpmcd@mit.edu · jpmcd.github.io
Brooklyn, NY

Math Ph.D. with 6 years machine learning research and engineering experience in startups and academia. Seeking scientist-engineering roles focused on ML/NLP solutions at AI-centered company. Strong ML/AI, NLP and HPC background. Open to in-person/remote/hybrid.

Positions

10/2020 – present *Researcher, Massachusetts Institute of Technology, Lincoln Laboratory Supercomputing Center*

- Research in machine learning and natural language processing. Investigating LLM training and inference on distributed systems on LLSC GPU cluster.
- Current work in information retrieval using LLMs and NLP libraries with custom datasets.
- Leader of system-level research of hardware optimizations for datacenter approaches to sustainable machine learning and language modeling. Lead author on NAACL publication.
- Computer vision, AI applications for tornado detection and prediction. Joint work with meteorological division staff. Primary author of publication on approaches for hail detection and hydrometeor classification.
- Co-wrote successful $50K Dept. of Defense 2021 SBIR award proposal with RedShred LLC, for developing AI-integrated document processing applications.

1/2020 – 6/2020 *AI Technology Consultant, Co-Star, Series A Social Media Startup*

- Developed and advised on machine learning applications for popular social media iOS/Android app.
- Automated and scaled NLP tasks and toolsets to aid writing staff in creating and editing content.

6/2017 – 4/2019 *Machine Learning Scientist, HIFI, Music Tech Startup*

- Research and development optimizing music recommendation engine using Deep Learning/NLP with Spotify and Amazon user data.
- Wrote engine for mobile app providing swipe-able song recommendations. Developed novel reinforcement learning methods for online learning through app. Designed and trained neural nets for audio analysis.
- Lead development of analytics platform for new business model using inference-based predictions.

6/2015 – 8/2015 *Software Engineering Intern, Nest Labs, Google Inc.*

- Internship on Machine Learning Algorithms Team. Developed machine perception algorithms and integrated new Google learning architectures for Nest Cam.

Education

2019 *Ph.D., Mathematics, Courant Institute, New York University*

- Optimization, Machine Learning, Mathematical Theory for Signal Processing.

2010 *B.S., Mathematics, Physics, summa cum laude, Washington and Lee University*

Select Publications

· Mark Veillette, James M. Kurdzo, Phillip M. Stepanian, Joseph McDonald, Siddharth Samsi, John Y. N. Cho. A Deep Learning-based Velocity Dealiasing Algorithm Derived from the WSR-88D Open Radar Product Generator. *Artificial Intelligence for the Earth Systems*, accepted 2023.

· J. McDonald, B. Li, N. Frey, D. Tiwari, V. Gadepally, S. Samsi. Great Power, Great Responsibility: Recommendations for Reducing Energy for Training Language Models. *Findings of the Association for Computational Linguistics NAACL*, 2022.

· J. McDonald, J. Kurdzo, P. Stepanian, M. Veillette, S. Samsi. Performance Estimation for Efficient Image Segmentation Training of Weather Radar Algorithms. *2022 IEEE High Performance Extreme Computing Conference*, 2022.

· N. C. Frey, S. Samsi, J. McDonald, L. Li, C. W. Coley, V. Gadepally. Scalable Geometric Deep Learning on Molecular Graphs. *NeurIPS 2021 AI for Science Workshop*, 2021.

· J. McDonald, S. Samsi, D. Edelman, C. Byun, J. Kepner, V. Gadepally. Improved Compression for Word Embeddings by Scaling Principal Components. *2021 IEEE High Performance Extreme Computing Conference*, 2021.

· J. McDonald, B. Bernstein, C. Fernandez-Granda. A Sampling Theorem for Deconvolution in Two Dimensions. *SIAM Journal on Imaging Sciences*, 13(4), 2020.

· P.S. Bourdon, E. Gerjuoy, J.P. McDonald, and H.T. Williams. Deterministic Dense Coding and Entanglement Entropy. *Physical Review* A, 77, 022305.

Honors and Awards

· Henry M. MacCracken Doctoral Fellowship, NYU
· Barry Goldwater Scholar, National Scholarship for STEM
· George Washington Scholarship, WLU
· Robinson Award in Mathematics and Science, WLU
· James McDowell Scholarship, WLU
· Phi Beta Kappa

Skills

· Python, BASH, Unix, Git
· PyTorch, TensorFlow, Keras