

Christopher Galbraith

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Summary

Data scientist with a passion for discovering and effectively communicating actionable insights from data.

Education

University of California, Irvine

Irvine, CA

DOCTOR OF PHILOSOPHY, STATISTICS

Oct 2014 - May 2020

- Thesis: Statistical Methods for the Forensic Analysis of User-Event Data
- Advisor: Dr. Padhraic Smyth (joint faculty in Computer Science & Statistics)
- Advanced to Candidacy June 2017; Leave of Absence 2018/19

MASTER OF SCIENCE, STATISTICS - GPA 3.94/4.00

Jun 2016

South Dakota State University (SDSU)

Brookings, SD

BACHELOR OF SCIENCE, MATHEMATICS (MINORS IN COMPUTER SCIENCE & STATISTICS) - GPA 4.0/4.0

Aug 2010 - May 2014

Research

Interests

- Statistical machine learning, applied statistics, and Bayesian methodologies with an emphasis on user-behavior modeling.
- Passionate about data visualization, statistical computing, and AI-assisted cybersecurity and digital forensics.

Graduate Student Researcher at University of California, Irvine

Irvine, CA

NIST CENTER FOR STATISTICS AND APPLICATIONS IN FORENSIC EVIDENCE (CSAFE)

Oct 2014 - May 2020

- Developed statistical methods for assessing same-source forensic questions with user-generated event data.
- Investigated applications to both temporal and spatial event data.
- Analyzed both simulated and real-world event data from a variety of sources (Twitter, web browsing, authentication, and mobile device data).
- Emphasized individual-level models for event data (mixture models with components for the population and individual).
- Spatial modeling of geolocated event data via kernel density estimation (KDE) and mixtures of KDEs.
- Wrote open source software (**assocr**) that implements the aforementioned models.

Publications

In Print

- **C. Galbraith** & P. Smyth (2017). Analyzing user-event data using score-based likelihood ratios with marked point processes. *Digital Investigation*, 22, S106 – S114. <https://doi.org/10.1016/j.diin.2017.06.009>
- **C. Galbraith**, P. Smyth & H.S. Stern (2020). Quantifying the association between discrete event time series with applications to digital forensics. *Journal of the Royal Statistical Society: Series A (Statistics in Society)*. <https://doi.org/10.1111/rssa.12549>

In Press

- **C. Galbraith**, P. Smyth & H.S. Stern (2020). Statistical methods for the forensic analysis of geolocated event data. *Digital Investigation*

Experience

Obsidian Security

Newport Beach, CA

MACHINE LEARNING RESEARCHER

Jul 2018 - Present

- Deployed the company's first machine learning model for anomaly detection.
- Maintain and ensure quality of data transformation pipelines used for ML models, security researchers, and front-end devs.
- Work closely with security researches to produce models that are targeted for the specified problem and interpretable for the customer.

DATA SCIENCE INTERN

Jun 2018 - Jul 2018

- Developed probabilistic models for anomaly detection in hybrid-cloud environments.

University of California, Irvine

Irvine, CA

DATA SCIENCE INITIATIVE INSTRUCTOR & ORGANIZER

Oct 2016 - June 2018

- Designed and instructed a short courses, *Introduction to R* and *Introduction to Data Analysis with R*, on the fundamentals of statistical modeling—from the basics of the R programming language to exploratory data analysis through visualizations to linear and logistic regression.
- Organized a Climate Science Hackathon focused on data visualization and machine learning.
- Created and maintained a relational database of participant and instructor information on short courses.

TEACHING ASSISTANT

Jan 2016 - Mar 2016

- Teaching assistant for undergraduate-level introductory probability and statistics course.

RELEVANT COURSEWORK

- Design & Analysis of Algorithms, Machine Learning, Probabilistic Learning, Statistical Computing, Bayesian Statistical Analysis, Survival Analysis, Causal Inference

Cylance Inc.

Irvine, CA

DATA SCIENCE INTERN

Jun 2017 - Sep 2017

- Developed and implemented probabilistic models for real-time anomaly detection in network traffic data on endpoints.

Wells Fargo & Company – Retirement Technology Division

Sioux Falls, SD

ANALYST

Aug 2013 - Aug 2014

- Created statistical models of customer churn in Individual Retirement Accounts (IRAs) to identify high-value, high-risk accounts.

ANALYTICS INTERN

Jun 2013 - Aug 2013

- Wrote programs to automatically produce reports and visualizations for various retirement metrics and wrote SQL to validate data loads.

SDSU Simulation & Analysis Research Experience for Undergraduates

Brookings, SD

REU SCHOLAR

Jun 2012 - Jul 2012

- Applied Bayesian hierarchical models to model the volatility process of various financial assets including exchange rates and indices.
- Coded a Gibbs sampling algorithm in Matlab and improved its performance by parallelizing the algorithm to run on both CPUs and GPUs.

Skills

Programming Languages Python, Spark (PySpark & Scala), R

Software Numpy, Scipy, Pandas, R Tidyverse, Stan, Databricks

Databases SQL, PostgreSQL, MySQL, ArangoDB, GraphQL, Elastic, Delta

Presentations

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| Jul 2019 | Spatial DNA: Measuring Similarity of Geolocation Data Sets with Applications to Forensics , JSM | Denver, CO |
| Jul 2018 | Quantifying Association Between Discrete Event Time Series , JSM | Vancouver, BC, CA |
| Jun 2018 | Quantifying the Association Between Discrete Event Time Series (Poster) , CSAFE Meeting | Ames, IA |
| May 2018 | Quantifying the Association Between Discrete Event Time Series , UCI Statistics Department | Irvine, CA |
| Sep 2017 | Statistical Analysis of User-Event Data in a Digital Forensics Context , ICFIS | Minneapolis, MN |
| Aug 2017 | Analyzing User-Event Data Using Score-based Likelihood Ratios with Marked Point Processes , DFRWS | Austin, TX |
| Jun 2017 | Statistical Analysis of User-Event Data in a Digital Forensics Context , CSAFE Meeting | Ames, IA |
| Apr 2014 | Customer Churn Modeling , SDSU Economics and Management Student Research Showcase | Brookings, SD |
| Apr 2013 | Stochastic Volatility Models , Mathematical Association of America North Central Section Regional Meeting | St. Peter, MN |

Honors & Awards

- 2017 **Honorary Fellow**, UCI Machine Learning and Physical Sciences (MAPS) Program
- 2016 **Honorable Mention**, NSF Graduate Research Fellowships Program
- 2014 **Recipient**, UCI Graduate Dean's Recruitment Fellowship
- 2014 **Recipient**, SDSU Schultz-Werth Student Paper Award
- 2014 **Inducted**, Pi Mu Epsilon Honor Society
- 2014 **Inducted**, Alpha Lambda Delta Honor Society
- 2012 **Inducted**, Golden Key International Honour Society

Professional Memberships

- 2018 **Member**, American Statistical Association (ASA)