

Murat Ali Bayir

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Computer Science and Engineering
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Research Interests

- User Profiling (Smartphone Users (PhD Thesis), Web Users (MS Thesis))
- Web 2.0 and Mobile Computing, Pervasive Computing, Social Network applications for Smartphones and Web 2.0
- Data Mining, Graph Theory, Machine Learning
- Cloud Computing, Large Scale Data Processing with Map/Reduce
- Applied Research in general, Research Projects directly related to real life.

Preferred Locations

San Francisco Bay Area and New York City

Education

- 2007-present** **University at Buffalo, SUNY**, Buffalo, NY
◊ *Ph.D. in Department of Computer Science and Engineering*
◊ *Expected to finish in May 2010*
◊ Thesis: "Mobility Aware Smartphone Applications and Routing in PSNs"
◊ Advisor: Prof. Murat Demirbas
- 2006-2007** **Middle East Technical University**, Ankara, Turkey
◊ *PhD Student in Department of Computer Engineering*
- 2003-2006** **Middle East Technical University**, Ankara, Turkey
◊ *M.Sc. in Department of Computer Engineering*
◊ Thesis: "A New Reactive Method for Processing Web Usage Data"
◊ Advisor: Prof. Ismail Hakki Toroslu
- 1998-2003** **Middle East Technical University**, Ankara, Turkey
◊ *B.Sc. in Computer Engineering with Minor in Math*
◊ Graduation Project: "A Web Based Banking Automation System"
◊ Advisor: Prof. Ahmet Cosar
- 1994-1998** **Mersin 19 May Anatolian High School (English)**, Mersin, Turkey
◊ *Natural Science Division*

Employment History

- 2007-present** **University at Buffalo, SUNY**, Buffalo, NY, USA
◊ *Research Assistant at UbiComp Lab*
- 2008** **Bloomberg LP**, New York City, NY, USA
◊ *Financial Software R&D Intern*
- 2006-2007** **AGMLAB Information Technologies**, Ankara, Turkey
◊ *Member of Research Staff*
- 2004-2006** **Havelsan Inc**, Ankara, Turkey
◊ *Software Engineer*
- 2003-2004** **Ideal Technology**, Ankara, Turkey
◊ *Software Engineer*
- 2002-2003** **METU IDEA**, Ankara, Turkey
◊ *Teaching Assistant*
- 2002** **Probil Business Solutions**, Ankara, Turkey
◊ *Software R&D Intern*

Honors and Awards

- ◊ Best Research Project Award with Bilgi.com Turkish Search Engine Project by Elginkan Foundation, 2008.
- ◊ The Industrial project titled "A Framework for Intelligent Web Analysis System" originated from my MS Thesis is funded 300\$K by Scientific and Technological Council of Turkey (NSF of Turkey), 2007.
- ◊ Accepted to PhD program in Computer Science in several USA and Europe Universities with scholarship, 2006-2007
- ◊ Graduated as a honor student from Computer Engineering Department, METU, 2003.
- ◊ Ranked 582th in university entering exam among 1.4 million candidates, 1998.

Publications

M.S. Thesis

- ◊ Murat Ali Bayir, "A New Reactive Method For Processing Web Usage Data", MS Thesis, Middle East Technical University, June 2006.

Papers Under Submission

- ◊ Murat Ali Bayir, Ismail Hakki Toroslu, "Link Based Session Model for Improving Structure of Commercial Websites".
- ◊ Enis Soztutar, Ismail Hakki Toroslu, Murat Ali Bayir, "Semantically Enriched Event Based Model for Web Usage Mining".
- ◊ Murat Ali Bayir, Murat Demirbas, "PRO: A Mobility Profile Based Routing for Pocket Switched Networks".
- ◊ Murat Demirbas, Murat Ali Bayir, Cuneyt Gurcan Akcora, Yavuz Selim Yilmaz, Hakan Ferhatosmanoglu, "Crowd-Sourced Sensing and Collaboration Using Twitter".
- ◊ Cuneyt Gurcan Akcora, Murat Ali Bayir, Murat Demirbas, Hakan Ferhatosmanoglu, "Identifying Breakpoints in Public Opinion".
- ◊ Enis Soztutar, Ismail Hakki Toroslu, Murat Ali Bayir, "Mining Frequent Event Object Patterns".

Journal Publications

- ◇ Murat Ali Bayir, Murat Demirbas, Ahmet Cosar, "A Web Based Personalized Mobility Service for Smartphone Applications", (To Appear at **The Computer Journal**, Oxford University Press, Special Issue on Best Papers of ISCIS 2009, ranked in the top 5% among 240 submissions)
- ◇ Murat Ali Bayir, Murat Demirbas, Nathan Eagle. "Mobility Profiler: A Framework for Discovering Mobility Profiles of Cell Phone Users", (To Appear at **Pervasive and Mobile Computing Journal**, Elsevier, Special Issue on Human Behavior in Ubiquitous Environment).
- ◇ Murat Ali Bayir, Dogacan Guney, Tolga Can "Integration of Topological Measures for Eliminating Non-Specific Interactions in Protein Interaction Networks". **Discrete Applied Mathematics Journal**, Elsevier, Volume 157, Issue 10, Pages 2416-2424.
- ◇ Murat Ali Bayir, Ismail H. Toroslu, Ahmet Cosar, "Genetic Algorithm for Multiple Query Optimization problem". **IEEE Transactions on Systems, Mans and Cybernetics**. Part C. Volume:37, Issue:1 page(s): 147-153.

Conference and Workshop Publications

- ◇ Murat Ali Bayir, Murat Demirbas, Nathan Eagle "Discovering Spatiotemporal Mobility Profiles of Cell Phone Users". **IEEE WOWMOM 2009**, (acceptance rate = 24%).
- ◇ Murat Ali Bayir, Ismail H. Toroslu, Ahmet Cosar, Guven Fidan, "SmartMiner: A New Framework for Mining Large Scale Web Usage Data". **ACM WWW 2009**: 161 - 170, (acceptance rate = 12%).
- ◇ Murat Ali Bayir, Murat Demirbas, Ahmet Cosar, "TRACK ME! A Web Based Location Tracking and Analysis System for Smart Phone Users". **IEEE ISCIS 2009**.
- ◇ Murat Demirbas, Carole Rudra, Atri Rudra, Murat Ali Bayir. Imap: Indirect measurement of air pollution with cellphones. **PerCom Workshops 2009**: 537-542.
- ◇ Murat Ali Bayir, Ismail H. Toroslu, Ahmet Cosar, Guven Fidan "Discovering More Accurate Frequent Web Usage Patterns". **Text-Mining & Link-Analysis Workshop at IJCAI 2007**.
- ◇ Murat Ali Bayir, Ismail H. Toroslu, Ahmet Cosar, "A New Approach for Reactive Web Usage Data Processing," icdew, p. 44, **22nd International Conference on Data Engineering Workshops, ICDE 2006**.
- ◇ Murat Ali Bayir, "BASKIN: Small Scale Combat Simulation System", **ITEC 2006**, European Conference on Simulation and Training Systems.
- ◇ Murat Ali Bayir, Ismail H. Toroslu, Ahmet Cosar, "A Performance Comparison of Pattern Discovery Methods on Web Log Data", **IEEE AICCSA 2006**: 445-451.

Other Publications

- ◇ Murat Ali Bayir, Murat Demirbas. "On The Fly Learning of Mobility Profiles for Intelligent Routing in Pocket Switched Networks", Technical Report, 2009-03, Department of Computer Science and Engineering, University at Buffalo.
- ◇ Murat Ali Bayir, "Introduction to Web Programming", online course book for web Programming course of IDEA of CENG-METU, 2003. (in Turkish)

Conference Presentations

- ◇ Track Me! A web based location tracking and analysis system for smart phone users, ISCIS 2009, North Cyprus, Turkey.
- ◇ SmartMiner: A New Framework for Mining Large Scale Web Usage Data, WWW 2009, Madrid, Spain.
- ◇ Imap: Indirect measurement of air pollution with cellphones, PerCOM 2009, Galveston, TX, USA.
- ◇ Bilgi.com Turkish Search Engine, AB 2007, National Academic Conference on Information Systems, Kutahya, Turkey.
- ◇ Web Usage Mining, ISTEK 2006, Helsinki, Finland.

- ◇ BASKIN: Small Scale Combat Simulation System, USMOS 2005, National Conference of Turkey on Simulation and Modeling Systems, Ankara, Turkey.

SELECTED PROFESSIONAL R&D EXPERIENCE

University at Buffalo, SUNY, Ubiquitous Computing Lab, Buffalo, NY, USA

Research Associate

August, 2007 - present

Includes current Ph.D. research related to Pervasive Computing, Data Mining and Social networks. Developed novel framework for Mobility Profiling and location prediction of Smart Phone Users. Developed pervasive applications including air pollution exposure estimation, a novel context aware and self learning routing for Smart Phones through utilizing social networks.

Bloomberg L.P., New York City, NY, USA

Financial Software R&D Intern

May, 2008 - Aug, 2008

Data Mining and Machine Learning Techniques for Bond Pricing Algorithms. Worked in the Development of new bond pricing algorithms by using Collaborative Filtering Techniques. Developed an offline framework which prices active bonds based on the most recent historical data. Developed an application for bond trend visualization with several filtering options using C++ programming language.

AGMLAB Information Technologies, Ankara, Turkey

Member of Research Staff

Apr, 2006 - Aug, 2007

Participated in Development of Bilgi.com Turkish Search Engine Project. Implemented link based scoring system for Turkish Web by using Hadoop Map/Reduce framework. Developed an evaluation framework for measuring quality of search engine results based on user responses over frequently used query keywords. Participated in the development of Web Analytics Tool project for improving structure of commercial web sites. Developed several distributed applications by using Hadoop Map/Reduce framework for Tera Byte scale data analysis.

Havelsan Inc., Ankara, Turkey

Software Engineer

Apr, 2004 - Apr, 2006

Participated in the development of two different software projects which are listed below:

BASKIN (Small Scale Combat Simulation Project for Office of Naval Research),

UYAP project (which is a part of National E-Government Project of Turkey for Information System Management of Department of Justice).

Ideal Technology, Ankara, Turkey

Software Engineer

Jun, 2003 - Apr, 2004

Participated in the development of Hipfoto.com photography sharing portal. This project is developed for web users who is interested in photography. Hipfoto.com provides processing, editing and sharing photos online.

SELECTED RESEARCH PROJECTS DURING MS AND PHD STUDIES

Crowd-Sourced Sensing and Collaboration Using Twitter

Sep, 2009 - Jan, 2010

Despite the availability of the sensor and smartphone devices to fulfill the ubiquitous computing vision, the state-of-the-art has gap due to lack of infrastructure to task/utilize these devices for collaboration and coordination. For that reason, we design and implement a crowd-sourced sensing and collaboration over Twitter, and showcase our system in the context of two applications: a crowd-sourced weather radar, and a participatory noise-mapping application. We also present an analysis of our real-world Twitter experiments to give insights for the feasibility of our approach

TRACK ME!

Feb, 2009 - August, 2009

In this project, we propose a Web Based Mobility Analysis System which collects location data

from cell phone users via opportunistic Internet connections and convert these low level location data to high level mobility profiles as well as adding temporal dimension. Our system provides query interface for accessing mobility profiles of cell phone users for different applications such as air pollution exposure risk estimation, location based advertisement systems etc... We have also illustrated the benefits of our systems on the MIT Reality Mining data set containing 350K hours of cell tower connection data.

PRO: Profile Based Routing in Social Networks

Aug, 2008 - Jan, 2009

In this project, we learn social interactions between people by collecting blue tooth proximity data from smart phones carried by human. We learn the evolution of the social network and propose a new context aware routing algorithm for message communication between two pairs via adhoc protocol. Our experimental results shows that using contextual data related to the social network and mobility profiles improves the performance of routing process significantly.

Mobility Profiler

Jan, 2008 - May, 2008

In this project, we focus on the problem of discovering mobility patterns and mobility profiles of mobile users from the cellphone-based location logs. We define the mobility path concept used for representing users travel path from one location to another location. We generated frequent mobility patterns from mobility paths and propose a formal model for mobile user profiles that integrates both frequent mobility patterns and temporal information. We also present a complete framework, Mobility Profiler, for discovering mobile user profiles starting from cell based raw location data. Our analysis of mobility profiles of cellphone users expose a significant long tail in a user's location-time distribution.

Noisy Link Elimination in Protein Interaction Graphs

Sep, 2006 - Dec, 2006

In this project, we have proposed a new link scoring system for protein Interaction networks. Our approach is based on Integration of several topological metrics. By using our new link Scoring function, we have removed non-specific interactions in a large-scale protein-protein networks. Here we have transformed the whole interaction networks into a line graphs and compute betweenness and other clustering coefficients for all the edges in the network. We have also used confidence estimates and validate their method by comparing the results of a test case relating to the detection of a molecular complex with reality.

Smart Miner

Jun, 2004 - May, 2006

In this project, we propose a novel framework called SmartMiner for web usage mining problem which uses link information for producing accurate user sessions and frequent navigation patterns. Unlike the simple session concepts in the time and navigation based approaches, where sessions are sequences of web pages requested from the server or viewed in the browser, Smart Miner sessions are set of paths traversed in the web graph that corresponds to users' navigations among web pages. We have modeled session construction as a new graph problem and utilized a new algorithm, Smart-SRA, to solve this problem efficiently. For the pattern discovery phase, we have developed an efficient version of the Apriori-All technique which uses the structure of web graph to increase the performance. From the experiments that we have performed on both real and simulated data, we have observed that Smart-Miner produces at least 30% more accurate web usage patterns than other approaches including previous session construction methods. We have also studied the effect of having the referrer information in the web server logs to show that different versions of SmartSRA produce similar results. Our another contribution is that we have implemented distributed version of the Smart Miner framework by employing Map/Reduce Paradigm. We conclude that we can efficiently process terabytes of web server logs belonging to multiple web sites by our scalable framework.

Evolutionary Computing Methods for MQO Problem

Sep, 2003 - Jun, 2004

MQO problem is a well-known database research problem, and the database community has studied it since 1980s. The goal of MQO is to reduce the execution cost of a set of queries by performing their common tasks only once. In this project, We have proposed Genetic Algorithm for MQO problem. In the context of MQO, a chromosome corresponds to a solution instance for the set of

queries of the MQO problem. In a chromosome, each gene of a chromosome represents a plan to the corresponding query. Under this modeling, it is shown that MQO is also very suitable for genetic operations. Crossover and mutation operations can easily be defined to produce new valid solution instances. It is shown that by using GA, it is possible to obtain total execution times for MQO very close to optimum execution value in polynomial time.

Professional Activities and Services

- ◇ **IEEE Student Member.**
- ◇ **Member of local organization committee, 23rd International Conference on Data Engineering, ICDE 2007, April 15-20, Istanbul, Turkey.**
- ◇ **External or Direct Reviewer for the following Conferences:**
- ◇ Advance Information Networking and Applications (AINA) 2010; International Conference on Distributed Computing Systems (ICDCS) 2010; The 13th Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD) 2009; IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM) 2008-2009; International Symposium on Stabilization, Safety, and Security of Distributed Systems (SSS) 2008-2009; 11th International Conference on Principles of Distributed Systems (OPODIS) 2007;
- ◇ **External or Direct Reviewer for the following Journals:**
- ◇ IEEE Transactions on Evolutionary Computations; IEEE Transactions on Systems Man and Cybernetics; IEEE Transactions on Parallel and Distributed Systems; Elsevier Information Processing Letters.
- ◇ **Attended Future Faculty Training Workshops of SUNY Buffalo including Presentation, Speaking and Grant Writing Courses.**
- ◇ **Worked with Principal Investigators for preparation of the following Grant Proposals:**
- ◇ **During Employment at AGMLAB Inc:** FRICOC, A Framework for Intelligent Content Creation, for European Union FP-7 Program, worked with PI: Prof. Ismail Hakki Toroslu. MIRACLE, Multimedia Information Retrieval, Analysis, and Collaborative Learning System, for European Union FP-7 Program, worked with PI: Guven Fidan. InQuSoN, Information Quality in Social Networks, for European Union FP-7 Program, worked with PI: Guven Fidan. Web Analytics Tool for Improving Structure of Commercial Web Sites, for National Science Foundation of Turkey, worked with PIs: Prof Ismail Hakki Toroslu and Guven Fidan.
- ◇ **During Employment at SUNY Buffalo:** Time Activity Based Air Pollution Exposure Estimation, for National Institutes of Health (NIH), worked with PIs: Prof Murat Demirbas and Prof. Carole Rudra. Crowdsourced Sensing and Collaboration Using Twitter, for Google Inc, worked with PI: Prof Murat Demirbas.

Social Activities

- ◇ Senator for Graduate Student Association at University at Buffalo, 2009 - 2010.
- ◇ Member of Executive Board of Turkish Graduate Student Association, University at Buffalo, 2009 - 2010, maintained web site of student group, participated in event organizations.
- ◇ Member of Computer Science Graduate Student Association, University at Buffalo, 2007 - 2010.
- ◇ Member of Turkish Graduate Student Association, 2007 - 2010.

Computer Skills

- ◇ **Languages:** C, C++, Java, PHP, ASP.Net, advanced Unix shell scripts, Matlab, SQL, HTML.
- ◇ **Applications/Libraries:** Qt for Symbian, Symbian OS, Hadoop, Lucene, OpenGL, MFC
- ◇ **Operating Systems:** Unix/Linux, Windows.

Languages

- ◇ Turkish: Native
- ◇ English: Fluent
- ◇ French: Beginner

References

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Nathan Eagle Research Scientist MIT & Santa Fe Institute Machine Learning Social Computing +1 (857) 776-3279 nathan@mit.edu	Aidong Zhang Professor, IEEE Fellow SUNY at Buffalo Data Mining Databases +1 (716) 645-4730 azhang@buffalo.edu	Hakan Ferhatosmanoglu Assoc. Prof. Ohio State University Data Mining Databases +1 (614) 292-6377 hakan@cse.ohio-state.edu	Atri Rudra Assist. Prof. SUNY at Buffalo Algorithms Complexity Theory +1 (716) 645-2464 atri@buffalo.edu