Gergo Bohner **January 25, 2019**
Research Fellow in Health Data Science
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Research

- **The Alan Turing Institute and University of Warwick** London, UK
  Research Fellow in Health Data Science *Mar. 2018 -*
  - Research coordinator and main code developer for Scottish Patients at Risk of Readmission or Admission (SPARRA). The project is a joint venture between NHS Scotland and The Alan Turing Institute (ATI), aiming to improve predictive modeling based on electronic health records, pinpoint patients at risk and convey the information to local General Practitioners, moving towards preventive medicine. I have been responsible in coordinating researchers from multiple universities and leading the conversation between medical experts, NHS IT and academic researchers.
  - Involved as data science expert or computational support in other projects, including
    * an ongoing development of real-time patient evaluation software at the point of triage for the Accident and Emergency departments of the Barking, Havering and Redbridge University Hospitals.
    * a now completed policy project outlining best practice guidance for Machine Learning and Artificial Intelligence research in medicine, in collaboration with the National Institute for Care Excellence (NICE) and Health Data Research UK amongst others.
  - Advisor: Dr. Sebastian Vollmer (Associate Director of Health Data Science, ATI)

- **Gatbsy Computational Neuroscience Unit, UCL** London, UK
  PhD Student *Sep. 2013 -*
  - Thesis title: Unsupervised methods for large-scale, cell-resolution neural data analysis (in preparation)
  - A major goal of computational neuroscience is to reveal the underlying computation in the brain during a specific task, using a variety of experimental methods and carefully analysing the generated, often extremely noisy data. I worked closely with experimental collaborators to understand the tasks and recording methods, and developed robust and scalable algorithms that take into account the known artefacts and eliminate human biases from all parts of data analysis.
  - Aside from my main focus, I completed multiple smaller projects, including:
    * Modelling the adaptability of allosteric macromolecules, and suggesting that certain variations in their mechanistic biophysical parameters are coordinated in a predictable way that does not change functionality. With Gaurav Venkataraman, on JGP cover May 2017.
    * An official minor project, reviewing the variety of potential intracellular pathways underlying Drosophila sleep in dFB neurons, and proposing experimental methods to disambiguate their individual roles.
  - Developed scalable and distributed algorithms for a cluster environment in multiple programming languages (Python, Julia, Matlab)
  - Advisor: Prof. Maneesh Sahani (Director of Gatsby Unit)

- **London Research Institute, Cancer Research UK** — London, UK
  Diploma Student — *Jun. 2011 - Feb. 2013*
  - Worked as part of the Microtubule Cytoskeleton Group (now in Francis Crick Institute). Developed software for dynamical analysis of microtubules and associated proteins imaged via Total Internal Reflection Microscopy, utilising two dimensional model fitting and Bayesian inference.
  - Advisors: Dr. Thomas Surrey, Dr. Sebastian Maurer

- **Pazmany Peter Catholic University** — Budapest, Hungary
  BSc Student — *Sep. 2010 - Apr. 2011*
  - Built a model of near-focus electromagnetic fields in optical tweezers, based on the input parameters available for experimentalists. Found optimal calibration of the parameters to achieve better experimental results during kinesin step detection.
  - Advisors: Dr. Arpad Csurgay (Professor of Quantum Physics and Nanoelectronics)

Teaching and Education

- **Teaching Assistant** — London, UK
  University College London — *Sep. 2014 -*
  - Theoretical Neuroscience
  - Introduction to Machine Learning
  - Probabilistic and Unsupervised Learning
  - Approximate Inference and Learning in Probabilistic Models

- **Teaching Assistant** — Budapest, Hungary
  Pazmany Peter Catholic University — *Feb. 2012 - Jun. 2012*
  - Physics of Information Technology

- **Advanced Master of Artificial Intelligence** — Leuven, Belgium
  KU Leuven, Faculty of Engineering — *Feb. 2013 - Jun. 2013*
  - Select Courses

- **B.S. Molecular Bionics** — Budapest, Hungary
  Pazmany Peter Catholic University, Faculty of IT and Bionics — *Sep. 2009 - Jan. 2013*
  - Graduated with first-class honours, GPA 4.91/5.00
  - Summer Course in Quantum Physics, 2010

Publications

[1] L. Duncker, J. Boussard, **G. Bohner**, and M. Sahani, "Inferring interpretable nonlinear stochastic dynamics from population spike trains," Accepted at Computational and Systems Neuroscience (Cosyne) conference, 2019.

[2] S. Vollmer, B. Mateen, **G. Bohner**, F. Kiraly, P. Myles, M. Birse, K. Moons, J. Ioannidis, C. Holmes, H. Hemingway, and G. Collins, "Machine learning and AI research for Patient Benefit: 20 Critical Questions on Transparency, Replicability, Ethics and Effectiveness," Submitted to Journal of Machine Learning Research, 2019.

[3] L. Duncker, J. Boussard, **G. Bohner**, and M. Sahani, "Learning interpretable continuous time descriptions of latent stochastic dynamical systems," Submitted to International Conference in Machine Learning (ICML), 2019.

[4] **G. Bohner** and M. Sahani, "Empirical fixed point bifurcation analysis," Preprint, ArXiv, Submitted to International Conference in Machine Learning (ICML), 2018.

[5] **G. Bohner**, "Investigating intracellular mechanisms of sleep in Drosophila Melanogaster," unpublished, reviewed internally as a Minor Project of the UCL Gatsby PhD programme, 2017.

[6] **G. Bohner*** and G. Venkataraman*, "Identifiability, reducibility, and adaptability in allosteric macromolecules," *The Journal of general physiology*, vol. 149, no. 5, pp. 547–560, 2017.

[7] M. Sahani, **G. Bohner**, and A. Meyer, "Score-matching estimators for continuous-time point-process regression models," in *Machine Learning for Signal Processing (MLSP), 2016 IEEE 26th International Workshop on*, IEEE, 2016, pp. 1–5.

[8] **G. Bohner***, N Gustafsson*, N. Cade, S. Maurer, L. Griffin, and T. Surrey, "Important factors determining the nanoscale tracking precision of dynamic microtubule ends," *Journal of microscopy*, vol. 261, no. 1, pp. 67–78, 2016.

[9] **G. Bohner** and M. Sahani, "Convolutional higher order matching pursuit," in *Machine Learning for Signal Processing (MLSP), 2016 IEEE 26th International Workshop on*, IEEE, 2016, pp. 1–6.

[10] M. Park, **G. Bohner**, and J. H. Macke, "Unlocking neural population non-stationarities using hierarchical dynamics models," in *Advances in Neural Information Processing Systems*, 2015, pp. 145–153.

[11] S. P. Maurer*, N. I. Cade*, **G. Bohner***, N. Gustafsson, E. Boutant, and T. Surrey, "EB1 accelerates two conformational transitions important for microtubule maturation and dynamics," *Current Biology*, vol. 24, no. 4, pp. 372–384, 2014.

[12] V. Adam, J. Soldado-Magraner, W. Jitkritum, H. Strathmann, B. Lakshminarayanan, A. D. Ialongo, **G. Bohner**, B. D. Huh, L. Goetz, S. Dowling, *et al.*, "Seizure Detection Challenge - The Fitzgerald team solution," Tech. Rep., 2013.

[13] S. P. Maurer, F. J. Fourniol, **G. Bohner**, C. A. Moores, and T. Surrey, "EBs recognize a nucleotide-dependent structural cap at growing microtubule ends," *Cell*, vol. 149, no. 2, pp. 371–382, 2012.

[14] **G. Bohner**, "Theoretical Modelling of Optical Tweezers within the Rayleigh-regime and Studying Kinesin Movement [A lézercsipesz elméleti modellezése Rayleigh-tartományban és a modell alkalmazása kinezin mozgásának vizsgálatára]," B.S. Thesis, Pazmany Peter Catholic University, 2011.

Awards, Grants & Honors

EPSRC-IAA, Warwick Impact Fund - Grant for SPARRA project 2018-2019
Gatsby Computational Neuroscience Unit PhD Studentship 2013-2018
Grant of the Hungarian Republic (for major academic excellence) 2011-2013
Departmental Grant (for social activities and academic excellence) 2010-2011
Universal Academic Grant (for academic excellence) 2010-2012

Regional Finals at ACM International Collegiate Programming Contest, team 2011
1st Prize at Faculty Research Student Conference Simulation category 2010
2nd Prize at national K&H Banking Management Contest, team 2010
Finals at National High School Competitions in Physics and in Programming 2009

General Experience

- **TEDx Conference Organiser** — London, UK
  Goodenough College — *2016 -*
  - 2018-19 - Co-Curator, coordinating team of 20
  - 2017-18 - Speaker manager and coach, topic: Reflections on revolution
  - 2016-17 - Events manager, coordinating catering and entertainment
- **Data science consulting** — London, UK
  University College London — *2015 -*
  - Shell, consulting programmer via UCL Consulting, Mar. 2017 - Aug.2018
  - Royal Society Call for Evidence in Machine Learning - Authored policy white paper on NHS data handling and analysis, 2016
- **Other** — Various
  Various — *1997 -*
  - Dancesport competitor (1997-), instructor in ballroom and latin dancing (2016-)
  - Karate (Okinawan Goju Ryu, since 1997)
  - Music - Self-taught guitar and piano player (2008-)

Skills

- **Computational Modeling:** Machine Learning, Time Series, Big Data, Scalable (Parallel and Distributed) Systems, Numerical Optimisation, Model Reduction, Linear Algebra
- **Public Speaking:** I have given a number of talks to varied audiences and topics (including neuroscience and machine learning conferences, and the DARPA review board). I also worked with excellent TEDx speakers as a speaker coach on non-academic presentations.
- **Development:** Python, Julia, R, Matlab, LaTeX
- **Technology:** linux, git, tmux, docker, batch scripts, working in cluster environments and data safe havens
- My diverse background in Math, Physics, Cell Biology, Neuroscience and Optical Imaging allows me to quickly grasp a wide range of scientific problems, and my experience in Machine Learning and Data Science means I can begin contributing to any group immediately.
- I am incredibly motivated to learn new things, and I love understanding every little detail of experiments or data collection, and figure out how those details may inform computational analysis. I aim to reduce experimental and human biases during the investigation of any system, and to arrive at an interpretable and robust computational description of complex systems. This lets us update our model of how the world works, and ultimately enables us to design even more interesting experiments!