

LEMAN AKOGLU

Assistant Professor, Information Systems
H. John Heinz III College
Carnegie Mellon University
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EMPLOYMENT

- **Carnegie Mellon University** Pittsburgh, PA
Asst. Professor of Information Systems (Tenure-Track) September 2016 - Present
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
Asst. Professor (Tenure-Track) August 2012 - August 2016
Department of Computer Science

EDUCATION

- **Carnegie Mellon University** Pittsburgh, PA
Ph.D., Computer Science Sep. 2007 - August 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

- **Winner, Best Research Paper Runner-up** Award in SIAM SDM 2016
- **Received**, Stony Brook University Discretionary Award by the CS Dept, Dec 2015
- **Received**, Facebook Faculty Gift (discretionary funds), May 2015
- **Winner, Best Research Paper** Award in SIAM SDM 2015
- **Received**, SIAM SDM Early Career Travel Award, Feb 2015
- **Received**, NSF CAREER Award, Dec 2014
- **Received**, Stony Brook University Discretionary Award by the CS Dept, Dec 2014
- **Winner, Best Paper** Award in 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 in 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

PEER-REVIEWED JOURNAL ARTICLES

1. Sokratis Vidros, Constantinos Koliass, Georgios Kambourakis, Leman Akoglu. *Automatic Detection of Online Recruitment Frauds: Characteristics, Methods, and a Public Dataset*. **Future Internet**, Mar 2017.
2. 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.
3. Shebuti Rayana and Leman Akoglu. *Less is More: Building Selective Anomaly Ensembles*. **ACM Transactions on Knowledge Discovery from Data (TKDD)**, Jan 2016.

4. Hau Chan and Leman Akoglu
Optimizing Network Robustness by Edge Rewiring: A General Framework
Data Mining and Knowledge Discovery, Volume 30, Issue 5, pp 1395-1425.
(DAMI-D-14-00490R3; DOI: 10.1007/s10618-015-0447-5) (ECML PKDD Journal Track), 2016.
5. 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) (Springer), 2015.
6. 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.
7. Leman Akoglu, Hanghang Tong, Danai Koutra
Graph-based Anomaly Detection and Description: A Survey
Data Mining and Knowledge Discovery (DAMI), 28 (4), 2014.
8. Yuan Yao, Hanghang Tong, Tao Xie, Leman Akoglu, Feng Xu, Jian Lu
Detecting High-quality Posts in Community Question Answering Sites
Information Sciences, 2014.
9. 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. 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.
2. 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.
3. Abhinav Mishra, Leman Akoglu
Ranking in Heterogeneous Networks with Geo-Location Information
SIAM SDM (26%), Houston, Texas, April 2017.
4. 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.
5. Shebuti Rayana, Wen Zhong, Leman Akoglu
Sequential Ensemble Learning for Anomaly Mining: A Bias-Variance Perspective
IEEE ICDM (19.6%), Barcelona, Spain, Dec. 2016.
6. 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.
7. Junting Ye, Santhosh Kumar, Leman Akoglu
Temporal Opinion Spam Detection Using Multiple Indicative Signals
ICWSM (poster), Cologne, Germany, May 2016.
8. Bryan Perozzi and Leman Akoglu
Scalable Anomaly Ranking of Attributed Neighborhoods

- SIAM SDM** (25.9%), Miami, Florida, May 2016.
Best Research Paper Runner-up
9. Shebuti Rayana and Leman Akoglu
Collective Opinion Spam Detection using Active Inference
SIAM SDM (25.9%), Miami, Florida, May 2016.
 10. 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.
 11. Junting Ye and Leman Akoglu
Discovering Opinion Spammer Groups by Network Footprints
ECML/PKDD (23.2%), Porto, Portugal, Sep. 2015.
 12. Shebuti Rayana and Leman Akoglu
Collective Opinion Spam Detection: Bridging Review Networks and Metadata
ACM SIGKDD (19.4%), Sydney AU, Aug. 2015.
 13. 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.
 14. 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)
 15. 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)
 16. 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)
 17. 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.
 18. 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.
 19. 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.
 20. 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)*
 21. 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)*

22. Tiantian Gao, Leman Akoglu
Fast Information-Theoretic Agglomerative Co-Clustering
ADC, Brisbane, Australia, July 2014. (Oral presentation)
Best Paper
23. Leman Akoglu
Quantifying Political Polarity Based on Bipartite Opinion Networks
ICWSM, Ann Arbor, Michigan, June 2014.
24. Jun Seok Kang, Song Feng, Leman Akoglu, Yejin Choi
ConnotationWordNet: Learning Connotation of the Word+Sense Network
ACL, Baltimore, MD, June 2014. (Oral presentation)
25. 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.
26. Hau Chan, Leman Akoglu, Hanghang Tong
Make It or Break It: Manipulating Robustness in Large Networks
SIAM SDM, Philadelphia, PA, Apr. 2014. (Oral presentation)
27. Hau Chan and Leman Akoglu
External Evaluation of Topic Models: A Graph Mining Approach
IEEE ICDM, Dallas, Texas, Dec. 2013.
28. 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.
29. Leman Akoglu, Rishi Chandy, and Christos Faloutsos
Opinion Fraud Detection in Online Reviews by Network Effects
ICWSM, Boston, MA, July 2013.
30. 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.
31. Leman Akoglu, Jilles Vreeken, Hanghang Tong, Duen Horng Chau, Nikolaj Tatti, and Christos Faloutsos
Mining Connection Pathways for Marked Nodes in Large Graphs
SIAM SDM, Austin, Texas, May 2013.
32. Leman Akoglu, Hanghang Tong, Jilles Vreeken, and Christos Faloutsos
Fast and Reliable Anomaly Detection in Categorical Data
ACM CIKM, Maui, Hawaii, Oct 2012.
33. 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.
34. Keith Henderson, Brian Gallagher, Tina Eliassi-Rad, Hanghang Tong, Sugato Basu, Leman Akoglu, Danai Koutra, Lei Li, Christos Faloutsos
RoIX: Structural Role Extraction & Mining in Large Graphs
ACM SIGKDD, Beijing, China, Aug 2012.
35. 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.

36. Leman Akoglu, Hanghang Tong, Brendan Meeder, Christos Faloutsos
PICS: Parameter-free Identification of Cohesive Subgroups in Large Attributed Graphs
SIAM SDM, CA, Apr. 2012.
37. Leman Akoglu, Pedro Olmo Vaz de Melo, Christos Faloutsos
Quantifying Reciprocity in Large Weighted Communication Networks
PAKDD, Kuala Lumpur, Malaysia, May 2012.
38. 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.
39. U Kang, Mary McGlohon, Leman Akoglu, and Christos Faloutsos
Patterns on the Connected Components of Terabyte-Scale Graphs
IEEE ICDM, Sydney, Australia, Dec. 2010.
40. 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.
41. 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.
42. Leman Akoglu, Mary McGlohon, Christos Faloutsos
OddBall: Spotting Anomalies in Weighted Graphs
PAKDD, Hyderabad, India, June 2010.
Best Research Paper
43. Leman Akoglu and Christos Faloutsos
Event Detection in Time Series of Mobile Communication Graphs
27th Army Science Conference, Orlando, Florida, Dec. 2010.
44. Leman Akoglu and Christos Faloutsos
RTG: A Recursive Realistic Graph Generator using Random Typing
ECML PKDD, Bled, Slovenia, Sep. 2009.
Best Knowledge Discovery Paper
45. Nan Du, Christos Faloutsos, Bai Wang, Leman Akoglu
Large Human Communication Networks: Patterns and a Utility-Driven Generator
ACM SIGKDD, Paris, France, June 2009.
46. Leman Akoglu, Mary McGlohon, Christos Faloutsos
RTM: Laws and a Recursive Generator for Weighted Time-Evolving Graphs
IEEE ICDM, Pisa, Italy, Dec. 2008.
47. Mary McGlohon, Leman Akoglu, Christos Faloutsos
Weighted Graphs and Disconnected Components: Patterns and a Generator
ACM SIGKDD, Las Vegas, Nevada, Aug. 2008.

WORKSHOP PAPERS

48. 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.
49. 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.
 50. 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.
 51. 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.
 52. 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 (ODD²@KDD 2014), NYC, NY, USA, Aug. 2014.
 53. 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 (ODD²@KDD 2014), NYC, New York, USA, Aug. 2014.
 54. 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.
 55. Leman Akoglu
Classifying & Ranking Political Polarity by Network Effects. (Presentation)
WIN: Workshop on Information in Networks, New York, USA, Oct. 2013.
 56. 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.
 57. 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.
 58. 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

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

- (Under Review) PI: Army Research Office (ARO) (Contract # XXX)
MARINE: a Methodical Approach to Robust Inference of Networks with Ensembles. with co-PI: Sivaraman Balakrishnan (CMU). \$657,553 (Jul 2017–June 2021)
- 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. Venkatakrisnan, R. Gjomemo. (CMU transfer = \$417,052) (2015–2019)
- Facebook Faculty Gift (\$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 (2015–2020)
- PI: National Science Foundation (NSF) (Award# IIS-1408287)
Collective Opinion Fraud Detection: Identifying and Integrating Cues from Language, Behavior, and Networks. with Yejin Choi (University 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 (CDDA)) *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. (w/ ObjectVideo) \$50,000. (May 2014–Nov 2014).

RESEARCH & PROFESSIONAL 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 EXPERIENCE

- **Instructor** (Fall A2 2017) 95-801 *Data Mining Techniques*, CMU (Enrollment:)
- **Instructor** (Fall A2 2017) 95-869 *Big Data and Large Scale Computing*, CMU (Enrollment:)
- **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-590 *Data Science Fundamentals*, Stony Brook University, Fall 2015. (Enrolled: 44)
- **Instructor** CSE-512 *Machine Learning*, Stony Brook University, Spring 2015. (Enrolled: 46; 10 AMS PhD students)
- **Instructor** CSE-590 *Data Mining meets Graph Mining*, Stony Brook University, Fall 2014. (Enrolled: 50)
- **Instructor** CSE-512 *Machine Learning*, Stony Brook University, Spring 2014. (Enrolled: 58)
- **Instructor** CSE-590 *Networks and Data Mining Techniques*, Stony Brook University, Fall 2013. (Enrollment: 49)
- **Instructor** CSE-512 *Machine Learning*, Stony Brook University, Spring 2013. (Enrolled: 40)
- **Instructor** CSE-590 *Selected Topics in Data Mining and Networks*, Stony Brook University, 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

- 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

- Emaad Manzoor receives KDD 2017 Student Travel Award and CMU Graduate Student Assembly Conference Funding
- Meghanath Macha receives PwC Presidential PhD Fellowship 2017 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

Graduate (PhD/MS) students

- Hemank Lamba (PhD, Carnegie Mellon University), co-advisor, F 2017 -
- Shubhranshu Shekhar (PhD, Carnegie Mellon University), advisor, F 2017 -
- Meghanath Macha (PhD, Carnegie Mellon University), advisor, F 2016 -
- Emaad Ahmed Manzoor (PhD, Carnegie Mellon University), advisor, F 2015 -
- Shebuti Rayana (PhD, Stony Brook University), advisor, 2013 -
- 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
- Xuan Wu, (MS, ISR, Carnegie Mellon University), Independent Study, S 2017 - F 2017
- {Rashmi Raghunandan, Shruti Sridhar, Upasna Suman} (MS, 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} (MS, Carnegie Mellon University), Capstone Project Research Practicum, F 2016
- {Kee Wei Lam, Yu-Hsin Lin, Ming-Hsun Tsai} (MS, 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 Sastry (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

RPE/PhD thesis committee

- Ankita Mangal (PhD, Materials Science and Engineering, Carnegie Mellon), expected 2018
- Rami Al-Rfou' (PhD, CS, Stony Brook University), 2015
- Bryan Perozzi (PhD, CS, Stony Brook University), 2016
- Vivek Kulkarni (MS/PhD, CS, Stony Brook University), expected 201X
- Jun S. Kang (PhD, CS, Stony Brook University), expected 201X
- Michail Misyrlis (PhD, Stony Brook University), expected 201X
- Idil Akin (PhD, SBS, Stony Brook University), expected 201X
- Salman Mahmood (PhD, CS, Stony Brook University), expected 201X
- Hao Huang (PhD, CS, Stony Brook University), expected 2014

PhD committee (International)

- Aleksi Kallio (Doctoral programme in Science, Aalto University), expected 2015
- Véronique Van Vlasselaer (PhD, CS, KU Leuven), expected 2015
- Laura Langohr (PhD, CS, University of Helsinki), expected 2014

COMMUNITY ACTIVITIES

Program Committees

- **Tutorials Co-Chair** (2018) Conference on Knowledge Discovery and Data Mining (KDD)
- **Chair** (2018) Social Networks and Graph Analysis Track of the World Wide Web Conference (WWW)
- **Senior Member** (2018, 2017, 2016) International Conference on Web Search and Data Mining (WSDM)
- **Area Chair** (2017, 2016) IEEE International Conference on Data Mining (ICDM)
- **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)
- **Senior Member** (2017, 2016) SIAM International Conference on Data Mining (SDM)
- **Member** (2017) International School and Conference on Network Science (NetSci)
- **Member** (2017, 2016) International Conference on Social Informatics (SocInfo)
- **Member** (2017, 2016, 2013) Mining and Learning with Graphs (MLG) (in conj. with KDD)
- **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) 25th International Joint Conference on Artificial Intelligence (IJCAI)
- **Member** (2016, 2015, 2014) Conference on Knowledge Discovery and Data Mining (KDD)

- **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) European Conference on Machine Learning and Principles and Practice of Knowledge Discovery in Databases (ECML/PKDD)
- **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) International Conference on Social Informatics (SocInfo)
- **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

- ACM SIGKDD Workshop on Outlier Definition, Detection, and Description on Demand (ODD4.0@KDD 2016)
- ACM SIGKDD Workshop on Outlier Definition, Detection, and Description (ODDx3@KDD 2015)
- IJCAI (2016, 2015) Workshop on Heterogeneous Information Network Analysis (HINA)
- ACM SIGKDD Workshop on Outlier Detection and Description under Data Diversity (ODD²@KDD 2014)
- WWW Workshop on Big Graph Mining (1st BGM@WWW 2014)
- IEEE ICDM Workshop on Mining Social Data at Work (1st MSDW@ICDM 2013)
- ACM SIGKDD Workshop on Outlier Detection and Description (ODD@KDD 2013)
- 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

- 2017-18 Co-organizer for the College Seminar and HILS (Heinz Informal Lunch Seminar) series
- 2017 Committee Lead for ML-PP joint PhD program curriculum
- Sep 2016 PhD Seminar research talk for 1st year students, CMU
- 2016- PhD (Admissions) Committee, Heinz College, 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

- **Book Review** Outlier Analysis by Charu C. Aggarwal
- **Book Review** Introduction to Data Mining Ch. 10 on Anomaly Detection by Kumar et al.
- **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)

PATENT APPLICATIONS

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^AT_EX

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) dancing, hiking, zumba fitness

REFERENCES

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