

Current Interests

I'm a PhD student in machine learning interested in developing and applying new computational techniques to reason with uncertainty for deep neural networks, specifically using Bayesian methods. This has led to other interests in numerical linear algebra, scalable Gaussian processes and their applications more generally. I'm currently very excited by applications to automated decision making, meta-learning and transfer learning.

Education

- 9/2019 - **PhD Student, Data Science**, *New York University*, New York, NY, Advisor: Andrew Gordon Wilson.
- 2017 - 2019 **MS, Statistics**, *Cornell University*, Ithaca, NY, Advisor: Andrew Gordon Wilson.
Two years of PhD coursework in the field of statistics before transferring with advisor.
- 2016 - 2017 **MS, Statistics**, *Case Western Reserve University*, Cleveland, OH, Advisor: Wojbor Woyczynski.
- 2013 - 2017 **BS, Systems Biology**, *Case Western Reserve University*, Cleveland, OH.
- 1 - 6/2016 **Visiting Student**, *St. Catherine's College, University of Oxford*, Oxford, UK.

Awards and Fellowships

- 2019 **NYU Data Science PhD Fellowship**.
- 2019 **Best Paper ICML Time Series Workshop**.
- 2017 **NSF Graduate Research Fellowship (GRFP)**.

Work Experience

- 5/20–12/20 **Research Scientist Intern**, *Facebook*, Menlo Park, CA, remote.
(part time 9/20 – 12/20) Performed research as part of Core Data Science team on high dimensional and deep learning based Bayesian optimization. Supervised by Max Balandat and Eytan Bakshy.
- 6/19 – 9/19 **Applied Scientist Intern**, *Amazon*, Cambridge, UK.
Performed research as part of the supply chain optimization team into transfer learning, infinite width neural networks and Gaussian processes. Supervised by Andreas Damianou and Pablo Garcia Moreno.
- 6/17 – 8/17 **Statistics & Data Analytics Intern**, *Lubrizol*, Cleveland, OH.
Worked as part of the industrial statistics team to perform exploratory data analysis and modelling to understand sources of variability within chemical experiments, and then presented the results to intra-company clients.
- 7/16 – 8/16 **Data Science Intern**, *Vertical Knowledge*, Chagrin Falls, OH.
Worked within a data analysis team at a startup to produce actionable business intelligence insights through exploratory data analysis, data cleaning, exploratory modelling, and data visualizations.
- 6/15 – 8/15 **Research Intern**, *Research on Industrial Projects for Students, IPAM (UCLA)*, Los Angeles, CA.
Served as project manager for team consisting of three other undergraduates, and implemented a multi-level model of brain regions for biologically based pattern recognition.

Publications

Conference Papers

- [1] **Maddox, W. J.**, Tang, S., Moreno, P. G., Wilson, A. G., and Damianou, A. **2021**, "Fast Adaptation with Linearized Neural Networks," in *Artificial Intelligence and Statistics (AISTATS)*. Available: <http://arxiv.org/abs/2103.01439>.
- [2] Stanton, S., **Maddox, W. J.**, Delbridge, I., and Wilson, A. G. **2021**, "Kernel Interpolation for Scalable Online Gaussian Processes," in *Artificial Intelligence and Statistics (AISTATS)*. Available: <http://arxiv.org/abs/2103.01454>.

- [3] Benton, G., **Maddox, W. J.**, Salkey, J., Albinati, J., and Wilson, A. G. **2019**, “Function-space Distributions over Kernels,” in *Advances in Neural Information Processing Systems (NeurIPS)*, Best Paper at 2019 ICML Time Series Workshop. Available: <https://arxiv.org/abs/1910.13565>.
- [4] Izmailov, P., **Maddox, W. J.**, Kirichenko, P., Garipov, T., Vetrov, D., and Wilson, A. G. **2019**, “Subspace Inference for Bayesian Deep Learning,” in *Uncertainty in Artificial Intelligence (UAI)*, Contributed Talk at 2019 ICML Uncertainty in Deep Learning Workshop. Available: <http://arxiv.org/abs/1907.07504>.
- [5] **Maddox, W. J.**, Garipov, T., Izmailov, P., Vetrov, D., and Wilson, A. G. **2019**, “A Simple Baseline for Bayesian Uncertainty in Deep Learning,” in *Advances in Neural Information Processing Systems (NeurIPS)*, Contributed Talk at 2018 UAI Uncertainty in Deep Learning Workshop. Available: <https://arxiv.org/abs/1902.02476>.

Journal Articles

- [6] Belu, A., **Maddox, W. J.**, and Woyczynski, W. A. **2018**, “Copulas and dependency measures for multivariate Linnik distributions,” *International Journal of Statistics and Probability*, vol. 7, no. 6, DOI: 10.5539/ijsp.v7n6p154.
- [7] Grandhi, S., Bosworth, C., **Maddox, W. J.**, Sensiba, C., Akhavanfard, S., Ni, Y., and LaFramboise, T. **Aug. 2017**, “Heteroplasmic shifts in tumor mitochondrial genomes reveal tissue-specific signals of relaxed and positive selection,” *Human Molecular Genetics*, vol. 26, no. 15, pp. 2912–2922, ISSN: 0964-6906, 1460-2083. DOI: 10.1093/hmg/ddx172. Available: <https://academic.oup.com/hmg/article/26/15/2912/3798753>.

Workshop

- [8] Finzi, M., Izmailov, P., **Maddox, W. J.**, Kirichenko, P., and Wilson, A. G. **2019**, “Invertible ConvNets,” *ICML Workshop on Invertible Neural Nets and Normalizing Flows*, Available: https://invertibleworkshop.github.io/accepted_papers/pdfs/INNF_2019_paper_26.pdf.
- [9] **Maddox, W. J.**, Tang, S., Moreno, P. G., Wilson, A. G., and Damianou, A. **2019**, “On Linearizing Neural Networks for Transfer Learning,” *NeurIPS MetaLearn Workshop*, Available: <http://metalearning.ml/2019/papers/metalearn2019-maddox.pdf>.

Preprints

- [10] **Maddox, W. J.**, Benton, G., and Wilson, A. G. **Mar. 2020**, “Rethinking Parameter Counting in Deep Models: Effective Dimensionality Revisited,” arXiv: 2003.02139, Available: <http://arxiv.org/abs/2003.02139> (visited on 04/20/2020).
- [11] Tang, S., **Maddox, W. J.**, Dickens, C., Diethel, T., and Damianou, A. **Mar. 2020**, “Similarity of Neural Networks with Gradients,” arXiv: 2003.11498, Available: <http://arxiv.org/abs/2003.11498> (visited on 04/20/2020).
- [12] Zhang, R., **Maddox, W.**, Athiwaratkun, B., and Wilson, A. G. **2018**, “An Exploration of Bayesian Methods for Auto-Encoders,” Available: <https://github.com/ruqizhang/bayes-autoencoder/blob/master/bae.pdf>.

Other Activities

Teaching

- Fall 2019 **TA**, NYU, CSCI-GA.3033-027: Bayesian Machine Learning, Prof. Andrew Wilson.
- Spring 2019 **TA**, Cornell, BTRY 4520: Statistical Computing, Prof. Giles Hooker.
- Fall 2018 **Head TA**, Cornell, BTRY 6010: Statistical Methods I, Prof. Sumanta Basu.

Reviewing

- 2020 **AISTATS, ICLR, ICML, NeurIPS.**
- 2019 **ICML (top 5%), NeurIPS (top 400), UAI, AISTATS.**
- 2018 **NeurIPS (top 10%), ICML TADGM Workshop.**

Other Professional Service

- 1/18 – 5/19 **Social Chair, Reading Group Organizer**, Cornell Statistics Graduate Student Association.

Skills

Proficient **Python, R, numpy, PyTorch, GPyTorch, Git, L^AT_EX.**