

BRYAN HOOI

Homepage: <http://bhooi.github.io>

+65 96503537 • bhooi@comp.nus.edu.sg

EDUCATION

Carnegie Mellon University (2014 - 2019) • Ph.D. in Machine Learning •

Stanford University (2010 - 2014) • B.S. (Honors) in Mathematics with Distinction, M.S. in Computer Science •

RESEARCH INTERESTS

- Scalable Machine Learning, Graph Mining, Anomaly Detection

CONFERENCE PUBLICATIONS

- Siddharth Bhatia, Arjit Jain, Shivin Srivastava, Kenji Kawaguchi, Bryan Hooi. MemStream: Memory-Based Streaming Anomaly Detection, The Web Conference (WWW) 2022.
- Adam Goodge, Bryan Hooi, See Kiong Ng, Wee Siong Ng. LUNAR: Unifying Local Outlier Detection Methods via Graph Neural Networks, AAAI Conference on Artificial Intelligence (AAAI) 2022.
- Shimiao Li, Amritanshu Pandey, Bryan Hooi, Christos Faloutsos, Larry Pileggi. Dynamic Graph-Based Anomaly Detection in the Electrical Grid, IEEE Transactions on Smart Grid 2022.
- Xiaobing Sun, Wenjie Feng, Shenghua Liu, Yuyang Xie, Siddharth Bhatia, Bryan Hooi, Wenhan Wang, Xueqi Cheng. MonLAD: Money Laundering Agents Detection in Transaction Streams, ACM International Conference on Web Search and Data Mining (WSDM) 2022.
- Yifan Zhang, Bryan Hooi, Dapeng Hu, Jian Liang, Jiashi Feng. Unleashing the Power of Contrastive Self-Supervised Visual Models via Contrast-Regularized Fine-Tuning, Neural Information Processing Systems (NeurIPS) 2021.
- Juncheng Liu, Kenji Kawaguchi, Bryan Hooi, Yiwei Wang, Xiaokui Xiao. EIGNN: Efficient Infinite-Depth Graph Neural Networks, Neural Information Processing Systems (NeurIPS) 2021.
- Yiwei Wang, Yujun Cai, Yuxuan Liang, Henghui Ding, Changhu Wang, Siddharth Bhatia, Bryan Hooi. Adaptive Data Augmentation on Temporal Graphs, Neural Information Processing Systems (NeurIPS) 2021.
- Koki Kawabata, Siddharth Bhatia, Rui Liu, Mohit Wadhwa, Bryan Hooi. SSMF: Shifting Seasonal Matrix Factorization, Neural Information Processing Systems (NeurIPS) 2021.
- Kuangqi Zhou*, Yanfei Dong*, Kaixin Wang, Wee Sun Lee, Bryan Hooi, Huan Xu, Jiashi Feng. Understanding and Resolving Performance Degradation in Deep Graph Convolutional Networks, ACM Conference on Information and Knowledge Management (CIKM) 2021.
- Siddharth Bhatia, Yiwei Wang, Bryan Hooi, Tanmoy Chakraborty. GraphAnoGAN: Detecting Anomalous Snapshots from Attributed Graphs, European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) 2021.
- Kaixin Wang*, Kuangqi Zhou*, Qixin Zhang, Jie Shao, Bryan Hooi, Jiashi Feng. Towards Better Laplacian Representation in Reinforcement Learning with Generalized Graph Drawing, International Conference on Machine Learning (ICML) 2021.
- Shixuan Sun, Yuhang Chen, Bingsheng He, and Bryan Hooi. PathEnum: Towards Real-Time Hop-Constrained s-t Path Enumeration, ACM SIGMOD International Conference on Management of Data 2021 (SIGMOD) 2021.
- Shen Li, Xu Jianqing, Xiaqing Xu, Pengcheng Shen, Shaoxin Li, and Bryan Hooi. Spherical Confidence Learning for Face Recognition, IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR) 2021.
- Yiwei Wang, Wei Wang, Yuxuan Liang, Yujun Cai and Bryan Hooi. Mixup for Node and Graph Classification, The Web Conference (WebConf) 2021.
- Yiwei Wang, Wei Wang, Yuxuan Liang, Yujun Cai and Bryan Hooi. CurGraph: Curriculum Learning for Graph Classification, The Web Conference (WebConf) 2021.
- Siddharth Bhatia, Arjit Jain, Pan Li, Ritesh Kumar and Bryan Hooi. MSTREAM: Fast Anomaly Detection in Multi-Aspect Streams, The Web Conference (WebConf) 2021. **Best paper finalist.**

- Siddharth Bhatia, Arjit Jain, Bryan Hooi. ExGAN: Adversarial Generation of Extreme Samples, AAAI Conference on Artificial Intelligence (AAAI) 2021.
- Ailin Deng, Bryan Hooi. Graph Neural Network-Based Anomaly Detection in Multivariate Time Series, AAAI Conference on Artificial Intelligence (AAAI) 2021.
- Xiang Hui Nicholas Lim, Bryan Hooi, See Kiong Ng, Xueou Wang, Yong Liang Goh, Renrong Weng and Rui Tan. Origin-Aware Next Destination Recommendation with Personalized Preference Attention, ACM International Conference on Web Search and Data Mining (WSDM) 2021.
- Minji Yoon, Theophile Gervet, Bryan Hooi, and Christos Faloutsos. Autonomous Graph Mining Algorithm Search with Best Speed/Accuracy Trade-off, IEEE International Conference on Data Mining (ICDM) 2020. **Selected as one of the best papers of ICDM'20 for journal invitation to special issue of KAIS.**
- Yiwei Wang, Shenghua Liu, Minji Yoon, Hemank Lamba, Wei Wang, Christos Faloutsos, and Bryan Hooi. Provably Robust Node Classification via Low-Pass Message Passing, IEEE International Conference on Data Mining (ICDM) 2020.
- Yiwei Wang, Wei Wang, Yujun Cai, Bryan Hooi and Beng Chin Ooi. Detecting Implementation Bugs in Graph Convolutional Network based Node Classifiers, ACM SIGSOFT International Symposium on Software Testing and Analysis (ISSTA) 2020.
- Nicholas Lim, Bryan Hooi, See Kiong Ng, Xueou Wang, Yong Liang Goh, Renrong Weng and Jagannadan Varadarajan. STP-UDGAT: Spatial-Temporal-Preference User Dimensional Graph Attention Network for Next POI Recommendation, ACM Conference on Information and Knowledge Management (CIKM) 2020.
- Yiwei Wang, Wei Wang, Yuxuan Liang, Yujun Cai and Bryan Hooi. Progressive Supervision for Node Classification, European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML-PKDD) 2020.
- Yiwei Wang, Wei Wang, Yuxuan Liang, Yujun Cai, Juncheng Liu and Bryan Hooi. NodeAug: Semi-Supervised Node Classification with Data Augmentation, ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD) 2020
- Manh Tuan Do, Se-eun Yoon, Bryan Hooi, and Kijung Shin. Structural Patterns and Generative Models of Real-world Hypergraphs, ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD) 2020
- Adam Goodge, Bryan Hooi, See Kiong Ng, Wee Siong Ng. Robustness of Autoencoders for Anomaly Detection Under Adversarial Impact, International Joint Conference on Artificial Intelligence (IJCAI) 2020.
- Shen Li, Bryan Hooi, Gim Hee Lee. Identifying through Flows for Recovering Latent Representations, International Conference on Learning Representations (ICLR) 2020.
- Bryan Hooi, Kijung Shin, Hemank Lamba, and Christos Faloutsos. TellTail: a Principled Scoring Function for Dense Subgraphs. Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI) 2020.
- Xiangfeng Li, Shenghua Liu, Zifeng Li, Xiaotian Han, Chuan Shi, Bryan Hooi, He Huang and Xueqi Cheng. FlowScope: Spotting Money Laundering in Big Graphs, Thirty-Fourth AAAI Conference on Artificial Intelligence (AAAI) 2020.
- Siddharth Bhatia, Bryan Hooi, 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.
- Bin Zhou, Shenghua Liu, Bryan Hooi, Xueqi Cheng, and Jing Ye. BeatGAN: Anomalous Rhythm Detection using Adversarially Generated Time Series, International Joint Conference on Artificial Intelligence (IJCAI) 2019.
- Minji Yoon, Bryan Hooi, 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.
- Marko Jereminov, Bryan Hooi, 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.
- Bryan Hooi, Kijung Shin, Shenghua Liu, and Christos Faloutsos. SMF: Drift Aware Matrix Factorization with Seasonal Patterns, SIAM International Conference in Data Mining (SDM) 2019.

- Bryan Hooi and Christos Faloutsos. Branch and Border: Partition-Based Change Detection in Multivariate Time Series, SIAM International Conference in Data Mining (SDM) 2019.
- Wenjie Feng, Shenghua Liu, Christos Faloutsos, Bryan Hooi, 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.
- 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.
- 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**.
- 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.
- 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.
- 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.
- 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.
- 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.
- 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.
- Shenghua Liu, Bryan Hooi, Christos Faloutsos. HoloScope: Topology-and-Spike Aware Fraud Detection. ACM International Conference on Information and Knowledge Management (CIKM) 2017.
- 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.
- 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.
- 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.
- 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.
- 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.
- Kijung Shin, Bryan Hooi, Jisu Kim, and Christos Faloutsos. DenseAlert: Incremental Dense-Subtensor Detection in Tensor Streams. KDD 2017.
- 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.

- 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.
- Kijung Shin, Bryan Hooi, 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.
- Bryan Hooi, 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)**
- Bryan Hooi, 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,
- Bryan Hooi, 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.
- Meng Jiang, Alex Beutel, Peng Cui, Bryan Hooi, Shiqiang Yang, and Christos Faloutsos. A General Suspiciousness Metric for Dense Blocks in Multimodal Data. IEEE International Conference on Data Mining (ICDM) 2015.

JOURNAL PUBLICATIONS

- Shenghua Liu, Bin Zhou, Quan Ding, Bryan Hooi, Zheng bo Zhang, Huawei Shen, Xueqi Cheng. Time Series Anomaly Detection with Adversarial Reconstruction Networks, IEEE Transactions on Knowledge and Data Engineering (TKDE) 2022.
- Siddharth Bhatia, Rui Liu, Bryan Hooi, Minji Yoon, Kijung Shin, Christos Faloutsos. Real-Time Anomaly Detection in Edge Streams, ACM Transactions on Knowledge Discovery from Data (TKDD) 2022.
- Kijung Shin, Sejoon Oh, Jisu Kim, Bryan Hooi, and Christos Faloutsos. Fast, Accurate and Provable Triangle Counting in Fully Dynamic Graph Streams. ACM Transactions on Knowledge Discovery from Data (TKDD) 2020.
- Shenghua Liu, Bryan Hooi, and Christos Faloutsos. A Contrast Metric for Fraud Detection in Rich Graphs. Transactions on Knowledge and Data Engineering (TKDE), 2018.
- Kijung Shin, Bryan Hooi, and Christos Faloutsos. Fast, Accurate and Flexible Algorithms for Dense Subtensor Mining. ACM Transactions on Knowledge Discovery from Data (TKDD) 2018.
- Bryan Hooi, 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.
- Meng Jiang, Alex Beutel, Peng Cui, Bryan Hooi, Shiqiang Yang, and Christos Faloutsos. Spotting Suspicious Behaviors in Multimodal Data: A General Metric and Algorithms, IEEE Transactions on Knowledge and Data Engineering (TKDE) 2016.
- Evangelos E. Papalexakis, Bryan Hooi, Konstantinos Pelechrinis, and Christos Faloutsos. Power-Hop: A Pervasive Observation for Real Complex Networks, PLoS ONE 11(3) 2016.

HONORS AND AWARDS

1. ECML-PKDD 2018 Runner-Up Best Student Data Mining Paper Award
2. KDD 2016 Best Paper Award (Research Track)
3. Undergraduate Research Award 2014, Stanford University

SERVICE

- Senior Program Committee Member: IJCAI, AAAI, WSDM, KDD
- Program Committee Member: CVPR, KDD, CIKM, ADMA
- Reviewer: JMLR, TPAMI, TKDD, TKDE, Applied Network Science, IJITDM, DMKD, ACM Computing Surveys, IEEE Access

- Organizer: Outlier Detection and Description Workshop, in conjunction with KDD'21

TEACHING

National University of Singapore

- CS4225/5425: Big Data Systems for Data Science (2021)
- CS6208: Advanced Topics in Artificial Intelligence: Graph Representation Learning (2021)
- CS5228: Knowledge Discovery and Data Mining (2019, 2020)

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)

Stanford University: Teaching Assistant

- CS261: Optimization and Algorithmic Paradigms (Winter 2013)

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

Department of Computer Science
School of Computing
National University of Singapore
COM1, 13 Computing Drive
Singapore 117417
Republic of Singapore