Brian de Silva

Contact Information

University of Washington
Department of Applied Mathematics
202 Lewis Hall
UW Box 353925
Seattle, Washington 98195-3925

(707)673-7736
bdesilva@uw.edu
https://briandesilva.github.io/
https://github.com/briandesilva

Research Interests

Machine learning, scientific computing, reduced order modeling, and numerical analysis

Education

University of Washington

PhD, Applied Mathematics, March 2020

- Dissertation: *Data-driven discovery and model reduction of complex systems*
- Advisor: J. Nathan Kutz
- Advanced Data Science Option

University of California at Los Angeles

B.S. in Applied Mathematics, December 2013

- Specialization in computing

Publications

- ❑ de Silva, Brian, et al. "PySINDy: A Python Package for Identifying Nonlinear Dynamical Systems from Data." *Journal of Open Source Software* (Submitted 2020).
- ❑ de Silva, Brian, et al. "Discovery of Physics from Data: Universal Laws and Discrepancy Models." *arXiv preprint arXiv:1906.07906* (2019).
- ❑ de Silva, Brian and Ryan Compton. "Prediction of Foreign Box Office Revenues Based on Wikipedia Page Activity." *arXiv preprint arXiv:1405.5924* (2014).
- ❑ Maria-Grazia Ascenzi, et al. "Automated Cell Detection and Morphometry on Growth Plate Images of Mouse Bone." *Applied Mathematics, Special issue on Mathematical modeling and experimentation, 5.18* (2014): 2866.

Data Science Projects

- ❑ *Detecting scam pages*: Deployed three image-retrieval based models and trained a multi-channel page embedding for scam page detection. Tools used: K-nearest neighbors, proprietary retrieval methods, nonlinear embeddings, convolutional and feedforward neural networks.
- ❑ *Studying approaches for utilizing cross-domain data*: Investigated different methods of incorporating cross-domain features into in-domain models. Tools used: Sparse neural networks, two-tower sparse neural networks.
- ❑ *Clustering documents using nonnegative matrix factorization*: Classified text files based on thematic content. Tools used: Nonnegative matrix factorization and K-means.
- ❑ *Using recurrent neural networks to generate haiku*: Compared the performance of recurrent neural networks against LSTMs on the task of generating haiku. The training data consisted of a set of "artificial" haiku which we extracted from a large set of text documents. Tools used: RNNs and LSTMs.
- ❑ *Financial fraud detection*: Utilized cost-sensitive algorithms to detect fraudulent transactions in a Kaggle data set. Tools used: logistic regression, decision trees, and random forests.

Graduate Coursework

- ❑ Machine Learning
- ❑ Data Visualization
- ❑ Numerical Optimization
- ❑ Numerical Solution of Differential Equations
- ❑ Approximation Theory & Spectral Methods
- ❑ Machine Learning For Big Data
- ❑ Data Analysis
- ❑ Statistics
- ❑ Numerical Linear Algebra
- ❑ Numerical Analysis

Scientific Research Experience

Summer 2019	Software Engineer Internship Facebook, Seattle, WA Machine learning Embeddings, Image Retrieval
Summer 2018	Software Engineer Internship Facebook, Seattle, WA Machine learning Sparse Neural Networks, Embeddings
2013–2014	Information and Systems Sciences Internship HRL Laboratories, Malibu, CA Social and Information Networks Social modeling, Data collection
Summer 2013	Applied Mathematics Research Experience for Undergraduates UCLA, Los Angeles, CA Social Networks and Large Data Sets Topic Modeling, Nonnegative Matrix Factorization

Programming languages

C++	Four years, used for numerical methods and scientific computing
MATLAB	Six years, used for numerical methods and scientific computing
Python	Four years, used for machine learning and numerical methods
Mathematica	Two years, used for symbolic calculations and visualization
SQL	Six months, used throughout machine learning internships
TensorFlow	Three months, used for machine learning research

Teaching Experience

Autumn 2018	Instructor, *Introduction to Differential Equations and Applications*
Summer 2017	Instructor, *Introduction to Differential Equations and Applications*
Spring 2017	TA, *Graduate Numerical Anaylsis of Time Dependent Problems*
Winter 2017	Instructor, *Numerical Linear Algebra and Numerical Analysis*
Autumn 2016	TA, *Graduate Vector Calculus and Complex Variables*
Summer 2016	Instructor, *Numerical Linear Algebra and Numerical Analysis*
Spring 2016	TA, *Calculus III*
Winter 2016	TA, *Calculus II*
Autumn 2015	TA, *Beginning Scientific Computing*
Spring 2015	TA, *Beginning Scientific Computing*
Winter 2015	TA, *Calculus I*
Autumn 2014	TA, *Calculus* I

Honors and Awards

2019	Finalist in the Terminal Live, UW coding competition
2017	Boeing Award for Excellence in Service
2015	Joseph Hammack Endowment Award for Outstanding Work in Applied Mathematics

Extra–curriculars

2017–Present	Member of Applied Math Diversity Committee
2015–2018	Principal organizer for the Numerical Analysis Research Club
2017–2018	Member of Applied Math Teaching Club
2016–2017	Graduate Student Representative of Applied Math Department
2015–2016	Vice President of the UW SIAM student chapter