Bryan Hooi

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Education

Carnegie Mellon University (2014 - 2019) • Ph.D. in Machine Learning
GPA: 4.00/4.00

Stanford University (2010 - 2014) • B.S. (Honors) in Mathematics with Distinction, M.S. in Computer Science
Undergraduate GPA: 3.91/4.30 • Masters GPA: 4.20/4.30

Research Interests

- Scalable Machine Learning, Graph Mining, Anomaly Detection, Temporal Data

Honors and Awards

1. ECML-PKDD 2018 Runner-Up Best Student Data Mining Paper Award

2. CIKM 2017 Outstanding Reviewer Award

3. KDD 2016 Best Paper Award (Research Track) + CogX 2017 Best Student Paper in AI (for the same paper)

4. Undergraduate Research Award 2014, Stanford University (given for the top 2-3 honors theses in the mathematics department)

5. William Lowell Putnam Mathematical Competition 2012 (Top 120). Awarded the Two Sigma award for excellence in mathematics problem solving.

6. ACM-ICPC Programming Contest (Pacific-NW Regional): 2010 (4th) and 2011 (5th)

7. International Mathematical Olympiads 2006 and 2007 (Bronze medals)

Refereed Conference Publications

1. Shen Li, <u>Bryan Hooi</u>, Gim Hee Lee. "Identifying through Flows for Recovering Latent Representations", International Conference on Learning Representations (ICLR) 2020.

2. <u>Bryan Hooi</u>, Kijung Shin, Hemank Lamba, and Christos Faloutsos. "TellTail: a Principled Scoring Function for Dense Subgraphs." Thirty-Fourth AAAI Conference on Artificial Intelligence ¡/i¿ 2020.

3. Xiangfeng Li, Shenghua Liu, Zifeng Li, Xiaotian Han, Chuan Shi, <u>Bryan Hooi</u>, He Huang and Xueqi Cheng. "FlowScope: Spotting Money Laundering in Big Graphs". Thirty-Fourth AAAI Conference on Artificial Intelligence ¡/i¿ 2020.

4. Siddharth Bhatia, <u>Bryan Hooi</u>, Minji Yoon, Kijung Shin, and Christos Faloutsos. "MIDAS: Microcluster-Based Detector of Anomalies in Edge Streams." Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI) 2020.

5. Bin Zhou, Shenghua Liu, <u>Bryan Hooi</u>, Xueqi Cheng, and Jing Ye. "BeatGAN: Anomalous Rhythm Detection using Adversarially Generated Time Series," International Joint Conference on Artificial Intellince (IJCAI) 2019.

6. Minji Yoon, <u>Bryan Hooi</u>, Kijung Shin and Christos Faloutsos. "Fast and Accurate Anomaly Detection in Dynamic Graphs with a Two-Pronged Approach," ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD) 2019.

7. Marko Jereminov, <u>Bryan Hooi</u>, Amritanshu Pandey, Hyun Ah Song, Christos Faloutsos, and Larry Pileggi. "Impact of Load Models on Power Flow Optimization," IEEE Power & Energy Society General Meeting (PES) 2019.

8. <u>Bryan Hooi</u>, Kijung Shin, Shenghua Liu, and Christos Faloutsos. "SMF: Drift Aware Matrix Factorization with Seasonal Patterns," SIAM International Conference in Data Mining (SDM) 2019.

9. <u>Bryan Hooi</u> and Christos Faloutsos. "Branch and Border: Partition-Based Change Detection in Multivariate Time Series," SIAM International Conference in Data Mining (SDM) 2019.

10. Wenjie Feng, Shenghua Liu, Christos Faloutsos, <u>Bryan Hooi</u>, Huawei Shen, Xueqi Cheng. "Anomaly Detection in Large Graphs based on Vision-guided Summarization," Pacific-Asia Conference in Knowledge Discovery and Data Mining (PAKDD) 2019.

11. Bryan Hooi, Dhivya Eswaran, Amritanshu Pandey, Marko Jereminov, Larry Pileggi, and Christos Faloutsos. "ChangeDAR: Online Localized Change Detection for Sensor Data on a Graph." ACM International Conference on Information and Knowledge Management (CIKM) 2018.

12. Bryan Hooi, Dhivya Eswaran, Hyun Ah Song, Amritanshu Pandey, Marko Jereminov, Larry Pileggi, and Christos Faloutsos. "GridWatch: Sensor Placement and Anomaly Detection in the Electrical Grid." European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) 2018. **Runner-Up Best Student Data Mining Paper Award.**

13. Kijung Shin, Jisu Kim, Bryan Hooi, and Christos Faloutsos. "Think before You Discard: Accurate Triangle Counting in Graph Streams with Deletions." European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) 2018.

14. Aastha Nigam, Kijung Shin, Ashwin Bahulkar, Bryan Hooi, David Hachen, Boleslaw K. Szymanski, Christos Faloutsos, Nitesh V. Chawla. "ONE-M: Modeling the Co-evolution of Opinions and Network Connections." European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) 2018.

15. Pudi Chen, Shenghua Liu, Chuan Shi, Bryan Hooi, Bai Wang, Xueqi Cheng. "NeuCast: Seasonal Neural Forecast of Power Grid Time Series." International Joint Conference on Artificial Intelligence (IJCAI) 2018.

16. Bryan Hooi, Hyun Ah Song, Amritanshu Pandey, Marko Jereminov, Larry Pileggi, and Christos Faloutsos. "StreamCast: Fast and Online Mining of Power Grid Time Sequences." SIAM International Conference on Data Mining (SDM) 2018.

17. Srijan Kumar, Bryan Hooi, Disha Makhija, Mohit Kumar, Christos Faloutsos, and V.S. Subrahmanian. "REV2: Fraudulent User Prediction in Rating Platforms." ACM International Conference on Web Search and Data Mining (WSDM) 2018.

18. Pedro Costa, Aurlio Campilho, Bryan Hooi, Asim Smailagic, Kris Kitani, Shenghua Liu, Christos Faloutsos and Adrian Galdran. EyeQual: Accurate, Explainable, Retinal Image Quality Assessment." 16th IEEE International Conference On Machine Learning and Applications 2017.

19. Shenghua Liu, Bryan Hooi, Christos Faloutsos. "HoloScope: Topology-and-Spike Aware Fraud Detection." ACM International Conference on Information and Knowledge Management (CIKM) 2017.

20. Hemank Lamba, Bryan Hooi, Kijung Shin, Christos Faloutsos, and Jurgen Pfeffer. "ZOORANK: Ranking Suspicious Entities in Time-Evolving Tensors." European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) 2017.

21. Bryan Hooi, Shenghua Liu, Asim Smailagic, and Christos Faloutsos. "BEATLEX: Summarizing and Forecasting Time Series with Patterns." European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) 2017.

22. Hyun Ah Song, Bryan Hooi, Marko Jereminov, Amritanshu Pandey, Larry Pileggi, and Christos Faloutsos. "PowerCast: Mining and Forecasting Power Grid Sequences." European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) 2017.

23. Chi Ling Chan, Justin Lai, Bryan Hooi and Todd Davies. "The Message or the Messenger? Inferring Virality and Diffusion Structure from Online Petition Signature Data." Social Informatics (SocInfo) 2017.

24. Marko Jereminov, Amritanshu Pandey, Hyun Ah Song, Bryan Hooi, Larry Pileggi, and Christos Faloutsos. "Linear Load Model for Robust Power System Analysis." IEEE International Conference on Innovative Smart Grid Technologies (ISGT) 2017.

25. Kijung Shin, Bryan Hooi, Jisu Kim, and Christos Faloutsos. "DenseAlert: Incremental Dense-Subtensor Detection in Tensor Streams." KDD 2017.

26. Tsubasa Takahashi, Bryan Hooi, and Christos Faloutsos. "AutoCyclone: Automatic Mining of Cyclic Patterns and Anomalies by Robust Tensor Factorization". World Wide Web (WWW) Conference 2017.

27. Kijung Shin, Bryan Hooi, Jisu Kim, and Christos Faloutsos. "D-Cube: Dense-Block Detection in Terabyte-Scale Tensors," ACM International Conference on Web Search and Data Mining (WSDM) 2017.

28. Kijung Shin, <u>Bryan Hooi</u>, and Christos Faloutsos. "M-Zoom: Fast Dense-Block Detection in Tensors with Quality Guarantees," European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) 2016.

29. <u>Bryan Hooi</u>, Hyun Ah Song, Alex Beutel, Neil Shah, Kijung Shin, and Christos Faloutsos. FRAUDAR: Bounding Graph Fraud in the Face of Camouflage. KDD 2016. **KDD Best Paper Award (Research Track), and CogX 2017 Best Student Paper in AI.**

30. <u>Bryan Hooi</u>, Neil Shah, Alex Beutel, Stephan Gunnemann, Leman Akoglu, Mohit Kumar, Disha Makhija, and Christos Faloutsos. "BIRDNEST: Bayesian Inference for Ratings-Fraud Detection," SIAM International Conference on Data Mining (SDM) 2016,

31. <u>Bryan Hooi</u>, Hyun Ah Song, Evangelos Papalexakis, Rakesh Agrawal, and Christos Faloutsos. "Matrices, Compression, Learning Curves: formulation, and the GROUPNTEACH algorithms," Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD) 2016.

32. Meng Jiang, Alex Beutel, Peng Cui, <u>Bryan Hooi</u>, Shiqiang Yang, and Christos Faloutsos. "A General Suspiciousness Metric for Dense Blocks in Multimodal Data". IEEE International Conference on Data Mining (ICDM) 2015.

Refereed Journal Publications

1. Kijung Shin, Sejoon Oh, Jisu Kim, <u>Bryan Hooi</u>, and Christos Faloutsos. "Fast, Accurate and Provable Triangle Counting in Fully Dynamic Graph Streams." ACM Transactions on Knowledge Discovery from Data (TKDD) 2020.

2. Shenghua Liu, <u>Bryan Hooi</u>, and Christos Faloutsos. "A Contrast Metric for Fraud Detection in Rich Graphs." Transactions on Knowledge and Data Engineering (TKDE), 2018.

3. Kijung Shin, <u>Bryan Hooi</u>, and Christos Faloutsos. "Fast, Accurate and Flexible Algorithms for Dense Subtensor Mining." ACM Transactions on Knowledge Discovery from Data (TKDD) 2018.

4. <u>Bryan Hooi</u>, Kijung Shin, Hyun Ah Song, Alex Beutel, Neil Shah, and Christos Faloutsos. "Graph-Based Fraud Detection in the Face of Camouflage". ACM Transactions on Knowledge Discovery from Data (TKDD), 2017.

5. Meng Jiang, Alex Beutel, Peng Cui, <u>Bryan Hooi</u>, Shiqiang Yang, and Christos Faloutsos. "Spotting Suspicious Behaviors in Multimodal Data: A General Metric and Algortihms," IEEE Transactions on Knowledge and Data Engineering (TKDE) 2016.

6. Evangelos E. Papalexakis, <u>Bryan Hooi</u>, Konstantinos Pelechrinis, and Christos Faloutsos. "Power-Hop: A Pervasive Observation for Real Complex Networks," PLoS ONE 11(3) 2016.

Refereed Workshop Publications

1. Wenjie Feng, Shenghua Liu, Christos Faloutsos, <u>Bryan Hooi</u>, Huawei Shen and Xueqi Cheng. "EagleMine: Vision-Guided Mining in Large Graphs." KDD Outlier Detection De-constructed (ODD) Workshop 2018.

2. Shenghua Liu, <u>Bryan Hooi</u>, and Christos Faloutsos. "Fraud Detection using Graph Topology and Temporal Spikes." KDD Mining and Learning with Graphs (MLG) Workshop 2017.

3. Neil Shah, Alex Beutel, <u>Bryan Hooi</u>, Leman Akoglu, Stephan Gunnemann, Disha Makhija, Mohit Kumar, and Christos Faloutsos. "EdgeCentric: Anomaly Detection in Edge-Attributed Networks." IEEE International Conference on Data Mining (ICDM) Workshop on Data Mining for Cyber Security 2016.

4. <u>Bryan Hooi</u>, Hyun Ah Song, Evangelos Papalexakis, Rakesh Agrawal and Christos Faloutsos. "Education, Learning and Information Theory," IEEE ICDM Workshop on Data Mining for Educational Assessment and Feedback, 2015.

Service

Program Committee Member
- ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD) 2020
- ACM International Conference on Information and Knowledge Management (CIKM) 2017
- International Conference on Advanced Data Mining and Applications (ADMA) 2017

Reviewer

- Journal of Machine Learning Research (JMLR) 2020
- IEEE Access 2018, 2019
- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI) 2018, 2019
- ACM Transactions on Knowledge Discovery from Data (TKDD) 2019
- IEEE Transactions on Knowledge and Data Engineering (TKDE) 2019
- Applied Network Science 2019
- International Journal of Information Technology and Decision Making (IJITDM) 2019
- Data Mining and Knowledge Discovery (DMKD) 2019
- ACM Computing Surveys 2019

Organizer
- CMU Data Mining Seminar, 2017 - 2019

Teaching

Stanford University: Teaching Assistant
- CS261: Optimization and Algorithmic Paradigms (Winter 2013)

Carnegie Mellon University: Teaching Assistant
- 36-350: Statistical Computing (Fall 2014, Fall 2015)
- 36-662: Data Mining (Spring 2015, Spring 2017)
- 36-201: Statistical Reasoning (Summer 2015)
- 10-702: Statistical Machine Learning (Spring 2016)
- 36-721: Hidden Markov Models (Fall 2016)
- 36-780: Deep Learning (Fall 2016)

Student Mentoring / Advising

- Ms. Minji Yoon, CMU PhD student
- Mr. Shubhranshu Shekhar, CMU PhD student
- Ms. Cindy Li, ECE PhD student

Grant Proposals

- Contributed to NSF proposal: Group Mining of Cardiovascular-Disease Sensor Data (submitted Nov 2017; with Asim Smailagic, Christos Faloutsos)
- Contributed to NSF proposal: Collaborative Research: "What's happening?" Summarization for Human-Driven Exploration of Massive Time Series Data (submitted Oct 2018; with Alexandros Labrinidis, Walter Lasecki, Danai Koutra, Christos Faloutsos)
- Contributed to Flipkart $25K faculty grant (with Neil Shah, Dhivya Eswaran, Christos Faloutsos)

Talks

- *Anomaly Detection in Graphs and Sensor Data.* National University of Singapore, 2019.
- *Anomaly Detection in Graphs and Sensor Data.* Nanyang Technological University, 2019.
- *Anomaly Detection in Graphs and Sensor Data.* SIS Research Seminar, Singapore Management University, 2019.
- *ChangeDAR: Online Localized Change Detection for Sensor Data on a Graph.* CIKM 2018.
- *ChangeDAR: Online Localized Change Detection for Sensor Data on a Graph.* CMU Data Mining Seminar, 2018.
- *GridWatch: Sensor Placement and Anomaly Detection in the Electrical Grid.* ECML-PKDD 2018.
- *ONE-M: Modeling the Co-evolution of Opinions and Network Connections.* ECML-PKDD 2018.
- *StreamCast: Fast and Online Mining of Power Grid Time Sequences.* SDM 2018.
- *ETS Models and StreamCast: Fast and Online Mining of Power Grid Time Sequences.* CMU Databases Group Seminar, 2018.
- *BEATLEX: Summarizing and Forecasting Time Series with Patterns.* ECML-PKDD 2018.

- *FRAUDAR: Bounding Graph Fraud in the Face of Camouflage.* CMU AI Lunch, 2016.
- *FRAUDAR: Bounding Graph Fraud in the Face of Camouflage.* KDD 2016.
- *BIRDNEST: Bayesian Inference for Ratings-Fraud Detection.* SDM 2016.
- *Matrices, Compression, Learning Curves: formulation, and the GROUPNTEACH algorithms.* PAKDD 2016.
- *Education, Learning and Information Theory.* ICDM Workshop on Data Mining for Educational Assessment and Feedback 2015.

Mailing Address

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