Cuneyt Gurcan Akcora
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Research Interests

- Explainable Artificial Intelligence
- Data Science on complex networks, large scale graph analysis
- Nonparametric statistics, Bootstrap on graphs
- Deep Learning and Graph Mining on Bitcoin and Ethereum Blockchains
- Machine learning for privacy and security research on online social networks
- Topological data analysis, applications to networks

Education

2010-2014   **Università degli Studi dell'Insubria**, Varese, Italy
     ◇ *Thesis: Profiling user interactions on online social networks*
     ◇ *Ph.D. in Computer Science*
     ◇ Advisors: Elena Ferrari and Barbara Carminati

2012 Feb-Apr   **University of Texas at Dallas**
     ◇ *Visiting researcher, Computer Science*
     ◇ Advisor: Murat Kantarcioglu

2008-2010   **State University of New York at Buffalo**, Buffalo, NY
     ◇ *M.Sc. in Computer Science and Engineering*
     ◇ *Thesis: Using Microblogs for Crowdsourcing and Public Opinion Mining*
     ◇ Advisor: Murat Demirbas

2005-2006   **Gent University**, Gent, Belgium
     ◇ *Electronics and Information Systems*
     ◇ *Erasmus Exchange Student*

2002-2007   **Karadeniz Technical University**, Trabzon, Turkey
     ◇ *B.Sc. in Electrical and Electronics Engineering*

Honors and Awards

◇ International Fulbright Scholarship, 2008-2010.
◇ Amazon Web Services Research Grant, 2013.
◇ NSF travel award for SAMSI at Duke University, 2017.
◇ IBM travel award for SIGKDD, July 2010.
◇ IEEE travel award for ICDM, December 2012.
◇ Graduated as an honor student from Karadeniz Technical University, 2007.

Work Experience

2019 July - Current	**University of Manitoba**
	◇ *Assistant Professor at Computer Science/Statistics*
2016 Oct - 2019 June	**University of Texas at Dallas**
	◇ *Postdoctoral Fellow at Computer Science/Statistics*
	◇ *Joint work: Murat Kantarcioglu (CS) and Yulia Gel (Stat.)*
2015 Jun - 2016 Oct	**Huawei Research, Istanbul, Turkey**
	◇ *Research Engineer. Intelligent Search Group*
2014 Feb - 2014 Aug	**Qatar Computing Research Institute (QCRI), Qatar**
	◇ *Research Associate. Data Analytics Group*

Internships

2012 Jun-Aug	**Yahoo! Research Barcelona**
	◇ *Advisor: Francesco Bonchi*
2005 July-Aug	**University of Cairo**, Cairo, Egypt
	◇ IAESTE Student Program

Grants

External grants

  ◇ **CANSSI 2021**: With Dorcas Ofori-Boateng, Postdoctoral Research Fellowship from the Canadian Statistical Sciences Institute (2020-2021).

Publications (Asterisks denote a Ph.D. or MS. student)

Under Submission

  ◇ **Data Science for Blockchain**
  C. G. Akcora, Y. R. Gel, M. Kantarcioglu, pp 1—16.

  ◇ **Topological Anomaly Detection in Dynamic Networks**
  *Dorcas Ofori-Boateng, Ignacio Segovia Dominguez, C. G. Akcora,*Y. Li, Y. R. Gel, M. Kantarcioglu, pp 1—12.

Peer Reviewed Conference Papers

  ◇ **BitcoinHeist: Topological Data Analysis for Ransomware Payment Detection on the Bitcoin Blockchain**
  C. G. Akcora,*Y. Li, Y. R. Gel, M. Kantarcioglu
  29th International Joint Conference on Artificial Intelligence (IJCAI 2020)
  Tokyo, Japan, pp 1—9 (2020).

  ◇ **Ethereum Token Price Anomaly Prediction with Topological Depth Curves**
  *Y. Li, *U. D. Islambekov, C. G. Akcora, E. Smirnova, Y. R. Gel, M. Kantarcioglu
  SIAM International Conference on Data Mining (SDM) pp 1—9 (2020).

  ◇ **ChainNet: Learning on Blockchain Graphs with Topological Features**
  *N. C. Abay, C. G. Akcora, *U. D. Islambekov, Y. R. Gel, M. Kantarcioglu, B. Thuraisingham
  The 19th IEEE International Conference on Data Mining (ICDM)
  Beijing, China, pp 1—10 (2019).

  ◇ **Attacklets: Modeling High Dimensionality in Real World Cyberattacks**
  C. G. Akcora, J. Bakdash, Y. R. Gel, L. Marusich, M. Kantarcioglu, B. Thuraisingham
  IEEE International Conference on Intelligence and Security Informatics (ISI) (34%)
  Florida, Miami, USA pp 1—5 (2018).

  ◇ **Forecasting Bitcoin Price with Graph Chainlets**
  C. G. Akcora, *A. K. Dey, Yulia R. Gel, M. Kantarcioglu

The 22nd Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD) (27.7%)
Melbourne, Australia, pp 1—12 (2018).

⬦ **Temporal rules discovery for web data cleaning**
Z. Abedjan, C. G. Akcora, M. Ouzzani, P. Papotti, M. Stonebraker
The 42nd Very Large Data Bases Conference (VLDB)
New Delhi, India, pp 336—347 (2015).

⬦ **Discovering trust patterns in ego networks**
C. G. Akcora, E. Ferrari
The 4th IEEE/ACM International Conference on Social Network Analysis and Mining (ASONAM)
Beijing, China, pp 224—229 (2014).

⬦ **Multi-dimensional conversation analysis across online social networks**
*W. Lucia, C. G. Akcora, E. Ferrari
The 3rd IEEE International Conference on Social Computing and its Applications (SCSM)
Karlsruhe, Germany, pp 369—376 (2013).

⬦ **Risks of friendships on social networks**
C. G. Akcora, B. Carminati, E. Ferrari
The 12th IEEE International Conference on Data Mining (ICDM)
Brussels, Belgium, pp 810—815 (2012).

⬦ **Privacy in social networks, how risky is your social graph?**
C. G. Akcora, B. Carminati, E. Ferrari
The 28th IEEE International Conference on Data Engineering (ICDE)
Washington D.C, USA, pp 9—19 (2012).

⬦ **Network and profile based measures for user similarities on social networks**
C. G. Akcora, B. Carminati, E. Ferrari
The 12th IEEE International Conference on Information Reuse and Integration (IRI)
Las Vegas, NV, USA, pp 292—298 (2011).

⬦ **Building virtual communities on top of online social networks**
C. G. Akcora, B. Carminati, E. Ferrari
The 5th European Conference on Information Management and Evaluation (ECIME)
Como, Italy, pp 12—23 (2011).

⬦ **Crowd-sourced sensing and collaboration using Twitter**
M. Demirbas, *M. A. Bayir, C. G. Akcora, *Y. S. Yilmaz, H. Ferhatosmanoglu
The 11th IEEE Int. Symp. on a World of Wireless, Mobile and Multimedia Networks (WoWMoM)
Montreal, Canada, pp 1—9 (2010).

Journal Publications

⬦ **On the Role of Local Blockchain Network Features in Cryptocurrency Price Formation**
*A. K. Dey, C. G. Akcora, Y. R. Gel, M. Kantarcioglu
Canadian Journal of Statistics, pp 1—33 (2020).

⬦ **GraphBoot: Quantifying Uncertainty in Node Feature Learning on Large Networks**
C. G. Akcora, Y. R. Gel, M. Kantarcioglu, V. Lyubchich, B. Thuraisingham, IEEE Transactions on
Knowledge and Data Engineering, pp 1—16 (2019).

⬦ **Blockchain Analytics for Intraday Financial Risk Modeling**
Matthew Dixon, C. G. Akcora, Yulia R. Gel, M. Kantarcioglu, Springer's Digital Finance, pp 1—25
(2019).

⬦ Invited paper: **Blockchain Data Analytics**
C. G. Akcora, Matthew Dixon, Yulia R. Gel, M. Kantarcioglu, IEEE Bulletin of Intelligent Informatics,
pp 1—8 (2018).

⬦ **Bitcoin Risk Modeling with Blockchain Graphs**
C. G. Akcora, Matthew Dixon, Yulia R. Gel, M. Kantarcioglu, Economics Letters, pp 1—5 (2018).

- ⬦ **Blockchain: A graph primer**
  C. G. Akcora, Y. R. Gel, M. Kantarcioglu
  arXiv:1708.08749, pp 1—16 (2017).

- ⬦ **Detecting anomalies in social network data consumption**
  C. G. Akcora, B. Carminati, E. Ferrari, M. Kantarcioglu
  Springer Social Network Analysis and Mining, Vol. 4, pp 231—245 (2014).

- ⬦ **User similarities on social networks**
  C. G. Akcora, B. Carminati, E. Ferrari
  Springer Social Network Analysis and Mining, Vol. 3, pp 475—495 (2013).

- ⬦ **Trend sensing via Twitter**
  Y. S. Yilmaz, *M. F. Bulut, C. G. Akcora, *M. A. Bayir, M. Demirbas
  Inderscience Ad Hoc and Ubiquitous Computing, Vol. 14, 16—26 (2013).

Workshops
- ⬦ **Identifying breakpoints in public opinion**
  C. G. Akcora, *M. A. Bayir, M. Demirbas, H. Ferhatosmanoglu
  The 1st Workshop on Social Media Analytics (KDD'10 SOMA)
  Washington D.C, USA, pp 62—66 (2010).

Book Chapters
- ⬦ **Using Deep Learning to Generate Relational HoneyData**
  N. C. Abay, C. G. Akcora, Y. Zhou, M. Kantarcioglu, B. Thuraisingham
  Springer, Automated Cyber Deception, pp 1—16 (2019).

Encyclopedia Entries
- ⬦ **User Similarities on Social Networks**
  C. G. Akcora, E. Ferrari
  Springer Encyclopedia of Social Network Analysis and Mining (ESNAM), pp 1734—1743 (2014).

- ⬦ **Graphical User Interfaces for Privacy Settings**
  C. G. Akcora, E. Ferrari
  Springer Encyclopedia of Social Network Analysis and Mining (ESNAM), pp 1—8 (2014).

Translation
- ⬦ English-Turkish, **Fundamentals of Information Systems Security**
  David Kim and Michael G. Solomon, ISBN: 978-605-033-000-7
  Chapter 3: Malicious Attacks, Threats, and Vulnerabilities, pp 70—110
  Publisher: NOBEL Akademik Yayıncılık, Edited by Ozgu Can (2019).

Other Publications
- ⬦ **Twitter: Roots, Influence and Applications**
  C. G. Akcora, M. Demirbas
  Technical Report, Department of Computer Science and Engineering
  University at Buffalo, NY, pp 1—24 (2010).

Presentations

Conference Tutorials
- ⬦ **Data Science on Blockchains**, *with Yulia R. Gel and Murat Kantarcioglu. SIAM International Conference on Data Mining (SDM20), Ohio, U.S., (May 7 - 9, 2020).*

- ⬦ **Data Science on Blockchains**, *with Yulia R. Gel and Murat Kantarcioglu. The IEEE Conference on Data Engineering (ICDE20), Dallas, U.S., (April 20-24, 2020).*

◇ **Blockchain Data Analytics**, *with Yulia R. Gel and Murat Kantarcioglu. The Pacific-Asia Conference on Knowledge Discovery and Data Mining (PaKDD), Macau, China, (Spring 2019).*

◇ **Blockchain Data Analytics**, *with Yulia R. Gel and Murat Kantarcioglu. The IEEE International Conference on Data Mining (ICDM), Singapore, (17 November 2018).*

Invited Short Courses

◇ **Blockchain Data Analytics**, School of Statistics, University of Minnesota, Minneapolis, Minnesota, USA (November 2018).

◇ **Blockchain Data Analytics**, Operations Research, City University of Hong Kong, China (November 2018).

Invited Talks

◇ **Explainable Artificial Intelligence**, *Sightline Innovation Inc., Winnipeg, Manitoba, Canada (February 2020).*

◇ **Learning on Blockchain Graphs with Topological Features**, *SAMSI Workshop on Foundations of Blockchain Data Analytics, Durham, NC, USA (October 2019).*

◇ **Blockchain Data Analytics: A New Frontier in Data Science**, *The 36th Annual Quality and Productivity Research Conference, Washington D.C., USA (June 2019).*

◇ **Multi-Layer Analysis of Biological Networks**, *International Chinese Statistical Association, the ICSA China Conference, Tianjin, China (July 2019).*

◇ **Blockchain Data Privacy and Security**, *Annual Computer Security Applications Conference (ACSAC), Puerto Rico (December 2018).*

◇ **Understanding Cryptocurrency Price Formation from Time Series of Local Blockchain Graph Features**, *the Joint Statistical Meetings (JSM), Vancouver, Canada (August 2018).*

◇ **A Time Series Approach in Blockchain Data Analytics**, *Michigan State Symposium on Mathematical Statistics and Applications in Honor of Hira L. Koul's Scientific Legacy, East Lansing, Michigan, USA (September 2018).*

Guest lectures

◇ Ransomware Detection in Cryptocurrencies, CSL 550: Network and Internet Security, UW Tacoma, Computer Science, WA, USA. May 2020.

◇ A Holistic View of the Blockchain Ecosystem, UT Dallas, School of Management, Dallas, Texas, USA. April 2020.

Seminars

◇ *Rochester Institute of Technology, Statistics, Rochester, NY, USA. May 2018.*

◇ *University of Texas at Dallas, Computer Science, Dallas, Texas, USA. April 2018.*

◇ *Southern Methodist University, Statistics, Dallas, Texas, USA. March 2018.*

◇ *Instituto Tecnológico Autónomo de México, Computer Science, Mexico City, Mexico. October 2017.*

◇ *Ege University, Computer Science, Izmir, Turkey. August 2016.*

◇ *Marmara University, Computer Science, Istanbul, Turkey. June 2016.*

◇ *Bogazici University, Computer Science, Istanbul, Turkey. May 2016.*

Professional Service

- ◇ ***Demo chair for*** *IEEE International Conference on Data Engineering (ICDE 2020).*
- ◇ ***Track chair for*** *IEEE International Conference on Cyberspace Data and Intelligence (Cyber DI 2019).*
- ◇ ***Co-editor for***
    - – *the special issue of Big Data and Cognitive Computing: Blockchain Data Analytics and Graph Mining.*
- ◇ ***Review Editor*** *to the Editorial Board of Cybersecurity and Privacy for Frontiers in Big Data.*
- ◇ ***Program Committee for*** *ECML-PKDD 2020, MIDAS 2020, CCCIS 2020, CODASPY 2020, CO-DASPY 2019, the 1st International Symposium on Artificial Intelligence for ASEAN Development (ASEAN-AI 2018).*
- ◇ ***Referee for***
    - – ***IEEE*** *Internet Computing.*
    - – ***IEEE Transactions*** *on Emerging Topics in Computing, Systems, Man and Cybernetics, Industrial Electronics, Mobile Computing, Services Computing, Dependable and Secure Computing, Industrial Informatics.*
    - – ***Elsevier*** *Journals of Digital Communications and Networks, Computational Statistics and Data Analysis (CSDA).*
    - – ***Springer*** *Journals of Grid Computing, Social Network Analysis and Mining, Data Science and Engineering.*
    - – *The Information Security (IET-IS).*
    - – *PeerJ Computer Science.*
    - – *The VLDB Journal.*
    - – ***Oxford Academic*** *Journal of Complex Networks*
- ◇ ***Conference reviewer for*** *CODASPY 2019, VLDB 2018, KDD 2018, PaKDD 2018, KDD 2017, SDM 2017, SIGMOD 2017, ICDE 2014, ASONAM 2014, ICWSM 2014, ICDM 2013, SCA 2013, CODASPY 2012, IRI 2011, WWW 2011.*

Organization of Technical Meetings
- ◇ Organizer, Workshop on **AI and Blockchains**, IJCAI-PRICAI, Tokyo, Japan (2020).
- ◇ Organizer, Workshop on **Blockchain Data Analytics**, Canadian Statistical Sciences Institute, BIRS, Alberta (March 2020).
- ◇ Organizer, Workshop on **Blockchain Data Analytics**, 19th International Conference on Data Mining (IEEE ICDM), Beijing, China (2019).
- ◇ Organizer, Workshop on **Foundations of Blockchain Data Analytics**, The Statistical and Applied Mathematical Sciences Institute (SAMSI), North Carolina, U.S. (2019).
- ◇ Chair, Session on **Behavioral Data Mining**, The 23rd Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD), Macau, China (2019).
- ◇ Organizer, Session on **Future of Blockchain from a Big Data Perspective**, 4th International Conference on Big Data and Information Analytics (BigDia), Houston, USA (2018).

Panels
- ◇ *Panelist, **Blockchain Security and Privacy**, The 9th ACM conference on Data and Application Security and Privacy (CODASPY), Dallas, USA (2019).*

Selected Projects

CoinWorks: Graph Analysis for the Blockchain Technology

One of the first groups to analyze Blockchain graphs, at UT Dallas we introduced a novel concept of k-chainlets on Bitcoin that expands the ideas of motifs and graphlets to Blockchain graphs. Chainlet analysis provides a deeper insight into local topological properties of the Blockchain and the role of those local higher-order topologies in the Bitcoin price formation. In the entire history of the Bitcoin graph, we have found that certain types of chainlets have a high predictive utility for Bitcoin prices. So far, this ongoing project has resulted in three concluded publications. Further works are actively being developed.

Aetas: Temporal Rules Discovery for Web Data Cleaning

In a collaboration with MIT CSAIL, at the Qatar Computing Research Institute we developed Aetas, a system for the discovery of approximate temporal functional dependencies. We used the data provided by RecordedFuture.com, which crawls the Internet and extracts knowledge with an event oriented approach. At the core of the system are two modules that exploit machine learning techniques to identify approximate dependencies and their duration from noisy web data. Our results appeared in the VLDB 2015 conference.

Sight: Personalized privacy for social networks

To protect personal data in Online Social Networks (OSNs) against well-known privacy problems, several relationship-based access control mechanisms have been proposed, as well as, more expressive privacy settings have been adopted by commercial OSNs, like Facebook. Unfortunately, these efforts can be unproductive, because users are reluctant to set complex privacy preferences. To overcome this problem, we proposed a new model for privacy preference settings based on a risk concept. Our findings were presented at the IRI 2011, ICDE 2012 and ICDM 2012.

Taoss: Trend Analysis on Open Source Software

Started as a Turkish Research Council project at Huawei Research, Taoss aimed at modeling the open source landscape by analyzing software repositories (e.g., Github), Q&A sites (e.g., StackOverflow), online forums (e.g., HackerNews) and other web sources. Taoss is internally deployed by Huawei as an analysis tool in planning software projects.

Crowd-Sourced Sensing and Collaboration Using Twitter

We designed and implemented crowd-sourced sensing over Twitter, and showcased our system with two applications: a crowd-sourced weather radar, and a participatory noise-mapping application. In the project, we proposed a SensorML based classification for future detection of sensors on Twitter. Findings of this project were published in WOWMOM, 2010.

Upinion: Identifying Breaking Points in Public Opinion

While polls are traditionally used for observing public opinion, they provide a point snapshot, not a continuum. We considered the problem of identifying breakpoints in public opinion, and proposed using microblogging sites to capture trends in public opinion. This, to the best of our knowledge, is the first paper to employ an emotion corpus to classify emotion changes. We used a combination of vector space and set space models to represent and analyze tweets from Twitter about public opinion on two breaking news stories.

Teaching

⋄ *COMP 2140, Data Structures and Algorithms, Winter 2020.*
 Core course for undergraduate students (99 students).
 Computer Science, University of Manitoba.

- ◇ *COMP 7570, Blockchain Data Analytics, Fall 2019.*
  Elective course for graduate students (24 students).
  Computer Science, University of Manitoba.

- ◇ *CS 6313, Statistical Methods for Data Science, Spring 2019.*
  Core course for Data Science specialization (71 students).
  Computer Science and Engineering, University of Texas at Dallas.

- ◇ *CS 6313, Statistical Methods for Data Science, Fall 2018.*
  Core course for Data Science specialization (86 students).
  Computer Science and Engineering, University of Texas at Dallas.

- ◇ *Data Analysis with R, Spring 2013.*
  Master's level course (13 students).
  Computer Science, Università degli Studi dell'Insubria.

- ◇ *Privacy and Security of Data, Spring 2012.*
  Master's level course (11 students).
  Computer Science, Università degli Studi dell'Insubria.

Software packages

- ◇ *Github/GraphBoot: A Bootstrapped Sampling framework in Scala/Apache Spark.*

- ◇ *Github/Coinworks: Bitcoin Chain Analysis platform in R/Java/Scala.*

Computer Skills

- ◇ *Languages: Scala, Java, R, PHP, SQL, XHTML, Python, JavaScript, LaTeX.*

- ◇ *OS/Tools/Libraries: OpenMPI, Twitter4J, jQuery, Jung.*

- ◇ *Open Source Projects: Apache Storm, Apache Spark.*

Language Skills

- ◇ *Turkish: native*

- ◇ *English: Advanced.*

- ◇ *Italian: Upper-intermediate.*

- ◇ *Chinese:* 汉语水平考试三 *(HSK 3).*