Ivan Brugere

Lead AI Research Scientist - JPMorganChase
ivan@ivanbrugere.com
github.com/ivanbrugere
Chicago, IL

Current Objective

I am a Lead AI Research Scientist at JP Morgan with 6 years of experience focusing on perturbation-based robustness, adversarial robustness, and privacy-preserving ML. I have 25+ publications, many in top venues, and 12 filed patents. I leverage an interdisciplinary background, domain adaptability, and balanced track record of publications, patents, and deployed systems for high impact research. I am seeking industrial AI scientist roles where I can formulate novel, robust AI methods across large and classical ML models in unique and challenging domains, with an opportunity to mentor and develop emerging researchers.

Research Statement

My research develops methods to ensure AI systems remain reliable when real-world conditions violate their training assumptions—whether from distributional shifts, adversarial perturbations, or privacy constraints. My work—including my PhD era—has been in diverse, multi-disciplinary domains including biology, ecology, non-profit organizations, finance and legal. I greatly value interdisciplinary partnerships, deeply learning new domain areas, and articulating high-impact computational problems in those areas. I'm seeking collaborative, exploratory research teams and an opportunity to mentor junior scientists and students.

During my current role at JP Morgan, I focused on challenges unique to finance, including explainable and auditable models in highly regulated applications. Furthermore, finance is a high-stake domain, necessitating highly robust methods with respect to model or data perturbation. My PhD (defended 2020) focused on graph topology inference in machine learning; graph learning remains my common lens for formulating computational problems.

Experience

J.P. Morgan Chase & Co. *Jan. 2021-Current*:
Lead AI Research Scientist (promoted to **Lead**, Jan. 2025) - Trustworthy AI

Working on AI robustness and fairness: explainable and robust LLM methods, fair agent-based learning, robust and fair tree-based ensembles. Published in ICML, NeurIPS, TMLR, EMNLP, 12 patents filed.

- Co-led research initiative on perturbation robustness tree-based models, leading to 2 NeurIPS publications and 2 patent filings.
- Designed and deployed a model perturbation and auditing system for fairness, targeting firm-wide consumer-facing models (patent filed).
- Developed novel Bayesian model search frameworks for fair mortgage and auto loan pricing (patent filed).
- Led research of two summer AI research interns, yielding 1 NeurIPS, 1 TMLR publication, and 1 successful full-time scientist conversion.

- Co-led external research collaborations with university faculty at NYU, MSU, UMD, Harvard.

Salesforce *Jan. 2019-March 2020* Research Scientist - AI For Good

- Collaborated with Salesforce non-profit customers and external collaborators on fairness-aware AutoML applications
- Published research on graph augmentation for equitable access (AAAI AIES 2021), 1 patent filed.

Amazon *June-October 2018* Applied Scientist Intern (Mentor: Alex Smola)

Designed deep learning graph APIs on MXNet for scalable training as part of the DGL project. Part of the Amazon Web Services AI Platforms team.

Microsoft *May-August 2015* Data Science Intern (Mentor: Marcello Hasegawa)

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

Lawrence Livermore National Laboratory *May-August 2014* Research Intern (Mentor: Brian Gallagher)

Formulated graph inference problems over several scientific research domains.

University of Illinois at Chicago *2013-2015* Research Fellow (Mentor: Prof. Venkat Venkatakrishnan)

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

Technicolor *May-August 2013* Research Intern (Mentor: Fernando Silveira)

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 Illinois at Chicago *2012-2017* Research Assistant (Advisor: Prof. Tanya Berger-Wolf)

Model selection for graph structure inference and prediction. Focusing on ecology and population biology domains.

University of Minnesota *2010-2012* Research Assistant (Advisor: Prof. Vipin Kumar)

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 *2004-2007* Web Applications Developer (Department of Computer Science)

University of Minnesota *2002-2003* Web Applications Developer (College of Liberal Arts)

Education

University of Illinois at Chicago *2012-2020* Computer Science PhD (Advisor: Prof. Tanya Berger-Wolf)
Thesis: Network Structure Inference: Methodology and Applications.

University of Minnesota *2009-2012* Computer Science M.S. (Advisor: Prof. Vipin Kumar)
Thesis: Approximate Search on Massive Spatiotemporal Datasets.

The New School *2007-2009* International Affairs M.A.

University of Minnesota *2002-2007* Computer Science B.S., Cultural Studies and Comparative Literature B.A.

Selected Patents

System and method for generating constrained loan pricing
Automated loan pricing system incorporating regulatory constraints and fairness requirements while optimizing financial objectives.
I. Brugere, M. Hosking, S. Sharma, F. Lecue, Y. Tan, J. Stettler, H. Zhao, P. Glover, D. Kapadia, G. Ciraulo, D. Bollum, D. Magazzeni, L.C. Liang
US Patent App. 18/397,698, 2025

System and method for grounding outputs in tabular generative artificial intelligence
Method ensuring LLM-generated table analysis outputs are verifiable and traceable to source data for auditability in regulated applications.
I. Brugere, S. Kariyappa, S. Sharma, F. Lecue, G. Nguyen
US Patent 12,436,935, 2025

System and method for graph-based resource allocation using neural networks
Neural network approach for optimizing resource distribution across graph-structured systems, enabling equitable allocation in networked environments.
G.S. Ramachandran, **I. Brugere**, L. Varshney, C. Xiong
US Patent 12,165,053, 2024

Method and system for improving model fairness by using explainability techniques
Framework leveraging model explainability methods to identify and mitigate fairness issues by analyzing feature contributions across demographic groups.
I. Brugere, D. Magazzeni, N. Marchesotti, D. Heike, F. Zhao, E. Wang, H. Shu, M. Gabriel, M. Veloso, C. Tilli, S. Dutta, B. Mallik, A. Onigbanjo
US Patent App. 17/968,220, 2024

Selected Publications

Calibrating LLM Confidence by Probing Perturbed Representation Stability
Novel method applying adversarial perturbations to LLM hidden states to assess confidence via internal stability, reducing calibration error by ~55% across multiple models.
R. Khanmohammadi, E. Miahi, M. Mardikoraem, S. Kaur, **I. Brugere**, C. Smiley, K.S. Thind, M.M. Ghassemi
(EMNLP 2025)

Cross-Domain Graph Data Scaling: A Showcase with Diffusion Models
Introduces UniAug, a universal graph augmentor using discrete diffusion models pre-trained on thousands of graphs to enable cross-domain data scaling and adaptive structure enhancement for downstream tasks.
W. Tang, H. Mao, D. Dervovic, **I. Brugere**, S. Mishra, Y. Xie, J. Tang (NeurIPS 2025)

Interpretable LLM-based Table Question Answering
Introduces Plan-of-SQLs (POS) method decomposing table queries into transparent SQL steps for interpretable reasoning, achieving competitive accuracy with 25x fewer LLM calls.
G. Nguyen, **I. Brugere**, S. Sharma, S. Kariyappa, A.T. Nguyen, F. Lecue (TMLR June 2025)

RashomonGB: Analyzing the Rashomon Effect and Mitigating Predictive Multiplicity in Gradient Boosting

First systematic analysis of the Rashomon effect in gradient boosting with novel techniques to explore model sets and reduce predictive multiplicity for fairer model selection.

H. Hsu, **I. Brugere**, S. Sharma, F. Lecue, C.F. Chen (NeurIPS 2024)

Comparing Apples to Oranges: Learning Similarity Functions for Data Produced by Different Distributions

Efficient sampling framework learning cross-group similarity functions with limited expert feedback, enabling fair comparisons of data from different demographic distributions.

L. Tsepenekas, **I. Brugere**, F. Lecue, D. Magazzeni (NeurIPS 2023)

Additional Publications (2015-2026)

Full list available at: scholar.google.com/citations?user=JGlGUcsAAAAJ

Recent Works 2022-2026

Revisiting ML Training under Fully Homomorphic Encryption: Convergence Guarantees, Differential Privacy, and Efficient Algorithms

Y. Zhou, M. Liang, **I. Brugere**, D. Dervovic, Y. Guo, A. Polychroniadou, M. Wu, D. Dachman-Soled (in submission)

MAFE: Enabling Equitable Algorithm Design in Multi-Agent Multi-Stage Decision-Making Systems

Z.M. Lazri, A. Nakra, **I. Brugere**, D. Dervovic, A. Polychroniadou, F. Huang, D. Dachman-Soled, M. Wu (in submission)

How Reliable are Confidence Estimators for Large Reasoning Models? A Systematic Benchmark on High-Stakes Domains

R. Khanmohammadi, E. Miahi, S. Kaur, C. Smiley, **I. Brugere**, K.S. Thind, M.M. Ghassemi (EACL 2026)

The Unseen Threat: Residual Knowledge in Machine Unlearning under Perturbed Samples

H. Hsu, P. Niroula, Z. He, **I. Brugere**, F. Lecue, C.F. Chen (NeurIPS 2025)

Balancing Fairness and Accuracy in Data-Restricted Binary Classification

Z. McBride Lazri, D. Dervovic, A. Polychroniadou, **I. Brugere**, D. Dachman-Soled, M. Wu (ACM TKDD August 2025)

Investigating the Temporal Association of Biomedical Research on Small Business Funding: A Bibliometric and Data Analytic Approach

R. Khanmohammadi, S. Kaur, C.H. Smiley, T. Alhanai, **I. Brugere**, A. Nourbakhsh, M.M. Ghassemi (IEEE TCSS)

A Canonical Data Transformation for Achieving Inter- and Within-group Fairness

Z. McBride Lazri, **I. Brugere**, X. Tian, D. Dachman-Soled, A. Polychroniadou, D. Dervovic, M. Wu (IEEE TIFS)

Bounding the Accuracy Loss for Graphical Model Based Synthetic Data Generation in Privacy-Preserving Machine Learning

Y. Zhou, **I. Brugere**, D. Dachman-Soled, D. Dervovic, M. Liang, A. Polychroniadou, M. Wu, (ICML 2023)

Hyper-parameter Tuning for Fair Classification without Sensitive Attribute Access
A.K. Veldanda, **I. Brugere**, S. Dutta, A. Mishler, S. Garg (TMLR)

Fairness via In-Processing in the Over-parameterized Regime: A Cautionary Tale with MinDiff Loss
A.K. Veldanda, **I. Brugere**, J. Chen, S. Dutta, A. Mishler, S. Garg (TMLR)

Earlier Works 2015-2021

Parameterized Explanations for Investor/Company Matching
S. Kaur, **I. Brugere**, A. Stefanucci, A. Nourbakhsh, S. Shah, M. Veloso (ICAIF'21 Workshop on Explainable AI in Finance)

GAEA: Graph Augmentation for Equitable Access via Reinforcement Learning
G.S. Ramachandran, **I. Brugere**, L.R. Varshney, C. Xiong (AAAI AIES 2021)

Evaluation of crowdsourced mortality prediction models as a framework for assessing artificial intelligence in medicine
T. Bergquist, T. Schaffter, Y. Yan, T. Yu, **I. Brugere** et al. (Journal of the American Medical Informatics Association)

A continuously benchmarked and crowdsourced challenge for rapid development and evaluation of models to predict COVID-19 diagnosis and hospitalization
Y. Yan, T. Schaffter, T. Bergquist, T. Yu, J. Prosser, Z. Aydin, A. Jabeer, **I. Brugere**, et al. (JAMA Network Open)

Network Structure Inference: Methodology and Applications
I. Brugere (Ph.D. Thesis)

Network Structure Inference, A Survey: Motivations, Methods, and Applications
I. Brugere, B. Gallagher, T. Y. Berger-Wolf (ACM Computing Surveys)

Network model selection with task-focused minimum description length I. Brugere, T.Y. Berger-Wolf (WWW'18: BigNet Workshop on Learning Representations for Big Networks)

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 TKDD)

Evaluating Social Networks Using Task-Focused Network Inference
I. Brugere, C. Kanich, T.Y. Berger-Wolf (KDD'17: Workshop on Mining and Learning in Graphs)

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)

Social Information Improves Location Prediction in the Wild
J. Li, **I. Brugere**, B. Ziebart, T. Y. Berger-Wolf, M. Crofoot, D. Farine (AAAI'15: Workshop on Trajectory-based Behaviour Analytics)

PhD Scholarships and Awards

2014-2016

- NSF IGERT Electronic Security and Privacy Fellowship
- University of Illinois at Chicago, Chancellor's Graduate Research Fellowship

Other

- IEEE ICDM 2017 Travel Award
- SIAM SDM 2017 Travel Award
- 2016 ACM Tapia Celebration of Diversity in Computing, Travel Award
- 2016 ACM SIGKDD Broadening Participation in Data Mining Travel Award
- 2016 ACM WSDM Travel Award
- 2015 IEEE ICDM Travel Award
- 2015 ACM Ubicomp Broadening Participation Travel Award
- 2015 ACM SIGKDD Ram Kumar Memorial Travel Award
- 2015 SIAM CSE Travel Award supported by the Sustainable Horizons Institute
- Fifty for the Future Award supported by the Illinois Technology Foundation
- 2014 Google Lime Scholarship
- 2014 ACM BCB Travel Award
- 2014 ACM SIGKDD Broadening Participation in Data Mining Travel Award
- 2014 ACM Tapia Celebration of Diversity in Computing, Travel Award

Community Activities

Workshop organization (2016-2023)

- NLP and Network Analysis in Financial Applications (ACM ICAIF'23)
- PhD Forum (IEEE ICDM'19)
- NetInf'17: First Workshop on Inferring Networks from Non-Network Data (SIAM SDM'17)
- Inferring Networks from Non-Network Data (SIAM AM'16)

PC Member/Reviewer (2018-Present)

- Conferences: AAAI, CIKM, FAccT, ICDM, ICLR, IJCAI, KDD, NeurIPS, PAKDD, SDM, TheWebConf, WSDM
- Journals: ACM CSUR, IEEE TKDE, ACM TKDD, KAIS

Tutorials (2018)

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)

Other service (2014-2020)

- ACM Tapia Celebration of Diversity in Computing 2020 Plenary Speaker
- ACM Tapia Celebration of Diversity in Computing 2020 Accessibility Committee
- Bloomberg Data For Good Exchange Program Committee
- Google Lime campus ambassador
- University of Washington-AccessSTEM volunteer

- ACM SIGKDD Broadening Participation in Data Mining Coordinator and Mentoring Co-Chair (2014, 2016, 2017)

Teaching (2017)

Teaching Assistant: Computer Algorithms I (Senior-level), University of Illinois at Chicago.

Technical Skills

Languages: Python, Julia, Scala **AI/ML:** PyTorch, scikit-learn, XGBoost, Gymnasium, LM Studio **Graph Learning:** DGL, PyTorch Geometric, NetworkX **Tools:** Git, Docker, AWS, Jupyter, VS Code

Links

- ivan@ivanbrugere.com
- github.com/ivanbrugere
- linkedin.com/in/ivanbrugere
- scholar.google.com/citations?user=JGlGUcsAAAAJ
- orcid.org/0000-0002-2953-3746