DONGSHENG CHE

Curriculum Vitae

Contact Information

Computational Systems Biology Lab
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Research Interests

Algorithms, particularly graph algorithms and their applications in bioinformatics.

Computational intelligence/machine learning and applications to bioinformatics.

Bioinformatics/computational biology, particularly in comparative genomic analysis, characterization of transcriptional regulatory networks and pathways.

Education

Ph.D., Computer Science, The University of Georgia, Athens, GA, May 2008 (Expected)
Dissertation: Deciphering Genomic Structures in Prokaryotic Genomes
Advisors: Dr. Ying Xu and Dr. Liming Cai

Graduate Certificate, Bioinformatics, The University of Georgia, Athens, GA, May 2008 (Expected)

M.S., Computer Science, The University of Georgia, Athens, GA, Dec. 2002

M.S., Forest Biotechnology, The University of Georgia, Athens, GA, Aug. 2000

B.Agr., Forestry, Zhejiang Forestry College, Lin-an, China, July 1992

Research Experience

Research Assistant January 2004 - Present
Computational Systems Biological Lab (CSBL) The University of Georgia

- Developed a number of **graph matching-based algorithms** to characterize genomic structures (including operons, uber-operons and regulons) in prokaryotic genomes. The predicted genomic structures can be used to understand transcriptional regulatory networks and biological pathways.
- Applied **machine learning techniques** to classify whether neighbor genes belong to the same transcription unit or not.

Research Assistant January. 2006 - June. 2007
Liming Cai/Russell Malmberg The University of Georgia

- Developed and applied **graph tree-decomposition** approaches in searching whole genome-scale noncoding RNAs, and biological pathway modeling. These NP-hard optimization problems can be formulated on graphs with a practically small tree width, and thus can be solved efficiently.
- Developed a program to study protein co-evolution using mutual information and to predict protein residue contacts.

Research Assistant Jan. 2003 - June 2006
Southeast Collaboratory for Structural Genomics The University of Georgia
- Developed a new target selection strategy for protein structural genomics based on non-Pfam sequences.
- Designed and implemented the GUIs for MAID, SOLVE/RESOLVE, BEAST and DM programs embedded in the SGXPro software package, which is used for automation of structure determination.

M.S. Research Aug. 2001 - Dec 2002
Robert Robinson The University of Georgia
- Applied efficient external memory algorithms to simulated web graphs.

Teaching Experience

The University of Georgia, Athens, Georgia
Gained experience in teaching lab sessions, grading projects, homeworks and exams, and holding regular office hours.

05/2002-06/2002: CSCI4300/6300 Web Programming (teaching assistant)

08/2001-05/2002: CSCI1301 Introduction to Computing and Programming (lab instructor)

06/2001-08/2002: CSCI1302 Software Engineering (teaching assistant)

08/2000-05/2001: CSCI1301 Introduction to Computing and Programming (lab instructor)

Publications

Book Chapters

1. P. Dam, F. Mao, **D. Che**, P. Wan, T. Tran, G. Li, Y. Xu (2008). Computational elucidation of operons and uber-operons, in *Computational Methods for Understanding Bacterial and Archaeal Genomes*, Y. Xu and J. P. Gogarten, Eds., World Scientific Publishing.

Refered Journal Publications

1. Y. Li, P. Bahti, N. Shaw, G. Song, S. Chen 1, X. Zhang, M. Zhang, C. Cheng, J. Yin, J. Zhu, H. Zhang, **D. Che**, H. Xu, A. Abbas, B. Wang, Z. Liu (2008). Crystal structure of a novel non-Pfam protein AF1514 from Archeoglobus fulgidus DSM 4304 solved by S-SAD using a Cr X-ray source. *Proteins: Structure, Function, and Bioinformatics*.
2. P. Bahti, S. Chen, Y. Li, N. Shaw, X. Zhang, M. Zhang, C. Cheng, G. Song, J. Yin, H. Zhang, **D. Che**, A. Abbas, H. Xu, B. Wang and Z. Liu (2008). Purification, crystallization and preliminary crystallographic analysis of the non-Pfam protein AF1514 from Archeoglobus fulgidus DSM 4304. *Acta Cryst.*, F64, 91-93.
3. P. Wan, F. Mao, V. Olman, **D. Che**, H. Liu, Y. Xu (2007). Operon structural diversity is a reflection of adaptive evolution, submitted.
4. F. Pan, **D. Che**, M. Momany, L. Cai, R. Malmberg (2007). Co-evolution analysis of protein complexes and its applications in predicting residue interactions, submitted.
5. **D. Che**, J. Zhao, L. Cai, Y. Xu (2007). Decision tree modeling predicts operon structures of prokaryotic genomes, *International Journal of Information Technology and Intelligent Computing*, in press.
6. G. Li, **D. Che**, Y. Xu (2007). A universal operon predictor for prokaryotic genomes, accepted.
7. **D. Che**, R. Meagher, C. Rugh, T. Kim, A. Heaton, S. Merkle (2006). Expression of organomecurial lyase in eastern cottonwood enhances organomercury resistance. *In Vitro Cellular and Developmental Biology*, 228-234.
8. **D. Che**, G. Li, F. Mao, H. Wu, Y. Xu (2006). Detecting uber-operons in prokaryotic genomes. *Nucleic Acids Research*, 34(8):2418-2427.

9. **D. Che**, S. Jensen, L. Cai, J.S. Liu (2005). BEST: Binding-site estimation suite of tools. *Bioinformatics*, 21(12):2909-2911.
10. **D. Che**, R. Meagher, A. Heaton, A. Lima, C. Rugh, S. Merkle (2003). Expression of mercuric ion reductase in Eastern cottonwood (*Populus deltoides*) confers mercuric ion reduction and resistance. *Plant Biotechnol Journal*, 1(4):311-9.

Refered Conference Publications

1. **D. Che**, G. Li, S. Jensen, J.S. Liu, Y. Xu (2008). PFP: a computational framework for phylogenetic footprinting in prokaryotic genomes, *Proceedings of International Symposium on Bioinformatics Research and Applications* (ISBRA2008), 110-121.
2. J. Zhao, **D. Che**, L. Cai (2007). Comparative pathway prediction via unified graph modeling of genomic structure. *Proceedings of International Symposium on Bioinformatics Research and Applications* (ISBRA2007), 627-637.
3. **D. Che**, J. Zhao, L. Cai, Y. Xu (2007). Operon prediction in microbial genomes using decision tree approach. *Proceedings of IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology* (CIBCB2007), 135-142.
4. J. Zhao, **D. Che**, L. Cai (2007). Comparative pathway annotation with protein-DNA interaction and operon information via graph tree decomposition, *Pacific Symposium on Biocomputing*, 12:496-507.
5. **D. Che**, Y. Song, K. Rasheed (2005). MDGA: motif discovery using a genetic algorithm. *Genetic and Evolutionary Computation Conference* (GECCO2005), 447-452.
6. S. Sipani, K. Verma, S. Chandrasekaran, X. Zeng, J. Zhu, **D. Che**, K. Wang (2002) Designing an XML database engine: API and performance, *Proceedings of the 40th Annual ACM Southeast Conference* (ACMSE2002), 239-245.

Presentations

"Comparative pathway prediction via unified graph modeling of genomic structure", Proceedings of International Symposium on Bioinformatics Research and Applications (ISBRA), Atlanta, GA, May 2007.

"Operon prediction in microbial genomes using decision tree approach", Proceedings of IEEE Symposium on Computational Intelligence in Bioinformatics and Computational Biology (CIBCB), Honolulu, HI, April 2007.

"MDGA: motif discovery using a genetic algorithm", Genetic and Evolutionary Computation Conference (GECCO), Washington, D.C., June 2005.

Reviews

Reviewer for journals:
Briefings in Bioinformatics

Reviewer for conferences:
IEEE International Conference on Granular Computing 2006
44th ACM Southeast Conference (ACMSE2006)
International Conference on Intelligent Systems for Molecular Biology (ISMB2006)
International Conference on Computational Systems Bioinformatics (CSB2007)
International Conference on Intelligent Computing (ICIC2007)
18th International Conference on Genome Informatics (GIW2007)
Asia-Pacific Bioinformatics Conference (APBC2008)

Society Affiliations

Member of the IEEE and the IEEE Computational Intelligence Society
Member of the International Society of Computational Biology
Member of Institute of Mathematical Statistics

Honors & Awards

Travel awards for conferences of GECCO2005, CIBCB2007 and ISBRA2007
University-wide Graduate Fellowship, The University of Georgia, 1997-1999
Student Scholarship, First Prize, Zhejiang Forestry College, China, 1989-1992

Citizenship and Visa Status

Chinese citizen currently in USA on F-1 student VISA

References

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