

Patrick Mineault

Data scientist

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Work Experience

- June 2017 - August 2019 **Brain-computer interface engineer**, *Facebook*, Menlo Park, CA, BCI.
- Tech lead on research project to integrate brain computer interfaces into augmented and virtual reality
 - End-to-end transitioned optical brain sensing tech to FB: hardware, software, experiments, ML, leading to two completed and prototypes
 - Initiated and managed 3 external research statements on optics and the brain
 - Proposed new closed-loop BCI architecture leading to 2 patent applications
- 2015-2017 **Software engineer/Data scientist**, *Google*, Mountain View, CA, Ads Metrics.
- Proposed and ran in-lab and mechanical turk studies on thousands of subjects in eye tracking, visual psychophysics to find UX tunings to search engine results page
 - Tested and successfully launched these visual improvements to search engine ad presentation, leading to 2 launches with >1% improvement in top-line CTR
 - Ran cost-benefits analysis and blocked launches of 3 bad tweaks
 - Ran Google-wide machine learning reading group
- 2014-2015 **Postdoctoral researcher**, *UCLA*, Los Angeles, CA, David Geffen School of Medicine.
- Researched neural representations of vision and movement in single neurons under the supervision of Dr. Dario Ringach
 - Developed deep learning methods to estimate transfer function of single neurons to complex visual stimuli
 - Developed constrained matrix factorization based signal processing methods for analyzing 2p-fluorescence imaging recordings

Volunteer positions

- April 2020 - Present **CTO**, *Neuromatch Academy*, Montreal, QC.
- Devised communications, content and data science plan for graduate level online class in computational neuroscience
 - Landed first version of online class to 1700 students and 200 teaching assistants within 3 months of conception
 - Delivered pod matching algorithm allowing peer learning among students, leading to industry-leading course completion rates of 86% (versus 5-10% for conventional MOOCs)

Education

- 2008-2014 **PhD**, *McGill University*, Montreal, Canada, Integrated Program in Neuroscience.
- Thesis: Parametric modeling of visual cortex at multiple scales
 - Supervisor: Dr. Christopher Pack
- 2005-2008 **B.Sc.**, *McGill University*, Montreal, Canada, Mathematics and Physics.

Programming languages and frameworks

Proficient in Python, numpy, scipy, sklearn, PyTorch, R, ggplot, dplyr, SQL. Basic proficiency in Javascript, C for microcontrollers, Julia, C# for Unity.

Teaching

- 2021 Guest lecturer, Harvard PhD Program in Neuroscience, *Structuring code and data workshop*. <https://projects.iq.harvard.edu/cicnworkshops>
- 2020 Section leader, Stanford CS, *Code in Place*.
- 2020 Teacher, Champlain College, *Programming for AR/VR*.

Outreach

- xcorr.net
 - Wrote 200 articles on data science, programming and neuroscience
 - 10k visitors/month
- NMA
 - Contributed tutorials on computational neuroscience
 - 1.5k stars on Github
 - <https://github.com/NeuromatchAcademy/course-content>

Publications

- 2021 BM 't Hart, T Achakulvisut, G Blohm, K Kording, MAK Peters, ... **PJ Mineault**, ..., T van Viegen. (2021) *Neuromatch Academy: a 3-week, online summer school in computational neuroscience*. Submitted to the Journal of Open Source Education. <https://osf.io/9fp4v/>
- 2020 T van Viegen, A Akrami, K Bonnen, E DeWitt, A Hyafil, H Ledmyr, GW Lindsay, **PJ Mineault**, JD Murray, X Pitkow, A Puce, M Sedigh-Sarvestani, C Stringer, T Achakulvisut, E Alikarami, M Selim Atay, E Batty, JC Erlich, BV Galbraith, Y Guo, AL Juavinett, MR Krause, S Li, M Pachitariu, BE Straley, D Valeriani, E Vaughan, M Vaziri-Pashkam, ML Waskom, G Blohm, K Kording, P Schrater, B Wyble, S Escola, MAK Peters (2020). *Neuromatch Academy: Teaching Computational Neuroscience with global accessibility*. arXiv:2012.08973. Submitted to Trends in Cognitive Science (TiCS).
- 2020 T Achakulvisut, T Ruangrong, **PJ Mineault**, TP Vogels, MAK Peters, P Poirazi, C Rozell, B Wyble, DFM Goodman, KP Kording (2020). *Towards democratizing and automating online conferences: lessons from the Neuromatch Conferences*. In Press at Trends in Cognitive Science (TiCS).
- 2018 M Masis, **PJ Mineault**, E Phan, SC Lin (2018). *The role of phacoemulsification in glaucoma therapy: a systematic review and meta-analysis*. Survey of ophthalmology 63 (5), 700-710.
- 2018 P Berens, J Freeman, T Deneux, N Chenkov, T McColgan, A Speiser, JH Macke, SC Turaga, **PJ Mineault**, P Rupprecht, S Gerhard, RW Friedrich, J Friedrich, L Paninski, M Pachitariu, KD Harris, B Bolte, TA Machado, DL Ringach, J Stone, LE Rogerson, NJ Sofroniew, J Reimer, E Froudarakis, T Euler, MR Roson, L Theis, AS Tolias, M Bethge (2018). *Community-based benchmarking improves spike rate inference from two-photon calcium imaging data*. PLoS computational biology 14 (5), e1006157
- 2016 **PJ Mineault**, E Tring, JT Trachtenberg, DL Ringach (2016). *Enhanced Spatial Resolution During Locomotion and Heightened Attention in Mouse Primary Visual Cortex*. J Neurosci. 36(24):6382-6392.
- 2016 DL Ringach, **PJ Mineault**, E Tring, N Olivas, J Trachtenberg, P Garcia-Junco Clemente (2016). *Spatial clustering of tuning in mouse primary visual cortex*. Nature Communications. 12270.
- 2016 TP Zanos, **PJ Mineault**, D Guitton and CC Pack (2016). *Mechanisms of Saccadic Suppression in Primate Cortical Area V4*. J. Neurosci. 36 (35) 9227-9239

- 2015 TP Zanos, **PJ Mineault**, KT Nasiotis, D Guitton, CC Pack (2015). *A Sensorimotor Role for Traveling Waves in Primate Visual Cortex*. *Neuron*. 85:3, pp615-627.
- 2013 **PJ Mineault**, CC Pack (2013). *The Cerebral Emporium of Benevolent Knowledge*. *Neuron*. 79:5 pp. 833-855.
- 2013 **PJ Mineault**, TP Zanos, CC Pack (2013). *Local field potentials reflect multiple spatial scales in V4*. *Front. Comput. Neurosci.* 7:21.
- 2012 **PJ Mineault**, FA Khawaja, DA Butts, CC Pack (2012). *Hierarchical processing of complex motion in dorsal visual pathway*. *PNAS*, 109(16):E972-80.
- 2011 TP Zanos, **PJ Mineault**, CC Pack (2011). *Removal of spurious correlations between spikes and local field potentials*. *Journal of Neurophysiology*, 105, 474-486.
- 2009 **PJ Mineault**, S Barthelme, CC Pack (2009). *Improved classification images with sparse priors in a smooth basis*. *Journal of Vision*, 9(10):17, 1-24