Brian de Silva

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I am a research scientist in the Applied Mathematics department at UW working at the intersection of machine learning and dynamical systems. I enjoy solving problems by borrowing ideas and perspectives from disparate fields and I am seeking a position where I am immersed in and contribute to cutting edge machine learning research.

Education

University of Washington **Seattle, WA**
Ph.D. in Applied Mathematics – advanced data science option *March 2020*
- Dissertation: *Data-driven discovery and model reduction of complex systems*

University of California at Los Angeles **Los Angeles, CA**
B.S. in Applied Mathematics – specialization in computing *December 2014*

Experience

University of Washington Applied Mathematics **Seattle, WA**
Research Scientist *Mar 2020 – Present*
- Developed and implemented a physics-informed anomaly detection method for flagging commercial airplane sensor faults.
- Designed a competition for benchmarking data-driven physical systems models on a variety of datasets.

Facebook **Seattle, WA**
Software Engineer Intern – Machine Learning *Jun 2019 – Sep 2019*
- Designed and deployed three image retrieval models and trained a multi-channel (text, image, and preexisting dense embeddings) embedding for scam page detection, resulting in hundreds of scam page takedowns.
- Tools: K-nearest neighbors, proprietary retrieval methods, semantic embeddings, and convolutional neural networks.

Facebook **Seattle, WA**
Software Engineer Intern – Machine Learning *Jun 2018 – Sep 2018*
- Compiled report surveying embedding methods for using cross-domain features with in-domain models (transfer learning).
- Tools: Sparse neural networks, two-tower neural networks, and nonlinear embeddings.

Projects

PySINDy *May 2019 – Present*
I co-wrote and maintain PySINDy, a Scikit-learn style open source Python package using sparse regression to infer nonlinear dynamical system models from measurement data. PySINDy is being actively developed and receives numerous pull requests each month. https://github.com/dynamicslab/pysindy.

Course projects *Sep 2016 – Jun 2018*
- *Fraud detection:* Anomaly detection with cost-sensitive classifiers (GBDT, neural network, random forests).
- *Computer generated haiku:* Trained a character-level LSTM to write haiku using a handcrafted haiku dataset.
- *Visualizing water polo shot statistics:* Visualization available at https://bit.ly/3i3EN5q.

Additional information

- **Programming Languages:** Extensive working knowledge of Python. Experience with C++, SQL, and TensorFlow.
- **Relevant Graduate Coursework:** machine learning, data visualization, numerical optimization, statistics, numerical linear algebra, mathematical data analysis, and numerical analysis.
- **Teaching experience:** taught four applied math classes and acted as a TA for many others. I restructured a course to use mastery-based grading, improving student outcomes including retention and confidence in mathematical ability.
- **Extracurriculars:** Founded programs including a women's mentorship program and an annual graduate school panel as part of the Applied Math Diversity Committee (2017 – Present). Gave tutorials on reduced order models, Python, Make, Sublime Text, and other topics as the numerical analysis research club organizer (2015 – 2018). Sailing instructor (2018 – Present).

Selected publications

Brian de Silva, Kathleen Champion, Markus Quade, Jean-Christophe Loiseau, J. Nathan Kutz, and Steven L. Brunton. Pysindy: A python package for the sparse identification of nonlinear dynamical systems from data. *Journal of Open Source Software*, 5(49):2104, 2020.

Brian de Silva, David M. Higdon, Steven L. Brunton, and J. Nathan Kutz. Discovery of physics from data: Universal laws and discrepancies. *Frontiers in Artificial Intelligence*, 3:25, 2020.

Brian de Silva et al. Physics-informed machine learning for sensor fault detection with flight test data. *arXiv preprint arXiv:2006.13380*, 2020.