

## Research Summary

I focus machine learning applications for social good. Particularly, I am interested in applications in AI For Earth related to conservation, and AI in low-resource environments such as mobile devices.

My current ML methods research interests focus on graph representation learning, and explainable AI.

My PhD research focused on data science methodologies for inferring and validating graphs constructed from underlying data, with applications in interdisciplinary computational ecology, privacy and human mobile networks, and large-scale recommendation and search. My work develops model selection criteria for predictive tasks on graphs, accounting for many of the ad-hoc decisions and biases in the construction and analysis of graphs derived from data.

## Experience

### Salesforce Research

Research Scientist—AI For Good, January 2019–

Developing AI research and deployed services for Salesforce not-for-profit customers.

### Amazon

Applied Scientist Intern, Mentor: Alex Smola, June 2018–Sept. 2018

Designed deep learning graph APIs on MXNet. Focused on structured computational models on graphs, and scalability. Part of the Amazon Web Services AI Platforms team.

### Microsoft

Data Science Intern, Mentor: Marcello Hasegawa, May 2015–Aug. 2015

Developed textual and device models for novelty detection and attribution in the Windows 10 user population.

### Lawrence Livermore National Laboratory

Research Intern, Mentor: Brian Gallagher, Jun. 2014–Aug. 2014

Formulated network inference problems over several scientific research domains. Part of the Cyber Defenders internship program.

### University of Illinois at Chicago

Research Assistant, Advisor: Professor Tanya Berger-Wolf, Aug. 2012–

Model selection for network structure inference and prediction. Focusing on ecology and populations biology domains.

### University of Illinois at Chicago

Research Fellow, Electronic Security and Privacy IGERT, Dec. 2013–Dec 2015

Network-based models for attribute inference and privacy preservation on real mobile device datasets.

### Technicolor Research

Research Intern, Mentor: Brian Eriksson, May 2013–Aug. 2013

Rule discovery for biometric sensor time series data for actionable analysis of film audiences. Developed methods to discover and visualize dynamic audience communities.

## **University of Minnesota**

Research Assistant, Advisor: Professor Vipin Kumar, Jan. 2010–Jun. 2012

Time series change detection and anomaly detection on large remote sensing datasets. Focused on incorporating spatial aspects for change significance testing, and domain-driven information retrieval.

## **University of Minnesota - Department of Computer Science**

Web Applications Developer, Sept. 2004–Jun. 2007

## **University of Minnesota - College of Liberal Arts**

Web Applications Developer, Aug. 2002–Sept. 2003

## **Education**

### **University of Illinois at Chicago, 2012–Dec. 2018 (expected)**

PhD in Computer Science, ongoing.

Thesis: “Network Structure Inference: Methodology and Applications”

### **University of Minnesota – Twin Cities, 2002–2007, 2009–2012**

Master of Science in Computer Science, emphasis in spatiotemporal data mining.

Thesis: “Approximate Search on Massive Spatiotemporal Datasets.”

Bachelor of Science in Computer Science, minor in Mathematics.

Bachelor of Arts in Cultural Studies and Comparative Literature.

### **The New School, 2007–2009**

Master of Arts in International Affairs.

## **Tutorials**

### **Modeling Data with Networks + Network Embedding: Problems, Methodologies and Frontiers**

I. Brugere, B. Perozzi, P. Cui, W. Zhu, J. Pei, T.Y. Berger-Wolf

KDD 2018

## **Publications**

### **Network Structure Inference, A Survey: Motivations, Methods, and Applications**

I. Brugere, B. Gallagher, T. Y. Berger-Wolf

ACM Computing Surveys, 2018.

### **Network model selection with task-focused minimum description length**

I. Brugere, T.Y. Berger-Wolf

BigNet WWW Workshop on Learning Representations for Big Networks, 2018.

### **Network model selection for task-focused attributed network inference**

I. Brugere, C. Kanich, T.Y. Berger-Wolf

IEEE International Conference on Data Mining Workshop (ICDMW), 2017.

### **Coordination Event Detection and Initiator Identification in Time Series Data**

C. Amornbunchornvej, I. Brugere, A. Strandburg-Peshkin, D. Farine, M.C. Crofoot, T.Y. Berger-Wolf

ACM Transactions on Knowledge Discovery from Data (TKDD), 2018.

### **Evaluating Social Networks Using Task-Focused Network Inference**

I. Brugere, C. Kanich, T.Y. Berger-Wolf

MLG'17 SIGKDD Workshop on Mining and Learning in Graphs, 2017.

### **A General Framework for Task-Oriented Network Inference**

I. Brugere, C. Kanich, T.Y. Berger-Wolf

SIAM SDM Workshop on Inferring Networks from Non-Network Data, 2017.

### **Both Nearest Neighbours and Long-term Affiliates Predict Individual Locations During Collective Movement in Wild Baboons**

D. Farine, A. Strandburg-Peshkin, T.Y. Berger-Wolf, B. Ziebart, I. Brugere, J. Li, M. Crofoot

Nature Scientific Reports, 2016.

### **Collective Movement in Socially and Environmentally Heterogeneous Systems: A Case Study in Olive Baboons**

M.C. Crofoot, D. Farine, A. Strandburg-Peshkin, I. Brugere, J. Li, T. Y. Berger-Wolf

American Journal of Primatology

### **Social Information Improves Location Prediction in the Wild**

J. Li, I. Brugere, B. Ziebart, T. Y. Berger-Wolf, M. Crofoot, D. Farine

Proceedings of the 2015 International Workshop on Trajectory-based Behaviour Analytics

### **Modeling and Analysis of Spatiotemporal Social Networks**

I. Brugere, V. M.V. Gunturi, and S. Shekhar

Encyclopedia of Social Network Analysis and Mining, 2014

### **Approximate Search on Massive Spatiotemporal Datasets**

I. Brugere, K. Steinhaeuser, S. Boriah, and V. Kumar

Proceedings of the International Workshop on Spatial and Spatiotemporal Data Mining (SSTDM'12)

### **Incorporating Natural Variation into Time Series-Based Land Cover Change Identification**

V. Mithal, A. Garg, I. Brugere, S. Boriah, V. Kumar, M. Steinbach, C. Potter, and S. Klooster

Proceedings of the NASA Conference on Intelligent Data Understanding (CIDU'11)

### **A Study of Time Series Noise Reduction Techniques in the Context of Land Cover Change Detection**

X. Chen, V. Mithal, S.R. Vangala, I. Brugere, S. Boriah, and V. Kumar

Proceedings of the NASA Conference on Intelligent Data Understanding (CIDU'11)

### **A Novel Time Series Based Approach to Detect Gradual Vegetation Changes in Forests**

Y. Chamber, A. Garg, V. Mithal, I. Brugere, M. Lau, V. Krishna, S. Boriah, M. Steinbach, V. Kumar, C. Potter, and S. Klooster

Proceedings of the NASA Conference on Intelligent Data Understanding (CIDU'11)

### **GOPHER: Global Observation of Planetary Health and Ecosystem Resources**

A. Garg, V. Mithal, Y. Chamber, I. Brugere, V. Chaudhari, M. Dunham, V. Krishna, S. Krishnamurthy, S. Vangala, S. Boriah, M. Steinbach, V. Kumar, A. Cho, JD Stanley, T. Abraham, J. C. Castilla-Rubio, C. Potter, and S.A. Klooster

Proceedings of the IEEE Geoscience and Remote Sensing Symposium (IGARSS'11)

## Service

### Program Committees and Organizing:

AAAI, CIKM, ICDM, KDD, SDM 2019: PC Member

KDD 2018 PC Member

MLG 2018, 2019 Workshop at KDD: PC Member

ICDM 2019 PhD Forum Co-chair

SDM 2017: “NetInf’17: First Workshop on Inferring Networks from Non-Network Data,” Co-organizer

KDD 2017: Broadening Participation in Data Mining Mentoring Co-Chair

SIAM AM 2016: “Inferring Networks from Non-Network Data,” Mini-symposium Co-organizer

KDD 2016: Broadening Participation in Data Mining 2016 Coordinator

KDD 2014: Broadening Participation in Data Mining 2014 Mentoring Coordinator

### Conference and Journal Reviewer:

AAAI’12, 15, 17, 18, 19; CIKM’12; ICDM’10, 11, 14; IJCAI’11; KDD’11, 12, 13, 14, 15, 16, 18, 19;

PAKDD’12; SDM’11, 12, 19 | AOAS; KAIS; TKDE; ACM CSUR

### Community Activities:

Google Lime campus ambassador

University of Washington-AccessSTEM volunteer

### Conference Student Volunteer:

ICDM’15, 17; KDD’15, 16; SDM’17; WSDM’16

## Scholarships and Awards

### Fellowships and Scholarships:

IGERT Electronic Security and Privacy Fellowship, 2014-2016

UIC Chancellor’s Graduate Research Fellowship, 2014-2016

Google Lime Scholarship, 2014

### Awards:

IEEE ICDM 2017 Travel Award

SIAM SDM 2017 Travel Award

Tapia 2016 Celebration of Diversity in Computing, Travel Award

SIGKDD 2016 Broadening Participation in Data Mining Travel Award

WSDM 2016 Travel Award

ICDM 2015 Travel Award

UbiComp 2015 Broadening Participation Travel Award

SIGKDD 2015 Ram Kumar Memorial Travel Award

Fifty for the Future Award supported by the Illinois Technology Foundation,

SIAM CSE 2015 Travel Award supported by the Sustainable Horizons Institute

ACM-BCB 2014 Travel Award

SIGKDD 2014 Broadening Participation in Data Mining Travel Award

Tapia 2014 Celebration of Diversity in Computing, Travel Award

SIGKDD 2013 Broadening Participation in Data Mining Travel Award

## Notable Courses and Teaching

Teaching Assistant: CS401 – Computer Algorithms I

Advanced Computational Biology and Bioinformatics Seminar

Advanced Data Mining Seminar

Field Course in Computational Ecology at Mpala Research Centre, Kenya