

Keyur H. Desai

Dept. of Electrical and Computer Engineering
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Born in India – September 13, 1979.
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Education

PhD Michigan State University, E. Lansing, Electrical Engineering, Expected July 2008
Dissertation “Detecting differential gene expression in the presence of substantial inter-gene correlation.” Two main *contributions*: (i) Established the importance of third-moment *skewness corrections* while computing the false discovery rates; (ii) Developed a novel *gene-ranking algorithm* that shows significant improvement (in terms of statistical power) over published approaches. (Adviser Jack Deller)

MS Michigan State University, E. Lansing, Electrical Engineering, (GPA 3.97) 2004
BS The M. S. University of Baroda, India, Electronics Engineering, (GPA 3.90) 2001

Fields of Interest

THEORY AND METHODS: Statistical inference, Empirical Bayes, Multiple testing, Classification
APPLICATIONS: Microarray data analysis, Comparative genomics, Gene networks

Expertise and Skills

PRINCIPAL TECHNIQUES: Signal processing, Bayes’ rule, Convex optimization, Machine learning, Information theory, Graph theory–Combinatorics
COMPUTER PROGRAMMING: MATLAB, R, C, C++, Cluster–Parallel computing, Perl, LaTeX

Research Experience

RESEARCH FELLOW Quantitative Biology Initiative at MSU 2007 – present
Awarded to develop better *gene detection algorithms*. (Mentors Jack Deller & Justin McCormick)

RESEARCH ASSISTANT Dept. of ECE, MSU (Speech Proc. Lab of Jack Deller) 2004 – present
(i) Differential analysis of DNA *microarray data* (PhD dissertation) (ii) Non-coding *RNA sequence analysis* using stochastic-context free grammars (iii) *Hidden Markov models*, language models, and automatic speech recognition.

RESEARCH ASSISTANT Dept. of Physics, MSU (adviser S.D. Mahanti) 2001 – 2004
Markov Chain Monte Carlo simulations of Coulomb Lattice gas systems to understand the charge ordering in ternary and quaternary alloys of thermoelectric significance.

Teaching Experience

INSTRUCTOR ECE366 – Intro. to Signal Processing, Dept. of ECE, MSU Summer 2007
(MSU Student Instructional Rating System – rated 3.8 on 4-pt scale)

LEAD TA ECE458 – Communication Systems Lab., Dept. of ECE, MSU Spring 2007
(MSU Student Instructional Rating System – rated 3.9 on 4-pt scale)

Research Contributions

SCIENTIFIC SOFTWARES

Tellipsoid An algorithm to detect differential gene expression in the presence of substantial inter-gene correlation. <http://www.egr.msu.edu/~desaikey/publicsoft>

SIMPIE-Max A MATLAB too-suite to compute tail-area false discovery rates for highly correlated multiple hypotheses. <http://www.egr.msu.edu/~desaikey/publicsoft>

ROC-LM: A MATLAB software for evaluating language models that are used in automatic speech recognizers. http://www.egr.msu.edu/speechlab/roc_lmtool/

PUBLICATIONS

(Published / Under Review)

K. Desai, J.R. Deller, and J. McCormick. Tellipsoid: Exploiting inter-gene correlation for improved detection of differential gene expression. In submission, *arXiv* 0802.2959, 2008.

K. Desai, J.R. Deller, and J. McCormick. The distribution of number of false discoveries in highly correlated DNA microarray data. Submitted (with revisions) to *Annals of Applied Statistics*, 2007.

K. Desai, J.R. Deller, and J. McCormick. The distribution of the number of false discoveries in DNA microarray Data. *Proc. 14th IEEE/SP Statistical Signal Processing Workshop*, pp. 205–209, 2007.

K. Desai, J.R. Deller, and H. Radha. A learning framework for detecting remote non-coding RNA homologues. (Poster). *Proc. 13th Int. Conf. Intelligent Systems for Computational Biol.*, 2005.

J.R. Deller, **K. Desai**, and Y.P. Yang. A decision-theoretic framework for the evaluation of language models used in speech recognizers. *Journal of Natural Language Engineering*, vol. 11, pp. 363-396, 2005.

K. Hoang, **K. Desai**, and S.D. Mahanti. Charge ordering and self-assembled nanostructures in a fcc Coulomb lattice gas. *Physical Review B*, vol. 72, pp. 64102, 2005.

K. Desai. Advanced Receivers for WCDMA Downlink. *MS Thesis*, Department of Electrical and Computer Engineering, Michigan State University, 2004.

K. Desai, S.D. Mahanti, and S.N. Khanna. Magnetic field effects on thermal fluctuation of thermal fluctuations of cluster magnetic moments. *Proc. of Int'l Conf. on Clusters and Nano-Assemblies*, pp 223-230, 2003.

K. Waheed, **K. Desai**, and F. Salem. Blind Multi User Detection in DS-CDMA Systems using Natural Gradient based Symbol Recovery. *Proc. of 4th Intl Conf. on Independent Component Analysis and Blind Signal Separation*, pp. 1–4, 2003.

(Work in Progress)

- Correlation benefits multiple testing.
- Stein's phenomenon in multiple testing.
- Is Tellipsoid statistical?

RESEARCH PROPOSALS AND GRANTS

Contributed ideas and write-ups to research proposals submitted to funding agencies, such as the National Institute of Health, the State of Michigan 21st Century Job Funds, and the Office of Naval Research–Multidisciplinary Research Initiative. Further information available upon request.

Awards, Honors and Achievements

- Quantitative Biology Research Fellowship, MSU, 2007–2008
- 2nd rank in PhD qualifying examination, Dept. of ECE, MSU, 2004
- Winner, ECE802: Global-Positioning-Systems project contest, MSU, 2002
- Graduated with distinction in Bachelors of Electronics Engineering, India, 2001
- 8th rank in state-wide 10th grade examination from over fifty thousand students, India, 1995
- Junior Talent Search Scholarship Recipient, India, 1990–1992

Professional Memberships

IEEE (Institute of Electrical and Electronic Engineers)
ISCB (International Society for Computational Biology)

References

Available upon request