Jonathan Daniel Smith

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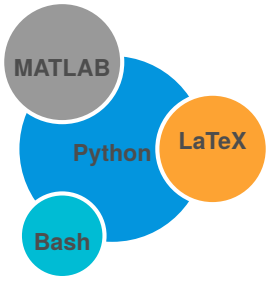
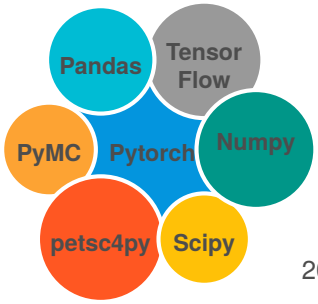
Programming



Python Knowledge



Background

I am a applied computational scientist interested in applying machine learning and statistical applications to real-world problems. I have just completed a postdoctoral research position at California Institute of Technology, investigating the dynamics of earthquakes using cutting edge machine learning techniques, and working with some of the leading experts in this field. Prior to this position, I received a Doctorate of Philosophy of Geophysics from Hughes Hall, University of Cambridge; and a Masters of Earth Sciences from St Edmund Hall, University of Oxford.
Throughout my research, I have leveraged machine learning and statistical based techniques, as demonstrated by my extensive collaborative multi-disciplinary publication record. These methods include, but are not limited to: Physics Informed Neural Networks, Neural Operators, Stein Variational Gradient Descent, Normalizing Flows, Recurrent Neural Networks, Convolutional Neural Networks, Independent Component Analysis, Bayesian Statistics and conventional Deep Neural Networks. Beyond my collaborative research, I have also worked with industry and acquired funding for active projects; convened and presented at international conferences; supervised graduate and undergraduate student projects; lectured undergraduate students; and, been involved in public outreach at schools and The Royal Society Summer Student Exhibition. I believe I am a highly effective team player that enjoys learning new fields, leveraging strengths working across diverse knowledge base.

Education

2019 - 2021 **California Institute of Technology - Postdoctoral Researcher**
Working with: Prof Zachary Ross, Prof Jean-Philippe Avouac and Prof Kamyar Azizzadenesheli
Following my PhD, I was invited to join Caltech as a 2-year postdoctoral researcher in Geophysics to continue my work on the improvement of earthquake detection and location techniques, of critical importance to understanding worldwide earthquake hazards. Using cutting edge machine learning applications I generated novel approaches applied to earthquakes. This has since been utilised more widely outside the geoscience community, within the field of computer science. In addition, my work is now being incorporated by the United States Geological Survey (USGS) into real-time hazard and earthquake monitoring for Southern California.
During this position, I collaborated closely with industry partners as an instrumental member of an NSF funded Industry-University Cooperative Research Centre, 'Geomechanics and Mitigation of Geohazards'. This work entailed developing software packages, convening industry outreach training sessions and applying developed techniques to industry datasets with an application to a number of large multi-million dollar industry projects.

2015 - 2019 **University of Cambridge - Doctorate in Philosophy - Geophysics**
Working with: Prof Jean-Philippe Avouac and Prof Robert White FRS
I completed my Doctorate of Philosophy at Hughes Hall on *'Geomechanical properties of the Groningen gas reservoir'*, funded under a EPSRC CASE award with Shell Global Solutions. I worked collaboratively with Shell Global Solutions demonstrating work/code and presenting at a senior level to Shell management, at Shell HQ Netherlands. The work entailed developing cutting-edge processing techniques to manipulate extensive datasets (>30TB) from multi Satellite Radar Altimetry, multi-instrumental continuous global positioning and continuous seismic signals across large arrays. This was used to monitor and forecast earthquakes for differing gas production scenarios, to assess the potential lifetime of the multi-billion Euro Groningen gas reservoir.

2011 - 2015 **University of Oxford - Master's Degree in Earth Sciences - 2:1**
Awarded a 2:1 honours degree in Earth Sciences from St Edmund Hall, Oxford.

2004 - 2011 **Saffron Walden County High School, Essex, United Kingdom**
I was awarded A*,A,A,B in A-Levels for Maths, Further Maths, Chemistry and Physics.

Personal Skills

Team Player
Project Management
Self Disciplined
Innovative
Insightful
Driven

Sports & Hobbies

Key Publications

Jonathan D. Smith, Zachary E. Ross, Kamyar Azizzadenesheli and Jack Muir, 2021,
HypoSVI: Hypocentral inversion with stein variational inference and physics informed neural networks
Geophysical Journal International
doi:10.1093/gji/ggab309, https://arxiv.org/abs/2101.03271.

Jonathan D. Smith, Kamyar Azizzadenesheli and Zachary E. Ross, 2020,
EikoNet: Solving the Eikonal equation with Deep Neural Networks
IEEE Transactions on Geoscience and Remote Sensing
doi:10.1109/TGRS.2020.3039165, arxiv:https://arxiv.org/abs/2004.00361.

Jonathan D. Smith, Jean-Philippe Avouac, Robert S.White, Alex Copley, Adriano Gualandi and Stephen Bourne (Shell Global Solutions), 2019,
Reconciling reservoir compaction and compressibility in the Groningen region
Journal of Geophysical Research
doi: https://doi.org/10.1029/2018JB016801.

Zachary E. Ross, Elizabeth S. Cochran, Daniel T. Trugman and **Jonathan D. Smith**, 2020,
3D fault architecture controls the dynamism of earthquake swarms
Science -
doi:10.1126/science.abb0779.

Bing Q. Li, **Jonathan D. Smith**, and Zachary E. Ross, 2021, **Basal nucleation of ascending swarms in Long Valley Caldera**, *Science Advances*
doi:10.1126/sciadv.abi8368.

I have 14 publications within the last 3 years. See additional publications on my website.

Teaching

During my PhD I delivered a series of small group lectures/tutorials to several Cambridge Natural Sciences undergraduate groups. I expanded on this work during my Postdoctoral Research positions to also include the mentoring of undergraduate Masters and first year PhD student projects, across the Earth Science and Computer Science departments.
I have been an invited speaker at multiple international conferences including: American Geophysical Union, European Geophysical Union and Southern California Earthquake Center Fall Meeting. In addition, I was an invited speaker for the international Remote Online Sessions for Emerging Seismologists (ROSES) seminar series in 2021, presenting an hour long presentation on Earthquake location theory with interactive Google Colab notebooks.

Outreach

The Royal Society Summer Student Exhibition, Summer 2016
I was involved in this prestigious event as part of the University of Cambridge 'Explosive Earth' exhibition. This included creating, building and demonstrating activities for the exhibit. I then presented our work to the general public during the week long exhibition in London.

Conference Convener, European Geophysical Union, May 2018
It was a considerable honor to be invited as a PhD student to be a convener at the EGU 2018 session G3.6/SM2.20 on 'Transients detection and modeling in geophysical time series'.

School Outreach
Given outreach talks to local schools and open days at University of Cambridge.