

Farnoush Banaei-Kashani

Assistant Professor in Computer Science
PhD Computer Science, MS Electrical Engineering

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EDUCATION

- **Ph.D. in Computer Science** Aug. 2001 to Dec. 2006
University of Southern California
Thesis: “Approximate Query Answering in Unstructured Peer-to-Peer Databases”
Advisor: Professor Cyrus Shahabi
Thesis Guidance Committee: Prof. Cyrus Shahabi (Chair), Prof. David Kempe,
Prof. Ramesh Govindan, Prof. Rajiv Kalia, Prof. Kenneth Alexander
- **M.S. in Electrical Engineering** Sept. 1999 to Aug. 2001
University of Southern California
Specialization: Computer Networks
- **B.S. in Computer Engineering** Sept. 1992 to Feb. 1996
Sharif University of Technology

SCOPE OF RESEARCH

I have organized my research and education activities around two tracks: a Data Science track, and a Data Management and Mining track. With the Data Science track, we engage with real-world problems that can benefit from data-driven solutions (consisting of all data scientific life-cycle components), given various combinations of the Big Data challenges. Toward this end, we have experienced with a number of data-driven decision-making systems (DDSs) from various application areas, such as health informatics, computational genetics, IoT, intelligent transportation, and scientific computing. The Data Science track complements the Data Management and Mining track by providing practical real-world problems, which we generalize, formalize, and rigorously study as novel data management and mining problems. In particular, we have special interest in the following areas (among others): spatiotemporal data management and mining, graph data management and mining, high-throughput data management and mining using modern hardware, and next generation database engines (or NewSQL).

TEACHING WORK EXPERIENCE

- Database Systems (CSCI 5559), University of Colorado Denver Spring 2017
- Introduction to Data Science (CSCI 4800-5800), University of Colorado Denver Fall 2016

- Database System Concepts (CSCI 3287), University of Colorado Denver Spring 2016
- Data Mining and Analytics (CSCI 5702), University of Colorado Denver Fall 2015
- Database Systems (CSCI 5559), University of Colorado Denver Spring 2015
- Advanced Data Stores: From SQL to NoSQL (CSCI 5800), University of Colorado Denver Fall 2014
- Database Systems (CSCI 585), University of Southern California Spring 2014
- Database Systems (CSCI 585), University of Southern California Fall 2013
- Database Systems (CSCI 585), University of Southern California Spring 2008

RESEARCH WORK EXPERIENCE

- **Department of Computer Science and Engineering**, University of Colorado Denver, Assistant Professor Aug. 2014 to Present
- **IMSC** (Integrated Media Systems Center) NSF Research Center, University of Southern California; Associate Director of Research Jan 2010 to Aug. 2014
- **InfoLab** (Information Laboratory), Computer Science Department, University of Southern California; Research Staff Apr. 2007 to Dec. 2009
- **InfoLab** (Information Laboratory), Computer Science Department, University of Southern California; Graduate Research Assistant (PhD Student) June 2001 to Mar. 2007
- **ISI** (Information Sciences Institute), University of Southern California; Graduate Research Assistant (MS Student) at Computer Networks Division Sept. 1999 to May 2001
- **ERC** (Electronic Research Center), Sharif University of Technology; Undergraduate Research Assistant (BS Student) at Data Processing Division Sept. 1998 to Aug. 1999

PUBLICATIONS

Book Chapters

- F. Banaei-Kashani and C. Shahabi, “*Applications of sensor network data management*”, Book chapter in **Encyclopedia of Database Systems –2** (Eds.: T. Ozsu and L. Liu), Springer, September 2014.
- F. Banaei-Kashani and C. Shahabi, “*Applications of sensor network data management*”, Book chapter in **Encyclopedia of Database Systems – 1** (Eds.: T. Ozsu and L. Liu), Springer, September 2009.

- F. Banaei-Kashani and C. Shahabi, “Case study: Scoop up data from peer-to-peer databases”, Book chapter in **Handbook of Peer-to-Peer Networking** (Eds.: X. Shen, H. Yu, J. Buford, M. Akon), Springer, December 2009.
- C. Shahabi and F. Banaei-Kashani, “A framework for efficient and anonymous web usage mining based on client-side tracking”, Book Chapter: **Lecture Notes in Computer Science**, Vol. 2356, 2001.

Refereed Journal Papers

- Farnoush Banaei-Kashani, Parisa Ghaemi, Bahman Movaqar, Seyed Javad Kazemitabar, “Efficient Maximal Reverse Skyline Query Processing”, **Geoinformatica**, Vol 21, Issue 3, pp. 549-572, July 2017.
- Michael Mannino, Joel Fredrickson, Farnoush Banaei-Kashani, Iris Linck and Raghda Alqurashi, “Development and Evaluation of a Similarity Measure for Medical Event Sequences”, ACM Transactions on Management Information Systems (**TMIS**), Vol 8, Issue 2, 2017.
- Farnoush Banaei-Kashani, Cyrus Shahabi, Seon Ho Kim, Luciano Nocera, Giorgos Constantinou, Ying Lu, Yinghao Cai, Gérard G. Medioni, Ramakant Nevatia, “Janus - Multi Source Event Detection and Collection System for Effective Surveillance of Criminal Activity”, **Journal of Information Processing Systems (JIPS)**, Vol 10, No 1, pp. 1-22, 2014.
- P. Ghaemi, K. Shahabi, J. Wilson, F. Banaei-Kashani, “A Comparative Study of Two Approaches for Supporting Optimal Network Location Queries”, **GeoInformatica**, Vol. 18, No. 2, pp. 229-251, April 2014.
- H. Shirani-Mehr, F. Banaei-Kashani and C. Shahabi, “Users plan optimization for participatory urban texture documentation”, **GeoInformatica**, Vol 17, No 1, January 2013.
- F. Banaei-Kashani, H. Shirani-Mehr, B. Pan, N. Bopp, L. Nocera, C. Shahabi, “GeoSIM: A geospatial data collection system for participatory urban texture documentation”, Special Issue of **IEEE Data Engineering Bulletin** on Spatial and Spatiotemporal Databases, June 2010.
- C. Shahabi, F. Banaei Kashani, A. Khoshgozaran and S. Xing, “GeoDec: A framework to effectively visualize and query geospatial data for decision-making”, **IEEE Multimedia Magazine**, July 2010.
- C. Shahabi, M. Jahangiri and F. Banaei-Kashani, “ProDA: An end-to-end wavelet-based OLAP system for massive datasets”, **IEEE Computer**, Vol. 41, No. 4, April 2008.
- F. Banaei-Kashani and C. Shahabi, “Partial read from peer-to-peer databases”, **Journal of Computer Communications**, Vol. 31, No. 2, February 2008.
- C. Shahabi and F. Banaei-Kashani, “Modeling peer-to-peer data networks under complex system theory”, **International Journal of Computational Science and Engineering (IJCSSE)**, Vol. 3, No. 2, November 2007.
- C. Shahabi and F. Banaei-Kashani, “Efficient and anonymous web usage mining for web personalization”, **INFORMS Journal on Computing** Special Issue on Mining Web-Based Data for e-Business Applications, Vol. 15, No. 2, Spring 2003.
- C. Shahabi and F. Banaei-Kashani, “Decentralized resource management for a distributed continuous media server”, **IEEE Transactions on Parallel and Distributed Systems (IEEE TPDS)**, Vol. 13, No. 7, July 2002.

Refereed Conference Papers

- Shahab Helmi and Farnoush Banaei-Kashani, “*Efficient Processing of Spatiotemporal Pattern Queries on Historical Frequent Co-Movement Pattern Datasets*”, Workshop on Mobility Analysis for Spatiotemporal and Social Data (**MATES 2017**) held in conjunction with VLDB 2017.
- Sidhaunt Kulkarni and Farnoush Banaei-Kashani, “*MVSC-Bench: A Tool to Benchmark Classification Methods for Multivariate Spatiotemporal Data*”, **SSTD 2017**.
- Anh Nguyen, Raghda Alqurashi, Zohreh Raghebi, Farnoush Banaei-kashani, Ann C. Halbower, and Tam Vu, “*A Lightweight and Inexpensive In-ear Sensing System For Automatic Whole-night Sleep Stage Monitoring*”, ACM Conference on Embedded Network Sensor Systems (**SenSys 2016**). New York, NY, 2016. **Best Paper Award**
- Shahab Helmi and Farnoush Banaei-Kashani, “*Mining Frequent Episodes from Multivariate Spatiotemporal Event Sequences*”, International Workshop of GeoStreaming (**IWGS 2016**) held in conjunction with ACMGIS 2016.
- Anh Nguyen, Raghda Alqurashi, Zohreh Raghebi, Farnoush Banaei-kashani, Ann C. Halbower, Thang Dinh, and Tam Vu, “*In-ear Biosignal Recording System: A Wearable For Automatic Whole-night Sleep Staging*”, Workshop on Wearable Systems and Applications (**WearSys 2016**).
- Michael Mannino, Joel Fredrickson, Iris Linck, Raghda Alqurashi and Farnoush Banaei-Kashani, “*Development and Evaluation of Similarity Measures for Medical Event Sequences*”, Workshop on Information Technologies and Systems (**WITS 2015**), Dallas, Texas, 2015.
- Dafei Yin and Chuntao Hong and Farnoush Banaei-Kashani, “*Efficient Evacuation Planning Algorithm in Map-Reduce Framework on Multi-Core*”(Demonstration), International Workshop on Computational Transportation Science (**IWCTS 2015**) held in conjunction with ACMGIS 2015.
- Farnoush Banaei-Kashani, “*GeoRealism: Expanding the Human Ability to Comprehend Larger Geo-Spaces*” (Vision Paper), International Workshop of GeoStreaming (**IWGS 2015**) held in conjunction with ACMGIS 2015.
- Houtan Shirani-Mehr and Cyrus Shahabi, Farnoush Banaei-Kashani, “*Reachability Query in Evolving Uncertain Contact Networks*” (Invited Presentation), International Workshop on Querying Graph Structured Data (**GraphQ**) held in conjunction with EDBT 2015.
- Farnoush Banaei-Kashani, Parisa Ghaemi, John P. Wilson, “*Maximal Reverse Skyline Query*”, **ACMGIS 2014**.
- Seyed Jalal Kazemitabar, F. Banaei-Kashani, Seyed Jalil Kazemitabar, Dennis McLeod, “*Efficient Batch Processing of Proximity Queries by Optimized Probing*”, **ACMGIS 2013**.
- H. Shirani-Mehr, F. Banaei-Kashani and C. Shahabi, “*Reachability query in large evolving contact networks*”, **VLDB 2012**.
- P. Ghaemi , K. Shahabi, J. Wilson and F. Banaei-Kashani, “*Continuous maximal reverse nearest query on spatial networks*”, **ACMGIS 2012**.

- U. Demiryurek, F. Banaei-Kashani, C. Shahabi and Anand Ranganathan, “*Online computation of fastest path in time-dependent spatial networks*”, **SSTD** 2011.
- Akdogan, U. Demiryurek, F. Banaei-Kashani and C. Shahabi, “*Voronoi-based geospatial query processing with MapReduce*”, **IEEE CloudCom** 2010. [**Best Paper Award**]
- L. Kazemi, F. Banaei-Kashani, C. Shahabi and R. Jain, “*Efficient approximate visibility query in large dynamic environments*”, **DASFAA** 2010.
- U. Demiryurek, F. Banaei-Kashani and C. Shahabi, “*Efficient K-Nearest Neighbor search in time-dependent spatial networks*”, **DEXA** 2010.
- P. Ghaemi, K. Shahabi, J. Wilson, F. Banaei-Kashani, “*Optimal network location queries (short paper)*”, **ACMGIS** 2010.
- U. Demiryurek, F. Banaei-Kashani and C. Shahabi, “*A case for time-dependent shortest path computation in spatial networks*”, **ACMGIS** 2010.
- F. Banaei-Kashani and C. Shahabi, “*Fixed-precision approximate continuous aggregate queries in peer-to-peer databases*”, **CollaborateCom** 2010.
- U. Demiryurek, F. Banaei-Kashani and C. Shahabi, “*TransDec: A spatiotemporal query processing framework for transportation systems*”, **ICDE** 2010.
- H. Shirani-Mehr, F. Banaei-Kashani and C. Shahabi, “*Efficient viewpoint assignment for urban texture documentation*”, **ACMGIS** 2009.
- L. Nocera, A. Rihan, C. Shahabi, S. Xing, A. Khodaei, A. Khoshgozaran, C. Shahabi, F. Banaei-Kashani, “*GeoDEC: A multi-layered query processing framework for spatiotemporal data*”, **ACMGIS** 2009.
- U. Demiryurek, F. Banaei-Kashani and C. Shahabi, “*ER-CkNN: Efficient continuous nearest neighbor query in spatial networks using Euclidian Restriction*”, **SSTD** 2009.
- H. Shirani-Mehr, F. Banaei-Kashani and C. Shahabi, “*Efficient viewpoint selection for urban texture documentation*”, **GSN** 2009.
- F. Banaei-Kashani and C. Shahabi, “*Fixed-precision approximate continuous aggregate queries in peer-to-peer databases (short paper)*”, **ICDE** 2008.
- F. Banaei-Kashani and C. Shahabi, “*Partial selection query in peer-to-peer databases (short paper)*”, **ICDE** 2006.
- F. Banaei-Kashani and C. Shahabi, “*SWAM: A family of access methods for similarity-search in peer-to-peer data networks*”, **CIKM** 2004.
- F. Banaei-Kashani, C. Chen and C. Shahabi, “*WSPDS: Web Services Peer-to-peer Discovery Service*”, **ISWS** 2004.
- F. Banaei-Kashani and C. Shahabi, “*Efficient flooding in power-law networks (short paper)*”, **PODC** 2003.
- C. Shahabi, F. Banaei-Kashani, Y. Chen and D. McLeod, “*Yoda: An accurate and scalable web-based recommendation system*”, **CoopIS** 2001.

Other Referred Publications (Workshop Papers, Posters)

- F. Banaei-Kashani et al., “*Monitoring Mobility Disorders at Home using 3D Visual Sensors and Mobile Sensors (demo paper)*”, **Wireless Health** 2013.
- F. Banaei-Kashani, M. Asghari, M Rahmani, C. Shahabi, Lisa Brenskelle, “*SDPF: A Framework for Online, Real-time Cleansing of Upstream Operating Data*”, **SPE** Western Regional Meeting, April 2013.
- F. Banaei-Kashani, C. Shahabi and B. Pan, “*Discovering traffic patterns in traffic sensor data*”, **IWGS** in conjunction with ACMGIS 2011.
- H. Shirani-Mehr, F. Banaei-Kashani and C. Shahabi, “*A case study of participatory data transfer for urban temperature monitoring*”, **W2GIS** 2011.
- Pan, U. Demiryurek, F. Banaei-Kashani and C. Shahabi, “*Spatiotemporal summarization of traffic data streams*”, **IWGS** in conjunction with ACMGIS 2010.
- H. Shirani-Mehr , F. Banaei-Kashani and C. Shahabi, “*Using location-based social networks for quality-aware participatory data transfer*”, **LBSN** in conjunction with ACMGIS 2010.
- U. Demiryurek, B. Pan, F. Banaei-Kashani and C. Shahabi, “*Temporal modeling of spatiotemporal networks*”, **IWCTS** in conjunction with ACMGIS 2009.
- C. Shahabi, F. Banaei-Kashani and Kai Song, “*On-the-fly visualization of scientific geospatial data using wavelets*”, Microsoft **e-Science** Workshop, December 2008.
- F. Banaei-Kashani and C. Shahabi, “*Searchable querical data networks*”, **DBISP2P** in conjunction with VLDB 2003.
- F. Banaei-Kashani and C. Shahabi, “*Criticality-based analysis and design of unstructured peer-to-peer networks as complex systems*”, **GP2PC** in conjunction with CC-Grid 2003.
- C. Shahabi, F. Banaei-Kashani, J. Faruque and A. Faisal, “*Feature Matrices: A model for efficient and anonymous web usage mining*”, **ECWeb** in conjunction with DEXA 2001.
- C. Shahabi, F. Banaei-Kashani and J. Faruque, “*A reliable, efficient, and scalable system for web usage data acquisition*”, **WebKDD** in conjunction with KDD 2001.

FUNDED RESEARCH PROPOSALS

- **USDOT-CDOT**\$25K May 2016-December 2017
PI
Title: “Toward Design and Development of an Omni-Purpose Big Data Infrastructure for Colorado Department of Transportation (CDOT)”
- **USDOT-MPC (Mountain Plain Consortium)**..... \$100K September 2016-September 2017
PI
Title: “Route Planning for Enhanced Transportation Network Utilization: A System Optimization Approach for Route Planning in Advanced Traveler Information Systems”

- **US DoEd-GAANN** \$750K September 2015-September 2018
PI
Title: “A study of Big Data Science and Engineering”
- **USDOJ – NIJ (National Institute of Justice)** \$1M October 2011-October 2013
Co-author and Co-PI
Title: “Janus - Multi Source Event Collection System for Effective Surveillance of Criminal Activity”
- **NIH – SC CTSI (Southern California Clinical and Translational Science Institute)** \$90K July 2012-July 2013
Co-author and Co-PI
Title: “Developing Point-of-Care Mobility (PoCM) Monitoring System Technologies”
- **Chevron / USC CiSoft** \$200K/Y December 2007-December 2008
Main Author and Senior Personnel December 2008-December 2009
Title: “Real-time Data Management for Efficient Storage, Access, and Analysis of Reservoir Sensory Data” December 2009-December 2010
 December 2011-December 2012
 December 2012-December 2013
 December 2013-December 2014
- **LA MTA (Los Angeles Metropolitan Transportation Authority)** \$800K January 2010-January 2012
Co-author and Senior Personnel
Title: “Design and Implementation of ADMS (Archived Data Management System) for LA MTA”
- **NSF CENS (Center for Embedded Networked Sensing)** June 2008-June 2010
Main Author and Senior Personnel \$100K
Title: “GeoSIM: An Urban Sensing System for Social Image Mapping of Urban Geolocations”
- **USDOT - METTRANS** \$90K/Y August 2008-August 2009
Main Author and Senior Personnel August 2009-August 2010
Title: “A Geospatial Framework for Dynamic Route Planning using Congestion Prediction in Transportation Systems”
- **USC Zumberge** \$40K August 2008-August 2009
Co-author and Senior Personnel
Title: “Urban-scale Computer Aided Sustainable Design”
- **NASA JPL (Jet Propulsion Laboratory)** \$90K August 2007-August 2008
Main Author and Senior Personnel
Title: “On-the-fly Retrieval and Fusion of 5-D Earth Science Data for Effective Visualization and Decision-Support”

PROFESSIONAL SERVICES

- **Co-Chair:** BSD 2017, IWGS 2017, BSD 2016, IWGS 2016, IWGS 2014, IWGS 2013, IWGS 2012, IWGS 2011
- **Conference Program Committee Member:** WISE 2016, ACMGIS 2015, GeoRich 2015 (in conjunction with SIGMOD/PODS), ACMGIS 2014, GeoRich 2014 (in conjunction with SIGMOD), ACMGIS 2013, MDM 2013 (Demo Track); MobiDE 2013 (in conjunction with SIGMOD); ACMGIS 2012; SensorKDD 2012 and 2011 (in conjunction with KDD), ACS 2012 (in conjunction with SDM), ICDE 2010, AP2PS 2011, 2010 , and 2009, SNAS 2009

AFFILIATIONS

- Member of **IEEE**, Computer Society
- Member of **ACM**
- Member of **ACM SIGSPATIAL**