Brett Tregoning, PhD

bdtregoning@gmail.com
http://bdtregoning.github.io/
https://www.linkedin.com/in/bdtregoning/
240-338-4496
Chicago, IL

Profile Summary

Data scientist and machine learning engineer with advanced statistical, computational, and analytical skills. Proven record of managing client needs and delivering success for stakeholders in a range of scientific and software development problems. Excellent interpersonal skills. Listens attentively, works to understand problems and tasks, and follows projects to completion diligently.

Skills

Scientific	Statistical Methods, Machine Learning, Bayesian Optimization, Adaptive Experimental Design, Deep Learning, Neural Networks, Transformers, Natural Language Processing, Large Language Models, Computer Vision, Reinforcement Learning, Decision Trees, Predictive Analytics, Time Series Analysis, Numerical Optimization, Hypothesis Testing, Causal Inference, Network Science, Data Science, Artificial Intelligence, Numerical Methods
Coding	Python, MATLAB, NumPy, Pandas, Scikit-Learn, PyTorch, BoTorch, Matplotlib, R, C, C++, SQL, Kubernetes, Docker, Git, CI/CD, Excel, Azure, AWS, Google Cloud

Education

2016 – 2021 **Georgia Institute of Technology** School of Physics.
Thesis title: *Investigation of spatiotemporal chaos using persistent homology*
Doctor of Philosophy-Physics, President's Fellow

2012 – 2016 **Vanderbilt University**
Bachelor of Arts-Physics with Highest Honors
Thesis title: *Ps2- in a magnetic field : structure and stability in the M=0 state.*
Bachelor of Arts-Mathematics

Experience

Data Scientist II
Corteva Agriscience, 2022 – · · · ·

- Discovered optimized recipes for testing obtained using machine learning techniques like Bayesian optimization and reinforcement learning that resulted in $10 million annual savings for the organization.
- Developed an internal production-ready machine learning and AI software platform in collaboration with a small team.
- Used Natural Language Processing techniques and Large Language Models to aid development of regulatory-compliant reports.
- Employed statistical techniques such as linear mixed modeling and hypothesis testing to isolate effects of certain variables in manufacturing processes.

- Provided statistical and data science support to process optimization at multiple points in the R&D scale-up pipeline.

Data Scientist
Self-directed, 2021 – 2022

- Applied modern data science and machine learning techniques to data sets with thousands of entries in health, economics, marketing, and physics to gain insights.
- Worked with simple neural networks, convolutional neural networks, recurrent neural networks, gradient boosted trees, and random forest.

Schatz Lab, Georgia Institute of Technology, School of Physics, Center for Non-linear Science
Advisors: Michael Schatz and Roman Grigoriev, 2016 – 2021

- Performed statistical analysis, including hypothesis testing, on distributions of fluid flow pattern features
- Predicted the evolution of fluid flows using convolutional neural networks and reservoir computing for about 10 Lyapunov time units
- Developed a technique to detect a specific sequence of flow snapshots in a turbulent flow over hundreds of time steps
- Used persistent homology to detect topological signatures in in very large (10^5 time steps) time-series of flow patterns consisting of 10^6 pixels
- Designed an experiment to detect surface waves on a centimeter-wide fluid flow using a shadowgraph imaging technique

Research Publications

Publications

1. **Tregoning**, **B.**, George-Kennedy, A., Miroslav, K., Grigoriev, R., & Schatz, M. F. (2022). Using persistent homology to detect shadowing of unstable solutions (in preparation).
2. **Tregoning**, **B.**, Mukherjee, S., Suri, B., Mischaikow, K., Paul, M. R., & Schatz, M. F. (2022). Quantifying plume statistics in spatiotemporally chaotic Rayleigh-Bénard convection using persistent homology (under review).
3. **Tregoning**, **B.**, & Stewart, S. G. (2014). Predicting navigational error of visual binary stars. *Naval Engineering Journal*, *126.4*, 169–172.
   https://my.vanderbilt.edu/susanstewart/files/2015/05/Stewart_DEC2014.pdf

Conference Proceedings and Talks

1. **Tregoning**, **B.**, Walker, C., & Brown, D. (2025). Adaptive experimental design for fermentation process optimization, In *2025 Spring Meeting and 21st Global Congress on Process Safety. AIChE, 2025.* Dallas, TX, USA. https://aiche.confex.com/aiche/s25/meetingapp.cgi/Paper/703343
2. Schatz, M., **Tregoning**, **B.**, Barnett, J., Yoda, M., & Grigoriev, R. (2019). Experimental Study of Roll-Hydrothermal Wave Coexistence in Convection Driven by Buoyancy and Thermocapillarity, In *72nd Annual Meeting of the APS Division of Fluid Dynamics (APS DFD 2019)*, Seattle, Washington, USA. https://meetings.aps.org/Meeting/DFD19/Session/S08.3
3. **Tregoning**, **B.**, Mukherjee, S., Levanger, R., Cyranka, J., Mischaikow, K., Paul, M., & Schatz, M. (2019). Characterizing Spatiotemporal Dynamics in Fluid Flows using Persistent Homology, In *Invited Seminar at Los Alamos National Labs*, Los Alamos, New Mexico, USA.

4 **Tregoning**, **B.**, Mukherjee, S., Levanger, R., Xu, M., Cyranka, J., Mischaikow, K., Paul, M., & Schatz, M. (2019). Using Persistent Homology to Compare Chaotic Dynamics Between Experiments on and Simulations of Rayleigh-Bénard Convection, In *72nd Annual Meeting of the APS Division of Fluid Dynamics (APS DFD 2019)*, Seattle, Washington, USA.
https://meetings.aps.org/Meeting/DFD19/Session/G14.4

5 **Tregoning**, **B.**, Levanger, R., Cyranka, J., Mukherjee, S., Paul, M., Mischaikow, K., & Schatz, M. (2018). Using topology to identify large Lyapunov vector magnitude in Rayleigh-Bénard convection, In *71st Annual Meeting of the APS Division of Fluid Dynamics (APS DFD 2018)*, Atlanta, Georgia, USA.
http://meetings.aps.org/Meeting/DFD18/Session/G33.5

Awards and Honors

2016 **President's Fellow,** Georgia Institute of Technology.

Highest Honors, Vanderbilt University Physics Department.

2012,2014,2016 **Dean's List,** Vanderbilt University.

2014 **Sigma Pi Sigma Physics Honor Society,** Vanderbilt University Physics Department.

References

Prof. Michael F. Schatz — Interim Chair, School of Physics, Georgia Institute of Technology-Atlanta, GA.
michael.schatz@physics.gatech.edu +1 (404) 445-4435

Dr. Rachel Levanger — Director of Data Science, Fidelity National Financial-Jacksonville, FL.
rachel.levanger@gmail.com +1 (904) 718-6842

Prof. Susan Gessner Stewart — Astronomer, U.S. Naval Observatory-Washington, DC.
Adjoint Professor, Vanderbilt University-Nashville, TN.
susan.g.stewart@vanderbilt.edu