Gulsah Altun

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Education

Georgia State University, Atlanta, GA 1/2004 - 5/2008
PhD, *Computer Science* Concentration: Bioinformatics

Georgia State University, Atlanta, GA 8/2001 - 12/2003
MS, *Computer Science* Concentration: Wireless networks

Kocaeli University, Izmit, Turkey 9/1995 - 9/1999
BS, *Electronics and Communication Engineering*

Experience

Research associate, The Scripps Research Institute, Center for Regenerative Medicine 11/2009-present

- Designed and implemented algorithms and computational methods for analyzing imprinted genes and X-chromosome inactivation in human embryonic stem cells, induced pluripotent stem cells, parthenotes, primary cells and tissue samples by utilizing DNA methylation, gene expression and SNP genotyping high-throughput data.
- Compared genome-scale DNA methylation and gene expression microarray data across human pluripotent and non-pluripotent cells for analyzing their genomic and epigenomic differences using statistical and computational approaches.

Postdoctoral scholar, University of California, San Diego (UCSD), Department of Reproductive Medicine/
Scientific Collaborator, The Scripps Research Institute, Center for Regenerative Medicine 8/2008 - 11/2009

- Developed a new numbering/tracking method based on IP addresses of nodes from computer networks for categorizing biological data samples, which replaced the previous numbering/tracking system that was used in the laboratory.
- Designed and implemented a normalization algorithm in C++ for normalizing DNA methylation microarray probe level data across a set of given samples.
- Analyzed high-throughput DNA methylation data from human embryonic stem cells using various programming languages (C/C++, Java, Perl), statistical packages (R, SAS) and bioinformatics software tools such as GenePattern, GeneGO, CLC Genomics Workbench, Significance Analysis of Microarrays (SAM), Cluster/JavaTree, Expander, GeneSpring, Cytoscape, Illumina GenomeStudio and various other bioinformatics tools.
- Performed quality control of gene expression (mRNA and miRNA), DNA methylation and SNP genotyping microarray data generated by the Illumina BeadStation 500GX BeadArray Reader in the laboratory on a regular basis.
- Responsible for the data retrieval, storage, backup and organization of all high-throughput microarray and sequencing data generated in the laboratory.
- Responsible for the data retrieval and analysis of microarray data from collaborators.

Graduate research assistant, Georgia State University, Department of Computer Science 8/2002 - 5/2008

- Designed and implemented a new algorithm in C++ based on graph theory and random forests for feature reduction in protein profiles, significantly reducing noise in the data.
- Introduced novel statistical methods based on z-scores for query (seed) protein selection methods that find high quality seeds.
- Developed new binary classifiers for the prediction of secondary structure transitions in proteins that achieve higher prediction accuracy than the current traditional binary classifiers.
- Implemented a new hybrid kernel for support vector machines (SVM) in C.
- Improved K-means clustering algorithm for exploring local protein sequence motifs with common structural properties.
- Applied support vector machines to SNP prediction and haplotype tagging.
- Implemented parallel protein secondary structure prediction schemes using Pthread and OpenMP over Hyper-Threading.
- Applied neural networks and support vector machines to the prediction of sick/healthy genotypes.
- Designed a mathematical model and developed a linear programming approach for the protein-protein interaction prediction problem formulated as a matching problem from graph theory. (developed in Java with ILOG CPLEX optimization package.)
- Designed and implemented an algorithm that modifies Dynamic Source Routing (DSR) protocol to secure ad hoc wireless networks. The results increased the packet delivery ratio in a network when compared to the original DSR protocol using the ns-2 network simulator.

Graduate laboratory assistant, Georgia State University, Department of Physics and Astronomy 8/2001- 8/2003

- Conducted electronics laboratory experiments in an electronics course and assisted students with electronics experiments.

Software engineer, Research & Development (R&D), ALCATEL, Istanbul, Turkey 1/2000 - 6/2001

- Implemented and tested network program modules using the C programming language in a UNIX environment.

Intern, R&D Department, SIEMENS, Istanbul, Turkey Summer 1998

- Tested newly designed power sources.

Intern, R&D Department, ENTES, Istanbul, Turkey Summer 1997

- Performed computer simulations of the electronic circuits using SPICE analog circuit simulation software (PSPICE).

Publications

1. Gulsah Altun, Louise C. Laurent, Jeanne F. Loring, "Epigenetic remodeling and stem cells", Drug Discovery Today: Technologies, Vol 5. No. 4, Pages 139-142, 2010.
2. Gulsah Altun, Jeanne F. Loring, Louise C. Laurent, "DNA methylation in embryonic stem cells", Journal of Cellular Biochemistry, Vol. 109, No. 1, pages 1-6**,** 2010.
3. Stefan Gremalschi, Gulsah Altun, Irina Astrovskaya and Alexander Zelikovsky, "Mean Square Residue Biclustering with Missing Data and Row Inversions", Proceedings of International Symposium on Bioinformatics Research and Applications (ISBRA'09), Springer LNBI (Lecture Notes in Computer Science), Vol. 5542, pages 28-39, 2009.
4. Stefan Gremalschi and Gulsah Altun, "Mean Squared Residue Based Biclustering Algorithms", Proceedings of International Symposium on Bioinformatics Research and Applications (ISBRA'08), Springer LNBI (Lecture Notes in Computer Science) Vol. 4983, pages 232-243, 2008.
5. Wei Zhong, Gulsah Altun, Xianmin Tian, Robert Harrison, Phang C. Tai, and Yi Pan, "Parallel Protein Secondary Structure Prediction Schemes using Pthread and OpenMP over Hyper-Threading Technology" The Journal of Supercomputing, Vol. 41, No.1, pages 1-16, July 2007.
6. Gulsah Altun, Hae-Jin Hu, Stefan Gremalschi, Robert W. Harrison and Yi Pan, "A Feature Selection Algorithm based on Graph Theory and Random Forests for Protein Secondary Structure Prediction", ISBRA'07, Springer LNBI (Lecture Notes in Computer Science) Vol. 4463, pages 590-599, 2007.
7. Michael Weeks and Gulsah Altun, "Efficient, Secure, Dynamic Source Routing for Ad-hoc Networks", Journal of Network and Systems Management, Vol. 14, No. 4, pages 559-581, 2006.
8. Gulsah Altun, Wei Zhong, Yi Pan, Phang C. Tai and Robert W. Harrison, "A New Seed Selection Algorithm that Maximizes Local Structural Similarity in Proteins", Proceedings of International Conference of the IEEE Engineering in Medicine and Biology (EMBC'06), pages 5822-5825, August 2006.
9. Jingwu He, Jun Zhang, Gulsah Altun, Alex Zelikovsky and Yanqing Zhang, "Haplotype Tagging using Support Vector Machines", Proceedings of IEEE International Conference on Granular Computing (GRC 2006), pages 758-761, May 2006
10. Gulsah Altun, Hae-Jin Hu, Dumitru Brinza, Robert W. Harrison, Alexander Zelikovsky and Yi Pan, "Hybrid SVM kernels for protein secondary structure prediction", GRC 2006, pages 762-765, May 2006.
11. Wei Zhong, Gulsah Altun, Robert Harrison, Phang. C. Tai, and Yi Pan, "Improved K-means Clustering Algorithm for Exploring Local Protein Sequence Motifs Representing Common Structural Property," IEEE Transactions on NanoBioscience, Vol. 4, No. 3, pages 255-265, 2005.
12. Wei Zhong, Gulsah Altun, Robert Harrison, Phang C. Tai, and Yi Pan, "Discovery of Local Protein Sequence Motifs using Improved K-means Clustering Technique", Proceedings of International Conference on Bioinformatics and its Applications (ICBA2004), Florida, December 2004.
13. Wei Zhong, Gulsah Altun, Robert Harrison, Phang C. Tai, and Yi Pan, "Factoring Tertiary Classification into Binary Classification Improves Neural Network for Protein Secondary Structure Prediction," Proceedings of IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB2004), pages 175-181, San Diego, 2004.

Talks/Poster presentations

1. Gulsah Altun, Franz-Josef Mueller, Marina Bibikova, Jeanne F. Loring, Louise C. Laurent, "Imprinting and X-Inactivation are Disrupted in Human Pluripotent Stem Cells", International Society for Stem Cell Research (ISSCR) 8th Annual Meeting, June 16-19, 2010, San Francisco.
2. Ileana Slavin, Gulsah Altun, Yu-Chieh Wang, Louise C. Laurent, Jeanne Loring "Involvement of DNA Methyltransferases in Human Embryonic Stem Cell Differentiation", International Society for Stem Cell Research (ISSCR) 8th Annual Meeting, June 16-19, 2010, San Francisco.
3. Ibon Garitonandia, Jordan Seldeen, Gerald Wambua, Candace Lynch, Gulsah Altun, Jeanne F. Loring, Louise C. Laurent, "Culture Methods can Influence the Genetic Stability and Phenotypic properties of Human Embryonic Stem Cells", International Society for Stem Cell Research (ISSCR) 8th Annual Meeting, June 16-19, 2010, San Francisco.
4. Victoria Glenn, Eyitayo Fakunle, Ha Tran, Suzanne Peterson, Kyle Nickey, Sara Abdelrahman, Gulsah Altun, Simon Ronald, James Shen, Candace Lynch, Louise C. Laurent, Jeanne F. Loring "Expanding the Genetic Diversity of a Human Pluripotent Stem Cell Database by the Derivation of Induced Pluripotent Stem Cells from People of African Descent", International Society for Stem Cell Research (ISSCR) 8th Annual Meeting, June 16-19, 2010, San Francisco.

5. Eyitayo Fakunle, Suzanne Peterson, Victoria Glenn, Ha Tran, Candace Lynch, Kyle Nickey, Sara Abdelrahman, Gulsah Altun, Simon Ronald, James Shen, Louise C. Laurent, Jeanne F. Loring "Potential application of Ethnically Diverse Induced Pluripotent Stem cells to study Genetic Variations involved in Drug Sensitivities", International Society for Stem Cell Research (ISSCR) 8th Annual Meeting, June 16-19, 2010, San Francisco.
6. Kyle Nickey, Eyitayo Fakunle, Suzanne Peterson, Victoria Glenn, Ha Tran, Candace Lynch, Sara Abdelrahman, Gulsah Altun, James Shen, Simon Ronald, Louise C. Laurent, Jeanne F. Loring "Using Ethnically Diverse Induced Pluripotent Stem Cells to Develop Improved Drug Screens", International Society for Stem Cell Research (ISSCR) 8th Annual Meeting, June 16-19, 2010, San Francisco.
7. Gulsah Altun, Jeanne F. Loring, Louise C. Laurent. "Statistical analysis of DNA methylation in human embryonic stem cells and comparison with induced pluripotent and differentiated cells", 4th Annual Stem Cells Meeting on the Mesa, November, 2009, La Jolla, CA.
8. Ileana Slavin, Gulsah Altun, Louise Laurent and Jeanne Loring, "Epigenetic regulation of microRNA expression in hESC pluripotency and differentiation", 4th Annual Stem Cells Meeting on the Mesa, November, 2009, La Jolla, CA.
9. Eyitayo Fakunle, Ha Tran, James Shen, Candace L. Lynch, Gulsah Altun, Ronald Simon, Louise C. Laurent and Jeanne F. Loring, "Derivation of an Ethnically Diverse Panel of Pluripotent Stem Cells for Studies on Genetic Variation", 4th Annual Stem Cells Meeting on the Mesa, November, 2009, La Jolla, CA.
10. Gulsah Altun, Dumitru Brinza, Jeanne F. Loring, Louise C. Laurent, "Role of DNA Methylation in Regulation of Transcription in Pluripotent Stem Cells and Their Derivatives", International Society for Stem Cell Research (ISSCR) 7th Annual Meeting, July 8-11, 2009, Barcelona, Spain.
11. Gulsah Altun, Julie V. Harness, Dumitru Brinza, Hans Keirstead, Jeanne F. Loring, Louise C. Laurent, "The Distinct Epigenetic Signatures of Standard and Parthenogenetic Human Embryonic Stem Cells", The International Society for Stem Cell Research, ISSCR, 7th Annual Meeting, July 8-11, 2009, Barcelona, Spain.
12. Gulsah Altun, Jeanne F. Loring, Louise C. Laurent, "Classification and Analysis of Human Stem Cell Lines", 3rd Annual Stem Cells Meeting on the Mesa, November, 2008, La Jolla, CA.
13. Gulsah Altun, Stefan Gremalschi, Robert W. Harrison and Alexander Zelikovsky. "Linear Programming for Protein-Protein Interaction Prediction", Georgia Tech-ORNL International Conference on Bioinformatics, International Conference on Bioinformatics in silico Biology: Gene Discovery and Systems Genomics, November 2007.
14. Gulsah Altun, Hae-Jin Hu, Stefan Gremalschi, Robert W. Harrison, Yi Pan, "Support Vector Machine and Clique Based Approach for Feature Selection in Protein Profiles", Poster Paper of the Eleventh Annual International Conference on Research in Computational Molecular Biology, (RECOMB'07), San Francisco, April 2007.
15. Gulsah Altun, Hae-Jin Hu, Dumitru Brinza, Robert W. Harrison, Alexander Zelikovsky and Yi Pan, "Hybrid SVM kernels for protein secondary structure prediction", Molecular Basis of Disease Symposium (MBD'06), 2006.
16. Wei Zhong, Gulsah Altun, Robert Harrison, Phang C. Tai, and Yi Pan. "Mining Relationship between Structural Homology and Frequency Profile for Structure Clusters," Poster Paper of the Ninth Annual International Conference on Research in Computational Molecular Biology (RECOMB 2005), Boston, May 2005.
17. Wei Zhong, Gulsah Altun, Robert Harrison, Phang C. Tai, and Yi Pan. "Protein Secondary Structure Prediction by Neural Networks", Biotech Symposium, Southeast Collaborative Alliance Biocomputing Center (SECABC), Atlanta, May 2004.
18. Gulsah Altun, Michael Weeks, "Efficient, Secure, Dynamic Source Routing for Ad-hoc Networks", Georgia Electronic Design Center Industry Advisory Board (GEDC IAB'04), 2004.

Technical expertise

Programming languages	: C/C++, Java, R, PERL, SQL, PL/SQL, Matlab, FORTRAN and Assembly
Web Applications	: JavaScript, ASP, JSP, JDBC, PHP, XML and (D/X) HTML
Databases	: Oracle 8i/10i, mySQL, MS SQL, Server and MS Access
Operating Systems and applications	: Linux, UNIX, Solaris, Windows 2000/XP, CPLEX, Eclipse, Microsoft Visual Studio 6.0

Awards/Fellowships

- Molecular Basis of Disease (MBD) Program Fellowship, Georgia State University (GSU) 1/2006 - 6/2008
- Research assistantship, Computer Science department, GSU 8/2002 - 12/2005
- Teaching assistantship, Physics department, GSU 8/2001 - 5/2004
- Turkpetrol Foundation Scholarship 8/2001 - 12/2005

Teaching experience

Instructor, Georgia State University (Full responsibility: Teaching, preparation of lecture notes and exams, grading)

- Java in bioinformatics (Summer 2006 and Fall 2007)
- C++ in bioinformatics (Fall 2007)
- Data structures in bioinformatics (Fall 2007)
- Design and analysis of algorithms (Spring 2007)
- Data structures (Spring 2006 and Spring 2008)

Teaching Assistant, Georgia State University (Responsibilities: Grading exams and assignments)

- VLSI CAD and computer architecture lab. (Fall 2004), Data security (Fall 2006), Software engineering (Spring 2004)

Courses

- Completed a 3-month Inter-institutional (UCSD, Burnham, Salk and Scripps research institutes) Core Course in Stem Cell Biology, Medicine, and Ethics which provides the latest information in human stem cell biology, medicine and ethics, January 5, 2010-March 11, 2010.
- Attended a 4-day NIH-sponsored human embryonic stem cell laboratory course hosted by the Center for Regenerative Medicine, The Scripps Research Institute (TSRI) and performed stem cell culturing techniques such as mechanical, collagenase and accutase passaging, learned stem cell morphology, derived mouse embryonic fibroblasts (mefs) and performed a teratoma assay in a mouse, April 20-23, 2010.
- Completed a 2-day San Diego Lab Management Course, January 22-23, 2009.
- Graduate level computer science/bioinformatics courses taken include:
  Advanced algorithms in bioinformatics I and II, Introduction to systems biology, Protein structure analysis I and II, Introduction to statistical methods, Advanced computer architecture, Data security, Advanced operating systems, Optical/Wireless networks, Databases and the web, VLSI CAD/Network algorithms, Advanced software engineering, Deductive databases and logic programming

Refereeing

- IEEE Transactions on Nanobioscience
- International Journal of Bioinformatics Research and Applications (IJBRA)
- 5th ACM SIGKDD Workshop on Data Mining in Bioinformatics
- International Conference on Parallel and Distributed Computing, Applications and Technologies (PDCAT'05)
- IEEE International Symposium on Circuits and Systems (ISCAS'04)
- International Conference on Network and Parallel Computing (NPC'04).

Professional services

- Member of the International Society for Stem Cell Research, 2010
- Poster chair and webmaster, International Symposium on Bioinformatics Research and Applications, (ISBRA'08/ISBRA'07)
- Webmaster, Second Southeast Collaborative Alliance for Biocomputing, Fall Workshop on Biocomputing (SECABC'05)
- Chair, GSU Student Chapter of Association of Computing Machinery (ACM) 5/2003 - 5/2006
- Program chair, GSU Student Chapter of ACM 9/2001 - 5/2003