Cuneyt Gurcan Akcora

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Research Interests

- 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
- Data mining on microblogging streams, opinion mining

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

2016 Oct - Current	**University of Texas at Dallas** ◇ *Postdoctoral Fellow at Computer Science/Statistics* ◇ *Advisors: 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

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

Under Submission

- **Bitcoin Risk Modeling with Blockchain Graphs**
  C. G. Akcora, Matthew Dicson, Yulia R. Gel, M. Kantarcioglu, pp 1—5.
- **ChainNet: Learning on Blockchain Graphs with Topological Features**
  *N. C. Abay, C. G. Akcora, *U. D. Islambekov, Gel Y. R., M. Kantarcioglu, B. Thuraisingham, pp 1—10.
- **Quantifying uncertainty in node feature analysis of large social networks**
  C. G. Akcora, Yulia R. Gel, M. Kantarcioglu, V. Lyubchich, B. Thuraisingham, pp 1—16.

Peer Reviewed Conference Papers

- **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)
  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

- **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).

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: 978-0763790257
  Chapter 3: Malicious Attacks, Threats, and Vulnerabilities, pp 70—110
  Edited by Ozgu Can (2018).

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

Invited Talks

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

Seminars

- University of Texas at Dallas, Dallas, Texas, USA. April 2018.
- Southern Methodist University, Dallas, Texas, USA. March 2018.
- Instituto Tecnológico Autónomo de México, Mexico City, Mexico. October 2017.
- Ege University, Izmir, Turkey. August 2016.
- Marmara University, Istanbul, Turkey. June 2016.
- Bogazici University, Istanbul, Turkey. May 2016.

Professional Service

- **Review Editor** to the Editorial Board of Cybersecurity and Privacy for Frontiers in Big Data.
- **Program Committee for** First International Symposium on Artificial Intelligence for ASEAN Development (ASEAN-AI 2018).
- **Journal referee for** IEEE Transactions on Mobile Computing (TMC), Social Network Analysis and Mining (SNAM), the Information Security (IET-IS), Computational Statistics and Data Analysis (CSDA).
- **Conference reviewer for** 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.

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 and collaboration over Twitter, and showcased our system in the context of two applications: a crowd-sourced weather radar, and a participatory noise-mapping application. Our system is composed of three components: Askweet, Sensweet and Twitter clients. Sensweet is a smartphone application that publishes real-time readings from the integrated-sensors to Twitter. Askweet is a program that listens to its Twitter account for questions and processes the questions and aggregates the replies it receives to these questions from Sensweet and the Twitter clients. 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 250K tweets from Twitter about public opinion on two breaking news stories. Our experiments showed that we were able to determine breakpoints in public opinion effectively. Our results were published in the KDD Workshop on Social Media Analytics, 2010.

Teaching

- ◇ Data Analysis with R. Master's level course, Università degli Studi dell'Insubria, 2013.
- ◇ Privacy and Security of Data. Master's level course, Università degli Studi dell'Insubria, 2012.

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, English: Advanced.
- Italian: Upper-intermediate.
- Chinese (November 2017): 汉语水平考试三(HSK 3).