

# LEMAN AKOGLU

Heinz College Dean's Associate Professor, Information Systems  
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## EMPLOYMENT

- **Carnegie Mellon University** Pittsburgh, PA  
*Heinz College Dean's Associate Professor of Info. Sys. (Tenure-Track)* July 2019 - Present  
*Heinz College Dean's Assistant Professor of Info. Sys. (Tenure-Track)* Apr. 2019 - July 2019  
*Asst. Professor of Information Systems (Tenure-Track)* Sep. 2016 - Apr. 2019  
*H. John Heinz III College*  
Affiliated Faculty of SCS Computer Science Department  
Affiliated Faculty of SCS Machine Learning Department
- **Stony Brook University** Stony Brook, NY  
*Assistant Professor (Tenure-Track)* Aug. 2012 - Aug. 2016  
*Department of Computer Science*

## EDUCATION

- **Carnegie Mellon University** Pittsburgh, PA  
*Ph.D., Computer Science* Sep. 2007 - Aug. 2012  
**Thesis** Mining and Modeling Real-world Networks: Patterns, Anomalies, and Tools.  
**Ph.D. advisor** Christos Faloutsos  
**Committee** Christos Faloutsos (Chair), Andrew Moore (CMU, Google Inc.), Aarti Singh (CMU), Andrew Tomkins (Google Inc.)
- **Bilkent University** Ankara, Turkey  
*B.S., Computer Science (with distinction)* Sep. 2003 - May 2007  
**Senior thesis** *Focused Crawling for Intelligent Portals*  
**Thesis advisor** Ozgur Ulusoy  
**GPA** 3.95/4.00, **Major GPA** 4.00/4.00 (Ranked 2nd/150)
- **Bursa Tan College** Bursa, Turkey  
*High School Education, GPA: 5.00/5.00* Sep. 2002 - June 2003  
Ranked 1st among 2003 graduates
- **İzmir Science High School** İzmir, Turkey  
*High School Education, GPA: 5.00/5.00* Sep. 2000 - June 2002

## RESEARCH INTERESTS

My research is in data mining and knowledge discovery, network science, and applied machine learning and statistics; with a focus on pattern discovery, anomaly, fraud, and event detection in large-scale, time-varying/streaming, multi-modal, noisy data through effective and scalable computational methods.

### Areas:

- Data Mining and Knowledge Discovery
- Graph Mining
- Big Data & Statistics
- Pattern Discovery
- Network Science
- Real-World Graph Modeling
- Machine Learning
- Anomaly & Event Detection

## HONORS & AWARDS

- Selected, **IJCAI 2021 Early-Career Spotlight** (among 15 all over the world), May 2021
- Received, **SDM/IBM Early Career Data Mining Research Award**, April 2021
- Received, Pacific Asia Conference on Knowledge Discovery and Data Mining (PAKDD) 2020 **The Most Influential Paper Award**
- Received, Adobe University Marketing Research Award, Oct. 2019
- Winner, **Best Research Paper** Award at SIAM SDM 2019
- Received, Heinz College Dean's Career Development Professorship, April 18, 2019
- Delivered, Gilbreth Lecture at the National Academy of Engineering, Feb 7, 2019
- Runner-up, **Best Student Machine Learning Paper** Award at ECML PKDD 2018
- Received, Adobe University Marketing Research Award, June 2017
- Runner-up, **Best Research Paper** Award at SIAM SDM 2016
- Received, Stony Brook University Discretionary Award by the CS Dept, Dec 2015
- Received, Facebook Faculty Research Award, May 2015
- Winner, **Best Research Paper** Award at SIAM SDM 2015
- Received, SIAM SDM Early Career Travel Award, Feb 2015
- Received, **NSF CAREER Award**, Jan 2015
- Received, Stony Brook University Discretionary Award by the CS Dept, Dec 2014
- Winner, **Best Paper** Award at ADC 2014
- Received, SIAM SDM Early Career Travel Award, Jan 2014
- Received, **Army Research Office Young Investigator Program Award**, Dec 2013
- Received, IBM First Patent Application Invention Achievement Award, 2012
- Received, PAKDD Student Travel Grant Award, 2012
- Winner, "Top IBM Intern" plaque in the Fifth Annual IBM Research Chess Tournament, 2011
- Winner, Facebook Grace Hopper Scholarship 2010
- Winner, Google ECML PKDD Conference and Travel Grant Award for Women in CS, 2010
- Winner, **Best Paper** Award at PAKDD 2010
- Winner, **Best Knowledge Discovery Paper** Award in ECML PKDD 2009
- Winner, "Instructors' Choice" Award for the Graphical Models class project 2008
- Winner, CMU Graduate Student Assembly Conference Funding on August 2008
- Ranked 2nd, Computer Science Department, Bilkent University, among 150 graduates, 2007
- High Honor Student, Bilkent University, for all terms, 2003-07
- Full Scholarship, Bilkent University, including tuition and monthly stipend, 2003-07
- Ranked 300th, National University Entrance Exam in Turkey among over 1 million students, 2003
- Ranked 5th, Science High School Entrance Exam in Turkey among over 300,000 students, 2000
- Winner, two bronze medals at Bursa Secondary Schools Chess Tournaments, 1996 and 1997

## THESIS

- Leman Akoglu. *Mining and Modeling Real-world Networks: Patterns, Anomalies, and Tools*. Doctoral Dissertation, Carnegie Mellon University, Computer Science Department (CSD), 2012.

## PUBLICATIONS

Also see my Google Scholar and DBLP pages.

### PRE-PRINTS

1. Martin Q. Ma, Yue Zhao, Xiaorong Zhang, Leman Akoglu  
*A Large-scale Study on Unsupervised Outlier Model Selection: Do Internal Strategies Suffice?*  
<https://arxiv.org/abs/2104.01422>, Apr. 2021
2. Yue Zhao, Ryan Rossi, Leman Akoglu  
*METAOD: Automating Outlier Detection via Meta-Learning*  
<https://arxiv.org/abs/2009.10606>, Mar. 2021
3. Lingxiao Zhao, Leman Akoglu  
*Connecting Graph Convolutional Networks and Graph-Regularized PCA*  
<https://arxiv.org/abs/2006.12294>, Mar. 2021
4. Lingxiao Zhao, Leman Akoglu  
*Issues with Propagation Based Models for Graph-Level Outlier Detection*  
<https://arxiv.org/abs/2012.12931>, Mar. 2021
5. Saurabh S. Sawlani, Lingxiao Zhao, Leman Akoglu  
*Deep Graph-level Anomaly Detection*  
Feb. 2021
6. Hung Nguyen, Pierre J. Liang, Leman Akoglu  
*Anomaly Detection in Large Labeled Multi-Graph Databases*  
<https://arxiv.org/abs/2010.03600>, Oct. 2020
7. Dimitris Berberidis, Pierre J. Liang, Leman Akoglu  
*Summarizing Graphs with Directed Multi-Edges and Multi-Type Nodes*  
Dec. 2020
8. Shubhranshu Shekhar, Dhivya Eswaran, Bryan Hooi, Jonathan Elmer, Christos Faloutsos, Leman Akoglu  
*Benefit-aware Early Prediction of Health Outcomes on Multivariate EEG Time Series*  
Feb. 2020
9. Yue Wu, Leman Akoglu, Ian Davidson  
*Coverage-based Outlier Explanation*  
<https://arxiv.org/abs/1911.02617>, Nov. 2019

### PEER-REVIEWED JOURNAL ARTICLES

1. Hung Nguyen, Xuejian Wang, Leman Akoglu  
*End-to-End Continual Rare-Class Recognition with Emerging Novel Subclasses*  
**ACM Transactions on Knowledge Discovery from Data (TKDD)**, Volume 14, Issue 5, Article No. 61, August 2020.
2. Meghanath Macha and Leman Akoglu  
*Explaining Anomalies in Groups with Characterizing Subspace Rules*  
**Data Mining and Knowledge Discovery (DAMI)**, 32(5), 1444-1480 (ECML PKDD Journal Track), 2018.
3. Bryan Perozzi and Leman Akoglu  
*Discovering Communities and Anomalies in Attributed Graphs: Interactive Visual Exploration and Summarization*  
**ACM Transactions on Knowledge Discovery from Data (TKDD)**, Volume 12, Issue 2, Article No. 24, Jan 2018.

4. Sokratis Vidros, Constantinos Koliass, Georgios Kambourakis, Leman Akoglu  
*Automatic Detection of Online Recruitment Frauds: Characteristics, Methods, and a Public Dataset*  
**Future Internet**, 9(1), 6; doi:10.3390/fi9010006, Mar 2017.
5. Véronique Van Vlasselaer, Tina Eliassi-Rad, Leman Akoglu, Monique Snoeck, Bart Baesens.  
*GOTCHA! Network-based Fraud Detection for Social Security Fraud.*  
**Management Science (INFORMS) MS-14-00232.R4**, Feb 2016.
6. Shebuti Rayana and Leman Akoglu  
*Less is More: Building Selective Anomaly Ensembles*  
**ACM Transactions on Knowledge Discovery from Data (TKDD)**, Jan 2016.
7. Hau Chan and Leman Akoglu  
*Optimizing Network Robustness by Edge Rewiring: A General Framework*  
**Data Mining and Knowledge Discovery (DAMI)**, 30(5), 1395–1425. (DAMI-D-14-00490R3; DOI: 10.1007/s10618-015-0447-5) (ECML PKDD Journal Track), 2016.
8. Vasudev Bhat, Adheesh Gokhale, Ravi Jadhav, Jagat Sastry Pudipeddi, Leman Akoglu  
*Effects of Tag Usage on Question Response Time: Analysis and Prediction in StackOverflow*  
**Social Network Analysis and Mining (SNAM-D-14-00101R1)** 5(1) (Springer), 2015.
9. Véronique Van Vlasselaer, Cristián Bravo, Olivier Caelen, Tina Eliassi-Rad, Leman Akoglu,  
Monique Snoeck, Bart Baesens  
*APATE: A Novel Approach for Automated Credit Card Transaction Fraud Detection using  
Network-Based Extensions*  
**Decision Support Systems** (Elsevier), 2015.
10. Leman Akoglu, Hanghang Tong, Danai Koutra  
*Graph-based Anomaly Detection and Description: A Survey*  
**Data Mining and Knowledge Discovery (DAMI)**, 29(3), 2015.
11. Yuan Yao, Hanghang Tong, Tao Xie, Leman Akoglu, Feng Xu, Jian Lu  
*Detecting High-quality Posts in Community Question Answering Sites*  
**Information Sciences**, 2015.
12. Leman Akoglu and Christos Faloutsos  
*RTG: A Recursive Realistic Graph Generator using Random Typing*  
**Data Mining and Knowledge Discovery (DAMI)** 19(2): 194-209, 2009.

## PEER-REVIEWED CONFERENCE PAPERS

1. Shubhranshu Shekhar, Neil Shah, Leman Akoglu  
*FAIROD: Fairness-aware Outlier Detection*  
**AIES** (Oral presentation) (9.6%), Virtual, May 2021.
2. Yue Zhao, Xiyang Hu, Cheng Cheng, Cong Wang, Changlin Wan, Wen Wang, Jianing Yang,  
Haoping Bai, Zheng Li, Cao Xiao, Yunlong Wang, Zhi Qiao, Jimeng Sun, Leman Akoglu  
*SUOD: Accelerating Large-scale Unsupervised Heterogeneous Outlier Detection*  
**MLSys** (23.5%), Virtual, Apr. 2021.
3. Meng-Chieh Lee, Yue Zhao, Aluna Wang, Pierre J. Liang, Leman Akoglu, Vincent S. Tseng and  
Christos Faloutsos  
*AUTOAUDIT: Mining Accounting and Time-Evolving Graphs*  
**IEEE BigData** (short paper), Virtual, Dec. 2020.
4. Jiong Zhu, Yujun Yan, Lingxiao Zhao, Mark Heimann, Leman Akoglu, Danai Koutra  
*Beyond Homophily in Graph Neural Networks: Current Limitations and Effective Design Choices*  
**NeurIPS** (20.1%), Virtual, Dec. 2020.

5. Lingxiao Zhao and Leman Akoglu  
PAIRNORM: *Tackling Oversmoothing in GNNs*  
**ICLR** (26.5%), Addis Ababa, Ethiopia, Apr. 2020.
6. Xiaoyi Gu, Leman Akoglu, Alessandro Rinaldo  
*Statistical Analysis of Nearest Neighbor Methods for Anomaly Detection*  
**NeurIPS** (24.4%), Vancouver, Canada, Dec. 2019.
7. Hung Nguyen, Xuejian Wang, Leman Akoglu  
*Continual Rare-Class Recognition with Emerging Novel Subclasses*  
**ECML PKDD** (17.71%), Würzburg, Germany, Sep. 2019.
8. Tahora H. Nazer, Matthew Davis, Mansooreh Karami, Leman Akoglu, David Koelle, Huan Liu  
*Bot Detection: Will Focusing on Recall Cause Overall Performance Deterioration?*  
**SBP-BRiMS**, Washington DC, USA, July 2019.
9. Lakmal B. Meegahapola, Thivya Kandappu, Kasthuri Jayarajah, Leman Akoglu, Shili Xiang, Archan Misra  
*BuSCOPE: Fusing Individual & Aggregated Mobility Behavior for "Live" Smart City Services*  
**ACM MobiSys** (23.25%), Seoul, Korea, June 2019.
10. Tuan M. V. Le and Leman Akoglu  
*ContraVis: Contrastive and Visual Topic Modeling for Comparing Document Collections*  
**TheWebConf** (18%), San Francisco, CA, May 2019.
11. Hemank Lamba and Leman Akoglu  
*Learning On-the-Job to Re-rank Anomalies from Top-1 Feedback*  
**SIAM SDM** (22.7%), Calgary, Canada, May 2019.  
**Best Research Paper**
12. Xuan Wu\*, Lingxiao Zhao\* Leman Akoglu  
*A Quest for Structure: Jointly Learning the Graph Structure and Semi-Supervised Classification*  
**ACM CIKM** (17%), Turin, Italy, Oct. 2018.
13. Bryan Hooi, Leman Akoglu, Dhivya Eswaran, Hyun Ah Song, Amritanshu Pandey, Marko Jereminov, Larry Pileggi, Christos Faloutsos  
*Online Localized Change Detection for Sensor Data on a Graph*  
**ACM CIKM** (17%), Turin, Italy, Oct. 2018.
14. Shubhranshu Shekhar and Leman Akoglu  
*Incorporating Privileged Information to Unsupervised Anomaly Detection*  
**ECML PKDD** (26%), Dublin, Ireland, Sep. 2018.  
**Best Student Machine Learning Paper Runner-up (plenary talk)**
15. Meghanath Macha, Deepak Pai, Leman Akoglu  
*Contextual Outlier Detection with Multiple Contexts: Application to Ad Fraud*  
**ECML PKDD** (26%), Dublin, Ireland, Sep. 2018.
16. Nikhil Gupta, Dhivya Eswaran, Neil Shah, Leman Akoglu, Christos Faloutsos  
*Beyond Outlier Detection: LookOut for Pictorial Explanation*  
**ECML PKDD** (26%), Dublin, Ireland, Sep. 2018.
17. Abhinav Maurya, Leman Akoglu, Ramayya Krishnan, Daniel Bay  
*A Lens into Employee Peer Reviews via Sentiment-Aspect Modeling*  
**ACM/IEEE ASONAM** (industry track), Barcelona, Spain, Aug. 2018.
18. Emaad A. Manzoor, Hemank Lamba, Leman Akoglu  
*x-STREAM: Outlier Detection in Feature-Evolving Data Streams*  
**ACM SIGKDD** (18.4%), London, UK, Aug. 2018.
19. Junting Ye and Leman Akoglu.

- Robust Semi-Supervised Learning on Multiple Networks with Noise*  
**PAKDD** (regular, 17.8%), Melbourne, Australia, June 2018.
20. Emaad A. Manzoor and Leman Akoglu  
*RUSH! Targeted Time-limited Coupons via Purchase Forecasts*  
**ACM SIGKDD** (poster, 21.46%), Halifax, Nova Scotia, Canada, Aug. 2017.
  21. Heeyoung Kwon, Mirza Basim Baig, Leman Akoglu  
*A Domain-Agnostic Approach to Spam-URL Detection via Redirects*  
**PAKDD** (28.2%), Jeju, South Korea, May 2017.
  22. Abhinav Mishra and Leman Akoglu  
*Ranking in Heterogeneous Networks with Geo-Location Information*  
**SIAM SDM** (26%), Houston, Texas, April 2017.
  23. Aria Rezaei, Bryan Perozzi, Leman Akoglu  
*Ties That Bind - Characterizing Classes by Attributes and Social Ties*  
**WWW Companion**, Alternate Web Science Track, Perth, AU, April 2017.
  24. Shebuti Rayana, Wen Zhong, Leman Akoglu  
*Sequential Ensemble Learning for Anomaly Mining: A Bias-Variance Perspective*  
**IEEE ICDM** (19.6%), Barcelona, Spain, Dec. 2016.
  25. Emaad A. Manzoor, Sadegh M. Milajerdi, Leman Akoglu  
*Fast Memory-Efficient Anomaly Detection in Streaming Heterogeneous Graphs*  
**ACM SIGKDD** (full paper, 8.93%), San Francisco, CA, USA, Aug. 2016.
  26. Junting Ye, Santhosh Kumar, Leman Akoglu  
*Temporal Opinion Spam Detection Using Multiple Indicative Signals*  
**ICWSM** (poster), Cologne, Germany, May 2016.
  27. Bryan Perozzi and Leman Akoglu  
*Scalable Anomaly Ranking of Attributed Neighborhoods*  
**SIAM SDM** (25.9%), Miami, Florida, May 2016.  
**Best Research Paper Runner-up**
  28. Shebuti Rayana and Leman Akoglu  
*Collective Opinion Spam Detection using Active Inference*  
**SIAM SDM** (25.9%), Miami, Florida, May 2016.
  29. 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 SDM** (25.9%), Miami, Florida, May 2016.
  30. Junting Ye and Leman Akoglu  
*Discovering Opinion Spammer Groups by Network Footprints*  
**ECML PKDD** (23.2%), Porto, Portugal, Sep. 2015.
  31. Shebuti Rayana and Leman Akoglu  
*Collective Opinion Spam Detection: Bridging Review Networks and Metadata*  
**ACM SIGKDD** (19.4%), Sydney AU, Aug. 2015.
  32. Veronique Van Vlasselaer, Tina Eliassi-Rad, Leman Akoglu, Monique Snoeck, Bart Baesens  
*AFRAID: Fraud Detection via Active Inference in Time-evolving Social Networks*  
**IEEE/ACM ASONAM**, Paris, France, Aug. 2015.
  33. Mirza Basim Baig and Leman Akoglu  
*Correlation of Node Importance Measures: An Empirical Study through Graph Robustness*  
**WWW Companion**, Web Science Track (13.8%), Florence, Italy, May 2015.  
*Invited to a Special Issue of the Journal of Web Science (JWS)*

34. Shebuti Rayana and Leman Akoglu  
*Less is More: Building Selective Anomaly Ensembles—Application to Event Detection in Temporal Graphs*  
**SIAM SDM**, Vancouver, BC, Canada, April 2015. (Oral presentation)
35. Hau Chan, Shuchu Han, Leman Akoglu  
*Where Graph Topology Matters: The Robust Subgraph Problem*  
**SIAM SDM**, Vancouver, BC, Canada, April 2015. (Oral presentation)  
**Best Research Paper**  
*Invited to “Best of SDM 2015” Special Issue of Statistical Analysis and Data Mining J. (SAM)*
36. Veronique Van Vlasselaer, Leman Akoglu, Tina Eliassi-Rad, Monique Snoeck, Bart Baesens  
*Guilt-by-Constellation: Fraud Detection by Suspicious Clique Memberships*  
**HICSS**, Kauai, HI, Jan. 2015.
37. Leman Akoglu, Rohit Khandekar, Vibhore Kumar, Srinivasan Parthasarathy, Deepak Rajan, Kun-Lung Wu *Fast Nearest Neighbor Search on Large Time-Evolving Graphs*  
**ECML PKDD**, Nancy, France, September 2014.
38. Bryan Perozzi, Leman Akoglu, Patricia Iglesias Sánchez, Emmanuel Müller  
*Focused Clustering and Outlier Detection in Large Attributed Graphs*  
**ACM SIGKDD**, NYC, New York, August 2014.
39. Vasudev Bhat, Adheesh Gokhale, Ravi Jadhav, Jagat Sastry Pudipeddi, Leman Akoglu  
*Min(e)d Your Tags: Analysis of Question Response Time in StackOverflow*  
**IEEE/ACM ASONAM**, Beijing, China, August 2014.  
*Invited to appear in **SNAM** (Social Network Analysis and Mining) journal by Springer (ASONAM best papers)*
40. Yuan Yao, Hanghang Tong, Tao Xie, Leman Akoglu, Feng Xu, Jian Lu  
*Joint Voting Prediction for Questions and Answers in CQA*  
**IEEE/ACM ASONAM**, Beijing, China, August 2014.  
*Invited to appear in **SNAM** (Social Network Analysis and Mining) journal by Springer (ASONAM best papers)*
41. Tiantian Gao, Leman Akoglu  
*Fast Information-Theoretic Agglomerative Co-Clustering*  
**ADC**, Brisbane, Australia, July 2014. (Oral presentation)  
**Best Paper**
42. Leman Akoglu  
*Quantifying Political Polarity Based on Bipartite Opinion Networks*  
**ICWSM**, Ann Arbor, Michigan, June 2014.
43. Jun Seok Kang, Song Feng, Leman Akoglu, Yejin Choi  
*ConnotationWordNet: Learning Connotation of the Word+Sense Network*  
**ACL**, Baltimore, MD, June 2014. (Oral presentation)
44. Jagat Sastry Pudipeddi, Leman Akoglu, Hanghang Tong  
*User Churn in Focused Q&A Sites: Characterizations and Prediction*  
**WWW**, Web Science Track, Seoul, Korea, Apr. 2014.
45. Hau Chan, Leman Akoglu, Hanghang Tong  
*Make It or Break It: Manipulating Robustness in Large Networks*  
**SIAM SDM**, Philadelphia, PA, Apr. 2014. (Oral presentation)
46. Hau Chan and Leman Akoglu  
*External Evaluation of Topic Models: A Graph Mining Approach*  
**IEEE ICDM**, Dallas, Texas, Dec. 2013.

47. Vivek Kulkarni, Jagat S. Pudipeddi, Leman Akoglu, Joshua T. Vogelstein, R. Jacob Vogelstein, Sephira Ryman, Rex E. Jung  
*Sex Differences in the Human Connectome*  
**BHI: Brain and Health Informatics**, Maebashi, Japan, Oct. 2013.
48. Leman Akoglu, Rishi Chandy, Christos Faloutsos  
*Opinion Fraud Detection in Online Reviews by Network Effects*  
**ICWSM**, Boston, MA, July 2013.
49. Evangelos E. Papalexakis, Leman Akoglu, Dino Ienco  
*Do more views of a graph help? Community Detection and Clustering in Multi-Graphs*  
**FUSION**, Istanbul, Turkey, July 2013.
50. Leman Akoglu, Jilles Vreeken, Hanghang Tong, Duen H. Chau, Nikolaj Tatti, Christos Faloutsos  
*Mining Connection Pathways for Marked Nodes in Large Graphs*  
**SIAM SDM**, Austin, Texas, May 2013.
51. Leman Akoglu, Hanghang Tong, Jilles Vreeken, Christos Faloutsos  
*Fast and Reliable Anomaly Detection in Categorical Data*  
**ACM CIKM**, Maui, Hawaii, Oct 2012.
52. Duen Horng Chau, Leman Akoglu, Jilles Vreeken, Hanghang Tong, Christos Faloutsos  
*TourViz: Interactive Visualization of Connection Pathways in Large Graphs* (Demo paper)  
**ACM SIGKDD**, Beijing, China, Aug 2012.
53. Keith Henderson, Brian Gallagher, Tina Eliassi-Rad, Hanghang Tong, Sugato Basu, Leman Akoglu, Danai Koutra, Lei Li, Christos Faloutsos  
*RolX: Structural Role Extraction & Mining in Large Graphs*  
**ACM SIGKDD**, Beijing, China, Aug 2012.
54. Leman Akoglu, Duen Horng Chau, U Kang, Danai Koutra, Christos Faloutsos  
*OPAvion: Mining and visualization in large graphs* (Demo paper)  
**ACM SIGMOD**, Arizona, May 2012.
55. Leman Akoglu, Hanghang Tong, Brendan Meeder, Christos Faloutsos  
*PICS: Parameter-free Identification of Cohesive Subgroups in Large Attributed Graphs*  
**SIAM SDM**, CA, Apr. 2012.
56. Leman Akoglu, Pedro Olmo Vaz de Melo, Christos Faloutsos  
*Quantifying Reciprocity in Large Weighted Communication Networks*  
**PAKDD**, Kuala Lumpur, Malaysia, May 2012.
57. Keith Henderson, Brian Gallagher, Lei Li, Leman Akoglu, Tina Eliassi-Rad, Hanghang Tong, Christos Faloutsos  
*It's Who You Know: Graph Mining Using Recursive Structural Features*  
**ACM SIGKDD**, San Diego, CA, Aug. 2011.
58. U Kang, Mary McGlohon, Leman Akoglu, and Christos Faloutsos  
*Patterns on the Connected Components of Terabyte-Scale Graphs*  
**IEEE ICDM**, Sydney, Australia, Dec. 2010.
59. Pedro Olmo Vaz de Melo, Leman Akoglu, Christos Faloutsos, Antonio Loureiro  
*Surprising Patterns for the Call Duration Distribution of Mobile Phone Users*  
**ECML PKDD**, Barcelona, Spain, Sep. 2010.
60. Keith Henderson, Tina Eliassi-Rad, Christos Faloutsos, Leman Akoglu, Lei Li, Koji Maruhashi, B. Aditya Prakash, Hanghang Tong  
*MetricForensics: A Multi-Level Approach for Mining Volatile Graphs*  
**ACM SIGKDD**, Washington, D.C., July 2010.
61. Leman Akoglu, Mary McGlohon, Christos Faloutsos



*OddBall: Spotting Anomalies in Weighted Graphs*

PAKDD, Hyderabad, India, June 2010.

**Best Research Paper**

**PAKDD 2020 The Most Influential Paper Award**

62. Leman Akoglu and Christos Faloutsos  
*Event Detection in Time Series of Mobile Communication Graphs*  
27th Army Science Conference, Orlando, Florida, Dec. 2010.
63. Leman Akoglu and Christos Faloutsos  
*RTG: A Recursive Realistic Graph Generator using Random Typing*  
ECML PKDD, Bled, Slovenia, Sep. 2009.  
**Best Knowledge Discovery Paper**
64. Nan Du, Christos Faloutsos, Bai Wang, Leman Akoglu  
*Large Human Communication Networks: Patterns and a Utility-Driven Generator*  
ACM SIGKDD, Paris, France, June 2009.
65. Leman Akoglu, Mary McGlohon, Christos Faloutsos  
*RTM: Laws and a Recursive Generator for Weighted Time-Evolving Graphs*  
IEEE ICDM, Pisa, Italy, Dec. 2008.
66. Mary McGlohon, Leman Akoglu, Christos Faloutsos  
*Weighted Graphs and Disconnected Components: Patterns and a Generator*  
ACM SIGKDD, Las Vegas, Nevada, Aug. 2008.

## WORKSHOP PAPERS

66. Lingxiao Zhao, Leman Akoglu  
*Connecting Graph Convolutional Networks and Graph-Regularized PCA*  
ICML 2020 Workshop on Graph Representation Learning and Beyond (GRL+ 2020), July 2020
67. Nikhil Gupta, Dhivya Eswaran, Neil Shah, Leman Akoglu, Christos Faloutsos  
*Beyond Outlier Detection: LookOut for Pictorial Explanation*  
5th ACM SIGKDD Workshop on Outlier Detection De-constructed, Aug. 2018.
68. Neil Shah, Alex Beutel, Bryan Hooi, Leman Akoglu, Stephan Gunnemann, Disha Makhija, Mohit Kumar, Christos Faloutsos *EdgeCentric: Anomaly Detection in Edge-Attributed Networks*  
IEEE ICDM Workshop on Data Mining for Cyber Security, Dec. 2016.
69. Rachee Singh, Hyungjoon Koo, Najmehalsadat Miramirkhani, Fahimeh Mirhaj, Leman Akoglu, Phillipa Gill. *The Politics of Routing: Investigating the Relationship Between AS Connectivity and Internet Freedom*  
6th USENIX Workshop on Free and Open Communications on the Internet (FOCI), Aug. 2016.
70. Shebuti Rayana and Leman Akoglu  
*Collective Opinion Spam Detection: Bridging Review Networks and Metadata* (Presentation)  
WIN: Workshop on Information in Networks, NYC, USA, Oct. 2015.
71. Bryan Perozzi, Leman Akoglu, Patricia Sanchez, Emmanuel Muller  
*Focused Clustering and Outlier Detection in Large Attributed Graphs.* (Poster)  
WIN: Workshop on Information in Networks, NYC, USA, Oct. 2015.
72. Shebuti Rayana and Leman Akoglu  
*An Ensemble Approach for Event Detection and Characterization in Dynamic Graphs*  
ACM SIGKDD 2nd Workshop on Outlier Detection and Description under Data Diversity (ODD<sup>2</sup>@KDD 2014), NYC, NY, USA, Aug. 2014.
73. Charu Aggarwal, Leman Akoglu, Emmanuel Muller, Raymond T. Ng (editors)

*Proceedings of the KDD 2014 Workshop on Outlier Detection and Description under Data Diversity*  
ACM SIGKDD 2nd Workshop on Outlier Detection and Description (ODD<sup>2</sup>@KDD 2014), NYC,  
New York, USA, Aug. 2014.

74. Leman Akoglu, Emmanuel Muller, Jilles Vreeken (editors)  
*Proceedings of the KDD 2013 Workshop on Outlier Detection and Description*  
ACM SIGKDD 1st Workshop on Outlier Detection and Description (ODD@KDD 2013), Chicago,  
IL, USA, Aug. 2013.
75. Leman Akoglu  
*Classifying & Ranking Political Polarity by Network Effects*. (Presentation)  
WIN: Workshop on Information in Networks, New York, USA, Oct. 2013.
76. Leman Akoglu, Jilles Vreeken, Hanghang Tong, Duen Horng Chau, Christos Faloutsos  
*Mining and Visualizing Connection Pathways in Large Information Networks*. (Poster)  
WIN: Workshop on Information in Networks, New York, USA, Sep. 2012.
77. Leman Akoglu and Christos Faloutsos  
*ValuePick: Towards a Value-Oriented Dual-Goal Recommender System*  
IEEE ICDM Workshop on Optimization Based Methods for Emerging Data Mining Problems,  
Sydney, Australia, Dec. 2010.
78. Leman Akoglu and Bhavana Dalvi  
*Structure, Tie Persistence and Event Detection in Large Phone and SMS Networks*  
ACM SIGKDD 8th Workshop on Mining and Learning with Graphs, Washington, D.C., July 2010.

All articles can be downloaded from [www.cs.cmu.edu/~lakoglu/pubs.html](http://www.cs.cmu.edu/~lakoglu/pubs.html)

## BOOK CHAPTER

- Mary McGlohon, Leman Akoglu, Christos Faloutsos  
*Statistical Properties of Social Networks*  
**Chapter 2 in Social Network Data Analytics** (Edited by Charu C. Aggarwal).
- Leman Akoglu  
*Graph-based Anomaly Mining: Methods and Applications* (Invited)  
**Big Data in Complex and Social Networks**, CRC Press, Taylor & Francis Group. (Edited by  
My T. Thai, Weili Wu, and Hui Xiong).

## GRANTS

- **PI:** Army Network Enterprise Technology Command (NETCOM)  
*Creating Non-Traditional Solutions and Novel Approaches to Maximize the Impact of Advanced  
Algorithms, Autonomy, and Artificial Intelligence (A4I)*.  
\$350,000 (Oct 1, 2020 - Sep 30, 2021)
- **PI:** PwC Risk and Regulatory Services Innovation Center  
*GL Anomaly Detection Applications and Graph Learning Research*.  
\$353,574 (June 1, 2020 - May 31, 2021)
- **Co-PI:** PNC Center for Financial Services Innovation  
*PNC CMU Payment Network* (with Christos Faloutsos)  
\$200,000 (Mar 31, 2020 - Jun 30, 2021)
- **PI:** Adobe University Marketing Research Awards Program  
*Entity Resolution and User De-duplication of Recurring Fraudsters and Free-loaders*.  
\$50,000 (October 1, 2019 - May 31, 2020)

- **PI:** PwC Risk and Regulatory Services Innovation Center  
*Detecting Accounting Abnormalities in General Ledger Detail Reports.*  
\$220,098 (October 1, 2018 - September 30, 2019)
- **PI:** PwC Risk and Regulatory Services Innovation Center  
*Early Detection of Risk from Streaming Media Documents.*  
\$146,980 (October 1, 2018 - September 30, 2019)
- **PI:** Adobe University Marketing Research Awards Program  
*Real-time Detection of Online Click & Display Advertising Exchange Fraud.*  
\$50,000 (June 1, 2017 - May 31, 2018)
- **PI:** PwC Risk and Regulatory Services Innovation Center  
*Fraud Analytics: Description, Sense-making and Detection.*  
\$121,425 (April 1, 2017 - April 30, 2018)
- **PI:** PNC Center for Financial Services Innovation  
*Dynamic Customer Spendings Modeling for Business Analytics.*  
\$30,000 (Sep 15, 2016 - Sep 15, 2017)
- **PI:** Defense Advanced Research Projects Agency (DARPA) (Award# FA8650-15-C-7561)  
*MARPLE: Mitigating APT damage by Reasoning with Provenance in Large Enterprise networks.*  
with (IBM) J.R. Rao, S. Chari, I. Molloy, X. Hu, D. Schales; (Northwestern) Y. Chen; (Stony Brook) R. Sekar, S. Stoller; (UIC) V. Venkatakrishnan, R. Gjomemo.  
(CMU transfer = \$417,052) (2015–2019)
- Facebook Faculty Research Award (\$25,000 in discretionary funds). (2015)
- **PI:** National Science Foundation (NSF) (**CAREER Award#** IIS-1452425)  
*A General Framework for Methodical and Interpretable Anomaly Mining.*  
\$507,165 (5/1/2015–4/30/2020)
- **PI:** National Science Foundation (NSF) (Medium Award# IIS-1408287)  
*Collective Opinion Fraud Detection: Identifying and Integrating Cues from Language, Behavior, and Networks.* with Yejin Choi (U of Washington), Christos Faloutsos (CMU), Bing Liu (UIC).  
\$1,200,000 (CMU portion = \$309,700) (2014–2018)
- **Lead Investigator:** Northrop Grumman Aerospace Systems (NSF Center for Dynamic Data Analysis) *Ensemble Methods for Event Detection.*  
\$35,000 (annual, 2013–2014, 2014–2015, 2015–2016)
- **PI:** Army Research Office (ARO) Young Investigator Award. (Contract No. W911NF-14-1-0029)  
*Anomaly Detection and Description in Complex Dynamic Networks* \$50,000 (06/2014–05/2016)
- **Co-PI:** Office of Naval Research (ONR) SBIR (Award#N141-075)  
*Patterns of Life Calculation from Big Graphs.* with Narayanan Ramanathan (ObjectVideo).  
\$50,000. (May 2014–Nov 2014).

## INDUSTRY RESEARCH EXPERIENCE

- **IBM T. J. Watson Research Labs** Hawthorne, NY, USA  
*Graduate assistant* May 2011 - Sep. 2011
  - Interned with the SmallBlue Data Analytics research group under Dr. Ravi Konuru, and supervised by Dr. Hanghang Tong.
  - Developed effective methods to spot anomalous data instances, interactions and events in complex data. **Keywords:** data compression, anomaly detection, filtering
- **IBM T. J. Watson Research Labs** Hawthorne, NY, USA  
*Graduate assistant* June 2010 - Sep. 2010
  - Interned with the Large-Scale Streaming Graph Analytics research group under Dr. Kun-Lung Wu, and supervised by Dr. Rohit Khandekar.

- Developed efficient distributed approximation algorithms to compute Personalized PageRank scores for a given node for very large graphs that grow in a streaming fashion. **Keywords:** incremental PageRank, disk-resident graphs, distributed graph algorithms

- **Microsoft Research Labs** Redmond, WA, USA  
*Summer intern* *June 2009 - August 2009*
  - Interned with the Search Quality & Cyber-Intelligence research group under Dr. Yi-Min Wang, and supervised by Dr. Chao Liu.
  - Analyzed the structure and dynamics of the User Browsing Graph with over 1 billion trails.
- **Bilkent University** Ankara, Turkey  
*Senior Thesis: Focused Crawling for Intelligent Portals* *Sep. 2006 - May 2007*
  - Extended the Rule-Based Focused Crawling algorithm by applying page fragmentation, and developed effective information extraction algorithms using machine learning approaches.
- **BOSCH Industry and Trade Inc.** Bursa, Turkey  
*Summer training in the Research and Development Department* *July 2006 - Sep. 2006*
  - Designed the relational database for tracking the hardware and employees in the department and designed and implemented the GUI for searching and making updates in the system.
- **Bilkent University** Ankara, Turkey  
*RETINA Research Project* *June 2006 - July 2006*
  - Worked with Dr. Pinar Duygulu and Dr. Selim Aksoy on a research project on content-based classification and retrieval of image and video data.
  - Participated in the database design of the image/video repository, the GUI design and the implementation for classification and retrieval, and experiments on TRECVID 2006 data.
- **Armakom IT Inc.** Ankara, Turkey  
*Summer training in the IT department* *June 2006 - July 2006*
- **Havelsan Aerospace Electronics Industry and Trade Inc.** Ankara, Turkey  
*Summer training in the IT Department* *June 2005 - July 2005*

## TEACHING

- **Instructor** (Spring 2021, Virtual) 95-828 *Machine Learning for Problem Solving*, CMU (Enrollment: 66)
- **Instructor** (Spring A1 2021, Virtual) 95-869 *Big Data and Large Scale Computing*, CMU (Enrollment: 38)
- **Instructor** (Fall A1 2020, Virtual) 95-869 *Big Data and Large Scale Computing*, CMU (Enrollment: 54)
- **Instructor** (Fall A1 2019) 95-869 *Big Data and Large Scale Computing*, CMU (Enrollment: 40)
- **Instructor** (Spring A4 2019) 95-869 *Big Data and Large Scale Computing*, CMU (Enrollment: 38)
- **Instructor** (Spring 2019) 95-828 *Machine Learning for Problem Solving*, CMU (two sections; Enrollments: 40 and 64)
- **Instructor** (Spring A4 2018) 95-869 *Big Data and Large Scale Computing*, CMU (Enrollment: 27)
- **Instructor** (Spring 2018) 95-828 *Machine Learning for Problem Solving*, CMU (Enrollment: 68)
- **Instructor** (Fall A2 2017) 95-801 *Data Mining Techniques*, CMU (Enrollment: 23)
- **Instructor** (Fall A2 2017) 95-869 *Big Data and Large Scale Computing*, CMU (Enrollment: 35)
- **Instructor** (Spring A4 2017) 95-869 *Big Data and Large Scale Computing*, CMU (Enrollment: 34)
- **Instructor** (Spring 2017) 95-828 *Machine Learning for Problem Solving*, CMU (Enrollment: 46)
- **Instructor** CSE-591 *Data Science Fundamentals*, Stony Brook, Fall 2015. (Enrolled: 44)
- **Instructor** CSE-512 *Machine Learning*, Stony Brook, Spring 2015. (Enrolled: 46; 10 AMS)
- **Instructor** CSE-590 *Data Mining meets Graph Mining*, Stony Brook, Fall 2014. (Enrolled: 50)
- **Instructor** CSE-512 *Machine Learning*, Stony Brook, Spring 2014. (Enrolled: 58)

- **Instructor** CSE-590 Networks & Data Mining Techniques, Stony Brook, Fall 2013. (Enrolled: 49)
- **Instructor** CSE-512 Machine Learning, Stony Brook, Spring 2013. (Enrolled: 40)
- **Instructor** CSE-590 Selected Topics in Data Mining & Networks, Stony Brook, Fall 2012. (Enrolled: 33)
- **Teaching Assistant** Database Applications, Instructor: Prof. Christos Faloutsos, Fall 2009.
- **Teaching Assistant** Machine Learning, Instructor: Prof. Aarti Singh, Fall 2010. Guided 5 groups of 2-3 each, on research course projects.

## INVITED TALKS

- IJCAI 2021 **Early-Career Spotlight Talk**, Aug. 2021, (Virtual)  
*Anomaly Detection in Graphs - Past, Present and Future*
- 2nd Workshop on Artificial Intelligence for Anomalies and Novelty (AI4AN 2021), in conjunction with IJCAI 2021, Aug 21, 2021; (Virtual)  
*TBD*
- AI for Materials Science: Mining and Learning Interpretable, Explainable, and Generalizable Models from Data, June 2021, (Virtual)  
*TBD*
- PAKDD 2021 **The Most Influential Paper Talk**, May 2021, (Virtual)  
*Anomaly Detection in Graphs - Past, Present and Future*
- Workshop on Graph Learning Benchmarks at TheWebConf (WWW) 2021, Apr 19, 2021; (Virtual)  
*On Using Classification Datasets to Evaluate Graph Outlier Detection: Peculiar Observations and New Insights*
- NetSI's Machine Learning with Graphs Seminar, Apr 9, 2021; (Virtual)  
*On Using Classification Datasets to Evaluate Graph Outlier Detection: Peculiar Observations and New Insights*
- AAAI 2021 Workshop on Deep Learning on Graphs (DLG), Feb 8, 2021; (Virtual)  
*Tackling Structure Learning and Oversmoothing for Graph-based SSL*
- IEEE Big Data Workshop on Graph Techniques for Adversarial Activity Analytics Workshop, Dec 10, 2020; (Virtual)  
*Detecting Anomalous Behavior in Large Graph Databases*
- Keynote at the 9th International Conference on Complex Networks, Dec 1–3, 2020; (Virtual)  
*Graph-based Anomaly Detection: Problems, Algorithms and Applications*
- NJIT's Data Science Seminar, Nov 11, 2020; (Virtual)  
*Graph-based Anomaly Detection: Problems, Algorithms and Applications*
- Interpretable Data and Network Mining at the 2020 INFORMS Annual Meeting, Nov 8–11, 2020; Washington DC  
*Human-in-the-loop Anomaly Mining: Explanation and Interactive Detection*
- Mining and Learning on Graphs at the 2020 INFORMS Annual Meeting, Nov 8–11, 2020; Washington DC  
*Tackling Structure And Oversmoothing for Graph-based SSL*
- AI in Finance Summit, Sep 5–6, 2019; NYC  
*Anomaly Mining: Detection, Explanation, Interaction*
- Stanford University RAIN (Research in Algorithms and Incentives in Networks) Seminar, May 22, 2019; Stanford, CA  
*A Quest for Structure: Joint Graph Structure & Semi-Supervised Inference*
- Amazon Research at Palo Alto, May 21, 2019  
*Anomaly Mining: Detection, Explanation, Interaction*
- University of California Riverside, Feb 8, 2019; Host: Evangelos Papalexakis  
*Anomaly Mining: Detection and Beyond*

- Gilbreth Lecture at the National Academy of Engineering National Meeting, February 7, 2019; Irvine, CA  
*Anomaly Mining: Detection and Beyond*
- Singapore Management University Research Seminar, Nov 14, 2018  
*Event Detection and Localization via Time-Varying Sensing on a Graph*
- Aalto University, Nov 8, 2018; Finland. Host: Aristides Gionis;  
*Anomaly Mining: Detection and Beyond*
- Capital One Workshop on Anomaly Detection, Oct 23, 2018; McLean, Virginia  
*Anomaly Mining: Detection with Networks and Beyond*
- Dagstuhl Seminar on Automating Data Science, Germany, Sep 30–Oct 5, 2018; Dagstuhl, Germany  
*Moderator: Automation in Data Science for Unsupervised Tasks*
- Japan-American Frontiers of Engineering Symposium (partnership of US National Academy of Engineering and Engineering Academy of Japan), June 18-20, 2018; Tsukuba, Japan  
*Anomaly Mining: Detection and Beyond*
- NetSci 2018 Satellite on Machine Learning In Network Science, June 12, Paris, France  
*Attributed Networks: Social Circles, Summarization, Comparison*
- NetSci 2018 Satellite on Statistical Inference of Network Models, June 11, Paris, France  
*A Quest for Structure: Joint Graph Structure & Semi-Supervised Inference*
- ACM WSDM International Workshop on Misinformation and Misbehavior Mining on the Web (MIS2), February 9, 2018  
*Opinion Spam Detection: A Story of Networks, Meta-data and an Oracle*
- ACM WSDM International Workshop on Heterogeneous Networks Analysis, February 9, 2018  
*Mining Rich Graphs: Ranking, Classification, and Anomaly Detection*
- IEEE ICDM 2017 Workshop on High Performance Graph Data Mining and Machine Learning, November 18, 2017  
*Online Detection of Anomalous Heterogeneous Graphs with Streaming Edges*
- UT Southwestern Medical Center CSB (Computational & Systems Biology) Seminar, Host: Murat Cobanoglu, October 23, 2017  
*automated Data Description (ODD): Explaining Anomalies for Human Interpretation*
- UT Austin McCombs School of Business Information Management Seminar, October 18, 2017  
*Discovering Networks of Fraudulent Users in Online Review Platforms*
- University of Pittsburgh Big Data Science Colloquium, Host: Yu-ru Lin, September 22, 2017  
*Discovering Communities and Anomalies in Attributed Graphs: Interactive Visual Exploration and Summarization*
- ACM KDD Interactive Data Exploration and Analytics (IDEA) Workshop, August 14, 2017  
*Understanding Node-Attributed Networks: Interactive Exploration and Summarization*
- SIAM SDM 2017 Workshop Women in Data Science (WinDS), April 29, 2017  
*Opinion Spam Detection with Multimodal Data*
- SCS Network Science Seminar Series, April 25, 2017  
*Ranking in Heterogeneous Networks with Geo-Location Information*
- Machine Learning Special Seminar, CMU, October 18, 2016  
*Tackling Anomaly Mining Problems in the Wild with Networks and Beyond*
- ACM KDD International Workshop on Mining and Learning with Graphs (MLG), August 14, 2016  
*Communities and Anomalies in Attributed Networks*
- Army Research Labs, Adelphi, MD, July 15, 2016  
*Tackling Anomaly Mining Problems in the Wild*
- ICML 2016 Anomaly Detection Workshop, June 24, 2016  
*Tackling Anomaly Mining Problems in the Wild*
- Amazon India, Machine Learning Team, June 8, 2016  
*Opinion Spam Detection with Networks and Beyond*

- Flipkart, Host: Mohit Kumar, June 6, 2016  
*Opinion Spam Detection with Networks and Beyond*
- Keynote talk at SDM 2016 Workshop on Mining Networks and Graphs, May 7, 2016  
*Fraud Detection with Networks and Beyond*
- Georgia Tech, Computational Science and Engineering, Host: Le Song, March 2016  
*3 D's of Anomaly Mining in Complex Graphs: Definition, Detection, Description*
- University of Southern California, Host: Yan Liu, March 2016  
*3 D's of Anomaly Mining in Complex Graphs: Definition, Detection, Description*
- University of Maryland, College Park, February 2016  
*3 D's of Anomaly Mining in Complex Graphs: Definition, Detection, Description*
- Carnegie Mellon University, Heinz College, Host: Daniel Neill, February 2016  
*3 D's of Anomaly Mining in Complex Graphs: Definition, Detection, Description*
- Northeastern University (Network Science Institute), Hosts: Tina Eliassi-Rad, Yizhou Sun, February 2016  
*3 D's of Anomaly Mining in Complex Graphs: Definition, Detection, Description*
- University of Massachusetts Amherst, Host: Andrew McCallum, February 2016  
*3 D's of Anomaly Mining in Complex Graphs: Definition, Detection, Description*
- Carnegie Mellon University, Electrical and Computer Engineering, January 2016  
*3 D's of Anomaly Mining in Complex Graphs: Definition, Detection, Description*
- NII Shonan Meeting on “Analytics on Complex Networks: Scalable Solutions for Empirical Questions” Japan, February 2016.
- University of Illinois at Chicago, Hosts: Bing Liu and Tanya Berger-Wolf, November 2015  
*3 D's of Anomaly Mining in Complex Graphs: Definition, Detection, and Description*
- CMU Tepper School of Business, Host: Wolfgang Gatterbauer, November 2015  
*Robust Semi-Supervised Classification with Multi-Relational Graphs*
- KU Leuven, Host: Bart Baesens, October 2015  
*3 D's of Anomaly Mining in Complex Graphs: Definition, Detection, and Description*
- Workshop on Statistical and Computational Challenges in Networks and Cybersecurity. Montreal, Canada. May 2015  
*Mining Large Graphs for Detecting Anomalies, Events, and Fraud*
- University of Pittsburgh, Host: Alexandros Labrinidis, April 2015  
*3 D's of Anomaly Mining in Complex Graphs: Definition, Detection, and Description*
- Huawei Technologies R&D, Santa Clara, CA. Nov. 2014  
*Large-scale Graph Analytics for Anomaly Mining and Event Detection*
- NICTA and University of Sydney, Sydney, AU. Host: Sanjay Chawla, July 2014.  
*Anomaly Detection and Description in Large Complex Graphs*
- KPMG LLP, Woodcliff Lake, NJ. Host: Rajiv Dulepet, April 2014.  
*Data Analytics Round Table*
- Twitter Inc., San Francisco, CA. Host: Ramnath Balasubramanian, Mar. 2014.  
*Mining Typed Information Networks with Applications to Finding Fraud, Polarization, and Word-Sense Connotation*
- University of California Santa Barbara, CA. Host: Xifeng Yan, Mar. 2014.  
*Measuring and Manipulating the Robustness of Large Networks*
- Stony Brook University, East-West Biomedical Informatics Workshop, Mar. 2014.  
*Sex Differences in the Human Connectome*
- Lawrence Berkeley National Lab, Berkeley, CA. Host: Aydin Buluc, Jan. 2014.  
*Robustness of Large Networks: Measuring and Manipulating*
- Rensselaer Polytechnic Institute, Troy, NY. Host: Sibel Adali, Nov. 2013.  
*Mining Signed Information Networks with Applications to Detecting Fraud and Polarization*

- Northrop Grumman Information Systems University Tech Day, Colshire, VA Nov. 2013  
*Cyber Network Anomaly Detection, Analysis, Visualization*
- NEC Laboratories America Inc., Princeton Campus, NJ. Host: Abhishek Sharma, Oct. 2013.  
*Detecting and Characterizing Highly Volatile Events in Large Temporal Graphs*
- NSF CDDA Workshop at Rutgers University. Sep. 2013.  
*Anomaly Detection in Large Graphs*
- City University of New York (CUNY), NY. Host: Hanghang Tong, April 2013.  
*Opinion Fraud Detection in Online Reviews using Network Effects*
- NSF CDDA Workshop at CEWIT, March 2013.  
*Fast and Reliable Information-Theoretic Anomaly Detection and Description*
- Google, Pittsburgh, PA. Host: Andrew Moore, October 2012.  
*Spotting Opinion Fraud in Online Reviews*
- Singapore Management University (SMU). Host: Kyriakos Mouratidis, June 2012.  
*Large Graph Analytics: Patterns, Anomalies, and Tools*
- Sabanci University, Turkey. Host: Yucel Saygin, May 2012.  
*Large Graph Analytics: Patterns, Anomalies, and Tools*
- Google Research, New York City, Research Talk, April 2012.  
*Large-scale Graph Analytics: Patterns, Anomalies, and Tools*
- Carnegie Mellon, Machine Learning Lunch Seminar, April 2012.  
*Efficient Vertex-Proximity Query Processing on Large Time-Evolving Graphs*
- Washington State University, CS Seminar, March 2012. Host: Larry Holder  
*Large-scale Graph Analytics: Patterns, Anomalies, and Tools*
- Virginia Tech, CS Seminar, March 2012. Host: Lenny Heat  
*Massive Graph Analytics: Patterns, Anomalies, and Tools*
- University of Waterloo, Research Seminar and Mock Lecture, March 2012. Host: Bill Cowan  
*Large-scale Graph Analytics: Patterns, Anomalies, and Tools*
- IBM Research, Yorktown NY, Machine Learning Group Talk, Feb. 2012.  
*Large-scale Graph Analytics: Patterns, Anomalies, and Tools*
- Stony Brook University, Research Talk, Feb. 2012.  
*Large-scale Graph Analytics: Patterns, Anomalies, and Tools*
- Clemson University, Research Talk. Host: Brian Dean, Feb. 2012.  
*Large-scale Graph Analytics: Patterns, Anomalies, and Tools*

## ADVISING&MENTORING

DATA Lab website can be found at <http://datalab.heinz.cmu.edu/>

### News/Awards

- Shubhranshu Shekhar receives 2021 George Duncan Award for his 2nd Heinz paper
- Hemank Lamba receives SIAM SDM 2019 Student Travel Award
- Lingxiao Zhao receives 2018 SIGIR Student Travel Grant to present his paper at CIKM
- Xuejian Wang receives 2018 PwC Presidential PhD Fellowship Award
- Meghanath Macha receives 2018 Suresh Konda Award for his 1st Heinz paper
- Bryan Perozzi receives the ACM SIGKDD 2017 Doctoral Dissertation Award
- Emaad A. Manzoor receives KDD 2017 Student Travel Award and CMU Graduate Student Assembly Conference Funding
- Meghanath Macha receives 2017 PwC Presidential PhD Fellowship Award
- Junting Ye receives AAAI ICWSM 2016 Student Travel Award
- Bryan Perozzi receives SIAM SDM 2016 Student Travel Award
- Shebuti Rayana receives SIAM SDM 2016 Student Travel Award
- Hau Chan wins Catacosinos Fellowship for Excellence in Computer Science



- Shebuti Rayana receives SIAM SDM 2015 Student Travel Award
- Hau Chan receives SIAM SDM 2014 Student Travel Award
- Hau Chan receives IEEE ICDM 2013 Student Travel Award

### Research assistants

- Saurabh Sunil Sawlani (Post-Doc, PhD: Georgia Tech), Jul 2020 –
- Martin Ma, (MS, SCS/CompBio, Carnegie Mellon University), Jul 2020 - (Feb 2021)
- Harsh Sharma, (MS, SCS/Robotics, Carnegie Mellon University), Jul 2020 - (Dec 2020)
- Meng-Chieh Lee (MS, National Chiao Tung University), visiting student, Aug 2019 – May 2020
- Dimitrios Bermperidis (Post-Doc, PhD: University of Minnesota), Jul 2019 – Jun 2020
- Jing Mao, (MS: ECE, Carnegie Mellon University), May 2019 – Aug 2019
- Hung T. Nguyen (Post-Doc, PhD: Virginia Commonwealth University), Aug 2018 – Aug 2019
- Tuan M. V. Le (Post-Doc, PhD: Singapore Management University), Aug 2017 – Jul 2018
- Lingxiao Zhao, (MS: ECE, Carnegie Mellon University), Feb 2018 – Aug 2018

### Graduate (PhD/MS) students

- Yue Zhao (PhD, Carnegie Mellon University), advisor, F 2019 – present
- Lingxiao Zhao, (PhD, Carnegie Mellon University), F 2018 – present
- Shubhranshu Shekhar (PhD, Carnegie Mellon University), advisor, F 2017 – present
- Sachin Grover, (PhD, Carnegie Mellon University), F 2018 – F 2019
- Xuejian Wang, (PhD, Carnegie Mellon University), F 2018 – F 2019
- Hemank Lamba (PhD, Carnegie Mellon University), advisor, F 2017 – F 2018
- Meghanath Macha (PhD, Carnegie Mellon University), advisor, F 2016 – S 2018
- Emaad Ahmed Manzoor (PhD, Carnegie Mellon University), advisor, F 2015 - S 2018
- Shebuti Rayana (PhD, Stony Brook University), advisor, 2013 - 2017
- Abhinav Maurya (PhD, Carnegie Mellon University), project advisor, Summer 2017
- Runshan Fu (PhD, Carnegie Mellon University), project advisor, F 2016 - S 2017
- Iris Roelens (PhD, Ghent University), visiting student, F 2016 - S 2017
- Junting Ye (PhD, Stony Brook University), advisor, F 2014 - S 2016
- Aria Rezaei (PhD, Stony Brook University), advisor, F 2015 - S 2016
- Mohammadzaman Zamani (PhD, Stony Brook University), advisor, F 2014 - S 2015
- Hau Chan (PhD, Stony Brook University), co-advisor with Luis Ortiz, 2015 - 2016
- Mirza Basim Baig (PhD, Stony Brook University), advisor, 2014 - 2015
- Bryan Perozzi (PhD, Stony Brook University), collaboration, 2013 -
- Shuchu Han (PhD, Stony Brook University), collaboration, 2012 - 2014
- {Connor Ford, William Kajos, Hayden Moore, Logan Smith} (MISM, Carnegie Mellon University), Capstone Project Research Practicum, S 2021
- Lingxiao Zhao, (MS, ECE, Carnegie Mellon University), Independent Study, F 2017 - S 2018
- Xuan Wu, (MS, ISR/SCS, Carnegie Mellon University), Independent Study, S 2017 - F 2017
- Anurag Gandhi, (MISM, Carnegie Mellon University), Independent Study, F 2017
- {Rashmi Raghunandan, Shruti Sridhar, Upasna Suman} (MISM, Carnegie Mellon University), Independent Project, S 2017
- {Qianyi Hu, Le Le, Ting Ying Yin, Lewen Zhang} (MS, Carnegie Mellon University), Capstone Project Research Practicum, S 2017
- Christian Perez, (MS, LTI, Carnegie Mellon University), Independent Study, F 2016

- {Emilio Esposito, Luan Jiang, Xiao Gong, Bingnan Zhou} (MISM, Carnegie Mellon University), Capstone Project Research Practicum, F 2016
- {Kee Wei Lam, Yu-Hsin Lin, Ming-Hsun Tsai} (MISM, Carnegie Mellon University), Independent Study, F 2016
- Abhinav Mishra (MS, Stony Brook University), MS project advisor, S 2015 - F 2016
- Santhosh K. M. Lakshminarayanan (MS, Stony Brook), MS project advisor, F 2014 - F 2016
- Heeyoung Kwon (MS, Stony Brook University), MS thesis advisor, S 2014 - S 2015
- Zichao Dai (MS, Stony Brook University), MS project advisor, 2013 - 2014
- Vasudev Bhat (MS, Stony Brook University), MS project advisor, 2013 - 2014
- Jagat S. Pudipeddi (MS, Stony Brook University), MS project advisor, 2012 - 2013
- Vivek Kulkarni (MS, Stony Brook University), MS project advisor, 2012 - 2013
- Tiantian Gao (MS, Stony Brook University), MS project advisor, Fall 2012

### Undergraduate/High-school students

- Nikhil Gupta (IIT Delhi), summer research advisor, 06/2017-08/2017
- Monica Helena Ribeiro (Stony Brook University), summer research advisor, 06/2015-09/2015
- Gabriel Augusto Baierle (Stony Brook University), summer research advisor, 06/2015-09/2015
- Junhee Park (Stony Brook University), research project advisor, 06/2013-09/2013
- Melissa Thomas (Herricks High School), summer research advisor, 06/2015-09/2015

### PhD thesis committee

- Namyong Park (PhD, SCS, Carnegie Mellon), expected 2022
- Xiaoyi Ivy Gu (PhD, Statistics & Data Science, Carnegie Mellon), expected 2022
- Tong Zhao (PhD, U. of Notre Dame), expected 2022
- Dawei Zhou (PhD, UIUC), expected 2021
- Abhinav Maurya (PhD, MLD/Heinz, Carnegie Mellon), expected 2021
- Yuexin Wu (PhD, LTI/SCS, Carnegie Mellon), 2020
- William Herlands (PhD, MLD/Heinz, Carnegie Mellon), 2020
- Tahora H. Nazer (PhD, Arizona State University), 2019
- Bryan Hooi (PhD, SCS, Carnegie Mellon), 2019
- Junting Ye (PhD, CS, Stony Brook University), 2019
- Kijung Shin (PhD, SCS, Carnegie Mellon), 2019
- Ankita Mangal (PhD, Materials Science and Engineering, Carnegie Mellon), 2018
- Rami Al-Rfou' (PhD, CS, Stony Brook University), 2015
- Bryan Perozzi (PhD, CS, Stony Brook University), 2016
- Hao Huang (PhD, CS, Stony Brook University), 2014

### PhD thesis committee (International)

- Edward Toth (Doctor of Philosophy (Engineering and IT), University of Sydney), 2019
- Polina Rozenshtein (Doctoral programme in Science, Aalto University), 2018
- Aleksi Kallio (Doctoral programme in Science, Aalto University), 2015
- Véronique Van Vlasselaer (Doctor of Philosophy, CS, KU Leuven), 2015
- Laura Langohr (Doctor of Philosophy, CS, University of Helsinki), 2014

## COMMUNITY ACTIVITIES

### Program Committees

- **Program Co-Chair** (2022) International Conference on Web Search and Data Mining (WSDM)
- **Tutorials Co-Chair** (2021, 2019, 2018) Conference on Knowledge Discovery and Data Mining (KDD)
- **Program Co-Chair** (2021) SIAM International Conference on Data Mining (SDM)

- **Senior Member** (2021, 2020, 2019) ACM Conference on Knowledge Discovery and Data Mining (SIGKDD)
- **Area Chair** (2021, 2020, 2019, 2018, 2017, 2016) IEEE International Conference on Data Mining (ICDM)
- **Area Chair** (2021) International Joint Conference on Artificial Intelligence (IJCAI)
- **Member** ECML PKDD 2020 Best Paper Award Committee
- **Tutorials Co-Chair** (2019, 2018) Conference on Knowledge Discovery and Data Mining (KDD)
- **Tutorials Co-Chair** (2019) Conference on Information and Knowledge Management (CIKM)
- **Senior Member** (2019, 2018, 2017, 2016) SIAM International Conference on Data Mining (SDM)
- **Senior Member** (2019, 2018, 2017, 2016) International Conference on Web Search and Data Mining (WSDM)
- **Member** (2019, 2015, 2014) European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML PKDD)
- **Member** (2019, 2017, 2016, 2013) Mining and Learning with Graphs (MLG) (in conj. with KDD)
- **Member** (2019) The Fifth International Conference on Machine Learning, Optimization, and Data Science (LOD)
- **Member** (2019) ACM KDD 2019 Workshop on Learning and Mining for Cybersecurity (LEMNCS)
- **Member** (2018, 2016, 2015, 2014) Conference on Knowledge Discovery and Data Mining (KDD)
- **Program Co-Chair** (2018) International Conference on Intelligent Information Technologies (ICIIT)
- **Tutorials Co-Chair** (2018) IEEE International Conference on Data Mining (ICDM)
- **Co-Chair** (2018) Social Networks and Graph Analysis Track of the World Wide Web Conference (WWW)
- **Member** (2018) Conference on Information and Knowledge Management (CIKM)
- **Member** (2018) IEEE International Conference on Big Knowledge (ICBK)
- **Member** (2018) 7th International Conference on Computational Data and Social Networks (CSoNet)
- **Member** (2018) First International Workshop on Online Social Networks and Media: Network Properties and Dynamics (in conj. with WWW)
- **Panelist** (2017) IEEE ICDM PhD Forum
- **Senior Member** (2017) Conference on Information and Knowledge Management (CIKM)
- **Publicity Chair** (2017) INFORMS Conference on Data Science
- **Workshops Co-Chair** (2017) Conference on Knowledge Discovery and Data Mining (KDD)
- **Workshops Co-Chair** (2017) SIAM International Conference on Data Mining (SDM)
- **Member** (2017) International School and Conference on Network Science (NetSci)
- **Member** (2017, 2016, 2014) International Conference on Social Informatics (SocInfo)
- **Member** (2017) High Performance Graph Data Mining and Machine Learning Workshop (HPGDML) (in conj. with ICDM)
- **Student Travel Awards Co-Chair** (2016) Conference on Knowledge Discovery and Data Mining (KDD)
- **PhD Forum Co-Chair** (2016) European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)
- **Tutorial Co-Chair** (2016) Pacific Asia Conference on Knowledge Discovery and Data Mining (PAKDD)
- **Member** (2016) International Joint Conference on Artificial Intelligence (IJCAI)
- **Member** (2016) International Workshop on Machine learning, Optimization & big Data (MOD)
- **Member** (2016) Third Workshop on Mining Networks and Graphs at the SIAM Data Mining (SDM)
- **Member** (2015, 2014, 2013) IEEE International Conference on Data Mining (ICDM)

- **Member** (2015, 2014, 2013) SIAM International Conference on Data Mining (SDM)
- **PhD Forum Co-Chair** (2015) IEEE International Conference on Data Mining (ICDM)
- **Publicity Co-Chair** (2015) SIAM International Conference on Data Mining (SDM)
- **Member** (2015, 2014) SIAM Workshop on Network Science (SIAMNS)
- **Member** (2015, 2014, 2013) Interactive Data Exploration and Analytics (IDEA) (in conj. with KDD)
- **Member** (2015) Workshop on Ensemble of Anomaly Detection Algorithms (EADA) (in conj. IEEE/WIC/ACM IAT 2015)
- **Member** (2015) BigGraphs Workshop at IEEE BigData 2015
- **Member** (2015) 1st International Workshop on Dynamics in Networks (DyNo) (in conj. with IEEE/ACM ASONAM)
- **Member** (2015) Workshop on Diffusion, Activity and Events in Networks: Models, Methods & Applications (in conj. with WWW 2015)
- **Member** (2015) WWW Social Networks and Graph Analysis Track
- **Member** (2014) ECML/PKDD 2014 Nectar Track
- **Member** (2014) Workshop on Diffusion Networks and Cascade Analytics of the ACM WSDM
- **Member** (2014) Ph.D. Workshop in Information and Knowledge Management (PIKM) (in conjunction with CIKM)
- **Member** (2014) International Conference on Web Search and Data Mining (WSDM)
- **Member** (2014) International Conference on Big Data Science (BigDataScience)
- **Member** (2014) Workshop on Big Scholarly Data: Towards the Web of Scholars (BigScholar) (in conjunction with WWW)
- **Member** (2013) IEEE ICDM PhD Student Forum
- **Member** (2013) Conference on Knowledge Discovery and Data Mining Demo Track (KDD)
- **Member** (2013) IEEE International Conference on Data Engineering (ICDE)
- **Member** (2013) Association for the Advancement of Artificial Intelligence (AAAI)
- **Member** (2013) The International Workshop on Large Scale Network Analysis (LSNA) (in conjunction with WWW)
- **Co-chair** (2013) International Workshop on Graph Data Management (GDM) (in conjunction with ICDE)

### Workshop Organizer

- 5th ACM SIGKDD 2021 Workshop on **ODD: Outlier Detection and Description** with Siddharth Bhatia, Sourav Chatterjee, Manish Gupta, Xiaodong Jiang, Bryan Hooi Kuen-Yew
- 4th ACM SIGKDD 2021 Workshop on **Machine Learning in Finance** with Nitesh Chawla, Tanveer Faruque, Senthil Kumar, Saurabh Nagrecha, Jose A. Rodriguez-Serrano
- 3rd ACM SIGKDD 2020 Workshop on **Machine Learning in Finance** with Nitesh Chawla, Tanveer Faruque, Senthil Kumar, Saurabh Nagrecha, Jose A. Rodriguez-Serrano
- 2nd ACM SIGKDD 2019 Workshop on **Anomaly Detection in Finance** with Nitesh Chawla, Tanveer Faruque, Prabhanjan Kambadur, Senthil Kumar, Saurabh Nagrecha
- 5th ACM SIGKDD Workshop on **Outlier Detection De-constructed** ODDv5.0 @ KDD 2018 with Evgeny Burnaev, Charu Aggarwal, Christos Faloutsos
- WWW 2018 the 2nd **Women in Data Science (WinDS)** Workshop
- 4th ACM SIGKDD Workshop on **Outlier Definition, Detection, and Description on Demand** ODD4.0 @ KDD 2016 with Franziska Bell, Emmanuel Müller, Ted E. Senator
- 3rd ACM SIGKDD Workshop on **Outlier Definition, Detection, and Description** ODDx3 @ KDD 2015 with Sanjay Chawla, Emmanuel Müller, Ted E. Senator
- IJCAI (2016, 2015) Workshop on **Heterogeneous Information Network Analysis (HINA)**
- 2nd ACM SIGKDD Workshop on **Outlier Detection and Description under Data Diversity** ODD<sup>2</sup> @ KDD 2014 with Charu Aggarwal, Emmanuel Müller, Raymond T. Ng
- WWW Workshop on **Big Graph Mining** (1st BGM@WWW 2014)

- 1st IEEE ICDM Workshop on **Mining Social Data at Work** (MSDW@ICDM 2013)
- 1st ACM SIGKDD Workshop on **Outlier Detection and Description** ODD @ KDD 2013 with Emmanuel Müller and Jilles Vreeken
- ACM SIGMOD Workshop on **Dynamic Networks Management and Mining** (DyNetMM 2013)

### Tutorials

- (ACM CCS 2015) Fraud Detection through Graph-Based User Behavior Modeling. Alex Beutel, Leman Akoglu, Christos Faloutsos. (3 hours)
- (ACM KDD 2015) Graph-Based User Behavior Modeling: From Prediction to Fraud Detection. Alex Beutel, Leman Akoglu, Christos Faloutsos. (3 hours)
- (ACM WSDM 2014) Big Graph Mining for Web & Social Media: Algorithms, Anomaly Detection, Applications. U Kang, Leman Akoglu, Polo Chau. (3 hours)
- (IEEE/ACM ASONAM 2013) Big Graph Mining: Algorithms, Anomaly Detection, and Applications. U Kang, Leman Akoglu, Polo Chau. (2 hours)
- (ACM WSDM 2013) Anomaly, Event, and Fraud Detection in Large Graph Datasets. Leman Akoglu, Christos Faloutsos. (6 hours)
- (IEEE ICDM 2012) What is Strange in Large Networks? Graph-based Irregularity and Fraud Detection. Leman Akoglu, Christos Faloutsos. (4 hours)

### Reviewer

- NSF III CAREER Review Panelist, Nov 2016
- NSF CISE/IIS Review Panelist, June 2015
- NSF CISE/III Review Panelist, Dec 2014
- NSF IIS Review Panelist, 2013
- NSF BIGDATA Review Panelist, 2012
- Data Mining and Knowledge Discovery Journal (DAMI)
- IEEE Transactions on Knowledge and Data Engineering (TKDE)
- ACM Transactions on Knowledge Discovery from Data (TKDD)
- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- Transactions on Dependable and Secure Computing (TDSC)
- Knowledge and Information Systems (KAIS)
- KDD, ICDM, SDM, WWW, WSDM, ICWSM, ECML/PKDD

### University Service

- 2016–2021 PhD (Admissions) Committee, Heinz College, CMU
- 2020–2023 CMU Academic Review Board (ARB) Member
- 2019–2020 Heinz College Dean’s Evaluation Committee Member
- April 2019 Research talk at the National Security Agency Research Meeting at CMU
- 2017–18 Co-organizer for the College Seminar and HILS (Heinz Informal Lunch Seminar) series
- Sep 2017 PhD Seminar research talk for 1st year students, CMU
- 2017 Committee Lead for ML-PP joint PhD program curriculum
- Sep 2016 PhD Seminar research talk for 1st year students, CMU
- 2015 CS Graduate Student Orientation Talk on Data Mining Research, SBU
- Coordinator: Data Science & Engineering Specialization to MS in CS (MSCS) Program, SBU
- April 2015 Women in CS Professor Mixer, SBU
- 2014-15 Graduate student admissions committee, SBU
- 2014 IACS Graduate Program Committee member, SBU
- 2013 CS Graduate Student Orientation Talk on Data Mining Research, SBU
- 2013-14 Graduate student admissions committee, SBU
- 2012-13 Graduate student admissions committee, SBU

## Other Service

- **IEEE Spectrum Article Review** *It's Too Easy to Hide Bias in Deep-Learning Systems* by Matthew Hutson
- **Book Review** *Outlier Analysis* by Charu C. Aggarwal
- **Book Review** *Introduction to Data Mining Ch. 9 on Anomaly Detection* by Pang-Ning Tan, Michael Steinbach, Anuj Karpatne, Vipin Kumar
- **Book Review** *Outlier Detection for Temporal Data* by Manish Gupta, Charu C. Aggarwal, Jiawei Han, and Jing Gao
- **Mentor** Broadening Participation in Data Mining Workshop (BPDM 2016, in conj. w/ KDD)
- Editorial Board Member: Data Mining & Knowledge Discovery (DMKD) (Jan-Sep 2016)
- Associate Editor: IEEE Trans. on Knowledge & Data Engineering (TKDE) (Jan'16-Jan'17)
- 2013 Guest Editor for Discrete Dynamics in Nature and Society (Special Issue on Discrete Analysis of Social Networks and Societies)

## PATENTS

1. **System and Method for Large Volume Data Analytics** Inventors: Leman Akoglu and Narayanan Ramanathan (ObjectVideo). U.S. Provisional Application No. 62/061,935, filed October 9, 2014.
2. **Vertex-proximity query processing in large time-evolving graphs** Inventors: Rohit M. Khandekar, Kun-Lung Wu, Leman Akoglu, Deepak Rajan, Vibhore Kumar, Srinivasan Parthasarathy. IBM T. J. Watson Research, filed Sep. 2011, approved: July 2014. US20130151536
3. **Anomaly, association and clustering detection** Inventors: Hanghang Tong, Leman Akoglu, Ching-Yung Lin, Ravi Konuru. IBM T. J. Watson Research, filed Dec. 2011, approved: US20140074838
4. **Dynamic anomaly, association and clustering detection** Inventors: Hanghang Tong, Leman Akoglu, Ching-Yung Lin, Ravi Konuru. IBM T. J. Watson Research, filed Dec. 2011, approved: US20140074796

## SKILLS

**Programming Languages** MatLab, Java, C, C++, C#, QT, Visual Basic, SQL, PHP, .NET, Perl, Python, Verilog, Assembly (Intel & MIPS), L<sup>A</sup>T<sub>E</sub>X

**Databases** PostgreSQL, Oracle, MySQL, Microsoft SQL Server

**Spoken Languages** Turkish (native), English (fluent), Spanish (intermediate level), German (intermediate level), Japanese (beginner level).

**Extracurricular Activities** Chess, (Latin, Ballroom, Argentine tango, Swing) dancing, hiking, zumba

## REFERENCES

**Christos Faloutsos**, Fredkin Professor  
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