Rebecka Jenny Jörnsten

Contact Information

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Mathematical Sciences
University of Gothenburg/Chalmers
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Research Interests

Model Selection in Clustering and Classification. Systems Biology. Data integration. Interface of information theory and statistics. Data depth.

Education

Ph.D. in Statistics, December 2001. University of California at Berkeley
Data compression and Its Statistical Implications, with applications to the analysis of Microarray images. Advisor: Bin Yu

M.A. in Statistics, May 1998. University of California at Berkeley

M.Sc. in Engineering Physics, May 1996. Lund Institute of Technology, Lund, Sweden
Sub-pixel resolution in PIXE images. Advisor: Anders Holtsberg

Professional Appointments

Associate Professor, Mathematical Sciences, Chalmers/University of Gothenburg, January 2009 - present

Associate Professor with Tenure, Department of Statistics and Biostatistics, Rutgers University, July 2008 - December 2008

Assistant Professor, Department of Statistics and Biostatistics, Rutgers University, January 2002-June 2008.

Consultant, Math Center, Lucent Bell Labs, Murray Hill, New Jersey, Sep 1998, April 2000

Grants and Awards

- Knut och Alice Wallenberg Foundation. "Stochastics for big data and big systems bridging local and global". 2012-2016. co-PI. PI Holger Rootzen.
- Åke Wibergs stiftelse. "Systembiologisk metodik för tumörforskning: effektiv identifiering och testning av biomarkörer och targets" Diarienr: 756194060 2012-2014 (co-PI, PI Sven Nelander, SciLife).
- Barncancerfonden. "Systematic experimental testing of in silico designed therapies and biomarkers against childhood neural tumors" Diarienr: PROJ11-057. 2012-2014 (co-PI, PI Sven Nelander, SciLife).
- Strategic Highway Research Program (SHRP 2). "Analysis of Naturalistic Driving Data - driver inattention and crash risk in rear-end collisions". 2011-2013 (co-PI, joint project with SAFER (vehicle and traffic safety center at Chalmers, Chalmers/GU Mathematical Sciences, Volvo cars).

- Vetenskapsrådet (Swedish Research Council) Project Research Grant, "Model Selection in Clustering and Multiple Testing", 2010-2012 (PI).
- Environmental Protection Agency RD-83272101-0 Bioinformatics Center grant, 2006-2008 (10%).
- National Science Foundation award DMS-0306360. "Clustering: visualization, validation and response oriented methods.", 2003-2006 (PI).
- National Science Foundation award DBI-0629346. "DNA barcode data analysis initiative: tools for a new generation of biodiversity data workshops. 2006-2007 (co-PI).
- National Science Foundation award "Eleventh New Researchers Conference in Statistics and Probability", 2008-2009 (PI).
- National Cancer Institute award "Eleventh and Twelfth New Researchers Conference in Statistics and Probability", 2008-2010 (PI).

Reviewer of Research Grants

- Panelist National Science Foundation, Division of Mathematical Sciences, 2009
- Panelist National Cancer Institute, R13 grants, 2008-2010
- External reviewer, National Security Agency, Mathematical sciences, 2010
- External reviewer, NSERC, 2008

Publications:

Submitted, Revised Manuscripts

1. Gerlee, P., Schmidt, L., Monsefi, N., Kling, T., **Jörnsten, R.**, Nelander, S. (2012) Efficient experimental screening: fast, system-scale discovery of synergistic target pairs. *Revised for PLoS One.*
2. Vickhoff, B., Malmgren, H., Åström, R., Nyberg, G., Ekström, S.R., Engvall, M., Snygg, J., Nilsson, M., **Jörnsten, R.** (2013) Music structure determines heart rate variability of singers. *Revised for Frontiers, Auditory and Cognitive Neuroscience.*
3. Barrenäs, F., Bruhn, S., **Jörnsten R.**, Langston, M., C., Nester, C., Rogers, G., Wang, H., Zhao, Y., and Benson, M. (2012) DNA methylation controls transcription factor binding in allergen-challenged CD4+ cells. *Submitted to Molecular Systems Biology.*
4. Moreau, M.P., Bruse, S.E., **Jörnsten, R.**, Liu, Y., Brzustowicz, L.M. (2011) Chronological Changes in microRNA Expression in the Developing Human Brain. *Submitted to PNAS.*
5. Asp, E., **Jörnsten, R.**, Nilsson, D., Jauhiainen, A., Nerman, O., Sunnerhagen, P. (2011) Impact of oxidative stress and the MAP kinase Sty1 on mRNA stability in S.Pombe. *Under revision.*

Manuscripts, Technical reports

1. Sanchez, J., Kling, T., Abenius, T., Nelander, S., **Jörnsten, R.** (2012) Topology-constrained differential network modeling of human cancer. *Presented at Nordstat2012 and the ISI2012-meeting.*

2. Kling, T., Abenius, T., Schmidt, L., Sanchez, J., **Jörnsten, R.**, Nelander, S. (2012) Large scale integrative modeling predicts genetic, epigenetic and transcriptional regulators of glioblastoma phenotypes. *Manuscript to be submitted as part of the Cancer Genome Atlas multi-cancer project.*
3. Vickhoff, B., **Jörnsten, R.**, Snygg, J., Åström, R., Sommermeyer, D., Nyberg, G., Theorell, T., Nilsson, M. (2012) The Musical Score of the Body. (Kroppens Partitur) *Manuscript in preparation. Press appearances: SVT Rapport (Swedish television), P3 (Swedish radio), SvD (newspaper), Radio (SR-P3), Science Festival (Vetenskapsfestivalen 2012), "Forskning och Framsteg" (Swedish popular science journal).*
4. Johansson, P., Kling, T., Abenius, T., Nelander, S., **Jörnsten, R.** (2012) Integrated Analysis of Gene Expression and Methylation Data in Human Cancer: an Accessible and Interactive Web-tool. *Manuscript in preparation.*
5. **Jörnsten, R.** (2007) MIXT, mixture modeling with profile transformations (online Technical report).

Articles, Peer-reviewed book chapters

1. Jauhiainen, A., Nerman, O., Michailidis, G., **Jörnsten, R.** (2012) Transcriptional and metabolic data integration and modeling for pathway identification. *Biostatistics, doi: 10.1093/biostatistics/kxs016.*
2. Abenius, T., **Jörnsten, R.**, Schmidth, L., Sanchez, J., Nelander, S. (2012) System scale network modeling using EPoC. *Advances in Experimental Medicine and Biology, Springer series (ICSB), Volume 736, Part 5, 617-643, DOI: 10.1007.978-1-4419-7210-1-37*
3. Barrenäs, F., Couto Alves, A., Chavali, S., Coin, L, Jarvelin, M-R., **Jörnsten, R.**, Langston, M.A., Ramasamy, A., Rogers, G., Wang H., Benson, M. (2011) Highly interconnected complex disease genes are enriched for disease-associated polymorphisms. *Genome Biology 2012, 13(46), doi:10.1186/gb-2012-13-6-r46*
4. **Jörnsten, R.**, Abenius, T., Kling T., Schmidt, L., Johansson, E., Nordling, T., Nordlander, B., Sander, C., Gennemark, P., Funa, K., Nilsson, B., Lindahl, L., Nelander, S. (2011) Network modeling of the transcriptional effects of copy number aberrations in glioblastoma. *Molecular Systems Biology 7: 486 doi:10.1038/msb.2011.17*
(`http://blogs.nature.com/sevenstones/2012/01/2011-top-accessed-articles.html`)
5. Abel, F., Dalevi, D., Nethander, M., **Jörnsten, R.**, De Preter K., Vermulen, J., Stallings, R., Kogner, R., Maris, J., Nilsson, S. (2011) A 6-gene signature identifies four molecular subgroups of neuroblastoma. *Cancer Cell Int. 11(1):9*
6. Rodriguez-Saona, C.R., Polavarapu, S., Barry J.D., Pol, D., **Jörnsten, R.**, Oudemans, P.V., Liburd, O.E. (2010) Color preference, seasonality, spatial distribution and species composition of thrips (Thysanoptera: Thripidae) in northern highbush blueberries. *Crop Protection, 29(11):133-1340, Nov 2010*
7. **Jörnsten, R.** (2009) Simultaneous subset selection via rate-distortion theory, with application to clustering and significance analysis of gene expression data. *Journal of Computational and Graphical Statistics. September 1, 2009, 18(3): 613-639. doi:10.1198/jcgs.2009.07043.*

8. **Jörnsten, R.**, and Keles, S. (2008) MIXL, Multi-level mixture modeling, with application to the analysis of multi-factor gene expression studies. *Biostatistics 9(3): 540-554.*
9. **Jörnsten, R.**, Wang, H-Y., and Ouyang, M. (2007) A Meta-data based method for DNA microarray imputation. *BMC Bioinformatics 8(109):doi:10.1186/1471-2105-8-109*
10. Goff, L.A., Davila, J., **Jörnsten, R.**, Keles, S. and Hart, R. (2007) Bioinformatic analysis of neural stem cell differentiation. *Journal of Biomolecular Techniques 18:205-212*
11. Lakshmipathy, U., Love, B., Goff, L., **Jörnsten, R.**, Graichen, R., Hart, R.P., Chesnut, J.D (2007) Micro RNA expression pattern of undifferentiated and differentiated human embryonic stem cells. *Stem Cells and Development 16:1-14*
12. Lopez-Pintado, S., and **Jörnsten, R.** (2006) Functional analysis via extensions of the Band Depth. *IMS Lecture Series, Volume 54, ed. R. Liu et al, p. 103-120*
13. Charych, E., Akum, B., Goldberg, J.S., **Jörnsten, R.J.**, Rongo, C., and Firestein, B.L. (2006) Activity-Independent Regulation of Dendrite Patterning by Postsynaptic Density Protein PSD-95. *The Journal of Neuroscience, October 4, 2006, 26(40):10164-10176;*
14. Chen, M., Lucas, K.G., Akum, B.F., Balsingam, G., Stawicki, T.M., Provost, J.M., Riefler, G.M., **Jörnsten, R.J.**, and Firestein, B.L. (2005) Novel Role for Snapin in Dendrite Patterning: Interaction with Cypin. *Molecular Biology of the Cell, Vol. 16, Issue 11, 5103-5114, November 2005.*
15. **Jörnsten, R.**, Wang H-Y., Welsh, W.J., and Ouyang, M. (2005) DNA microarray data imputation and significance analysis of differential expression. *Bioinformatics 2005 21(22):4155-4161*
16. **Jörnsten, R.** (2004) Clustering and Classification based on the L1 data depth. *Journal of Multivariate Analysis Volume 90, Issue 1, July 2004, p. 67-89*
17. **Jörnsten, R.**, and Yu, B. (2004) Simultaneous clustering and subset selection via MDL. *Advances in Minimum Description Length: Theory and Applications, MIT press. P.Grunwald, IJ Myung, M. Pitt Editors. p295-322.*
18. **Jörnsten, R.**, and Yu, B. (2004) Compressing Genomic and Proteomic Array Images for Statistical Analysis. *Invited book chapter Genomic Signal Processing and Statistics. E.R. Dougherty, I. Shmulevich, J. Chen, Z.J. Wang Editors. p341-366*
19. Pan, J.Z., **Jörnsten, R.**, and Hart, R.P. (2004) Screening anti-inflammatory compounds in injured spinal cord with microarrays: A comparison of bioinformatics analysis approaches. *Physiol. Genomics, 17:201-214.*
20. Freeman, W., Gaal, G., and **Jörnsten, R.** (2003) A neurobiological theory of meaning in perception. Part 3. Multiple cortical areas synchronize without loss of local autonomy. *International Journal & Bifurcation & Chaos, 13(10), 2845-2856*
21. **Jörnsten, R.**, and Yu, B. (2003) Simultaneous gene clustering and subset selection for sample classification via MDL. *Bioinformatics, 2003, 19: 1100-1109.*
22. **Jörnsten, R.**, Yu, B., Wang, W., and Ramachandran, K. (2003) Microarray image compression: SLOCO and the effects of information loss. *EURASIP*

Signal Processing Journal, Special issue on genomic signal processing, (2003), 83/4, 859-869

23. **Jörnsten, R.**, Vardi, Y., Zhang, C-H., (2002) A Robust Clustering Method and Visualization Tool Based on Data Depth. *Statistical data analysis based on the L1norm and related methods. Y. Dodge editor. p. 353-366*
24. **Jörnsten, R.**, Vardi, Y., Zhang, C-H., (2002) On the bit-plane compression of Microarray images. *Statistical Data Analysis based on the L1-norm and Related methods. Y. Dodge editor. p415-425*
25. **Jörnsten, R.**, and Yu, B., (2002) Multiterminal estimation - extensions and a geometric intepretation, Peer-reviewed extended abstract for *IEEE ISIT 2002, Lausanne, p24-29*

Conference proceedings and Posters

- Goff, L.A., **Jörnsten, R.**, Keles, S., Li, H., Grumet, M., and Hart, R.P. (2007) Co-regulation of a single mir-9 locus and the adjacent Mef2c gene during neuronal differentiation in neural stem cells. Stem Cells World Congress. Poster
- Davila, J., Goff, L., **Jörnsten, R.**, Li, H., Grumet, M., and Hart, R.P. (2007) Validation of microRNA targets predicted by computation or by cross-correlation of microRNAs and mRNAs during neural differentiation. Keystone Symposium: MicroRNAs and siRNAs: Biological Functions and Mechanisms Poster.
- Goff, L.A., Davila, J., **Jörnsten, R.**, Keles, S., Li, H., Grumet, M., and Hart R.P. (2006) Co-regulation of a single mir-9 locus and the adjacent Mef2c gene during neuronal differentiation in neural stem cells. Society for Neuroscience Annual Meeting. Poster
- Davila, J., Goff, L.A., Li, H., **Jörnsten, R.**, Wang, Q., Brooks, Grumet, M., and Hart, R.P. (2006) Predicted interactions between bHLH transcription factors and microRNAs during lineage specific differentiation of neural stem cells. 4th Annual Meeting of the International Society for Stem Cell Research. Toronto, Canada. Poster
- Goff, L.A., Davila, J., Li, H., **Jörnsten, R.**, Wang., Q., Brooks, A.I., Grumet, M., and Hart, R.P. (2005) miRNAs involved in lineage specific differentiation of neural stem cells. Society for Neuroscience Annual Meeting. Poster
- **Jörnsten, R.**, Yu, B., Wang, W., and Ramachandran, K. (2002) Compression of cDNA and inkjet microarray images. Image processing, International conference, proceedings p. 24-28.
- **Jörnsten, R.**, Yu, B., (2002) Compression of cDNA microarray images. Biomedical imaging, International symposium conference proceedings, p. 38-41
- **Jörnsten, R.**, and Yu., B. (2000) Comprestimation: Microarray images in abundance, Proc. Of Conference on Information Science and Systems, Princeton, p. 10-15
- **Jörnsten, R.**, and Yu, B. (1998) Insensitivity of Adaptive Quantization to Model Estimation in Wavelet Subband Coding. IEEE International symposium on Information theory, Proceedings 1998, p. 371

Teaching:

Short courses and workshops

- Guest Lecturer, short course "R for Biologists", Chalmers, Fall 2011.
- Co-organizer, short course on statistical analysis of natural driving studies (Safer - Chalmers center for vehicle and traffic safety). Spring 2011.
- Invited lecturer, NSF Statistical Genetics Short Course, Honolulu, July 2009.
- Invited lecturer, Statistical Genetics Short Course, New Orleans, February 2009.
- Invited lecturer, "Life after a Statistics Doctoral Program", Columbia University, April 2008.
- Invited lecturer, NIAMS (NIH sponsored) functional genomics short course, Atlanta, March 2006
- Invited lecturer, NIDDS (NIH sponsored) functional genomics short course, San Francisco, March 2006

- Rutgers Workshops: Invited lecturer, Microarray Workshop, W.M. Keck Center for Collaborative Neuroscience, Dec, 2004

Classroom instruction

- Chalmers/University of Gothenburg: Linear Models, Survival analysis, Statistical Inference, Applied multivariate analysis. PhD courses in Bootstrap, Sparse modeling, Empirical Bayes methods.
- Rutgers University: Seminar in applied and mathematical statistics, Applied time series analysis for the Mathematical Finance master program, Statistical methods in bioinformatics, Basic statistics for research, Interpretation of Data, Regression analysis.

Post-doc

- Torbj¨rn Nordling, 2013-present. Main advisor Sven Nelander.
- Sara Lopez-Pintado, 2005-2006. Current position, Assistant Professor, Biostatistics, Columbia.

Ph.D. Students

- Jose Sanchez, 2009-present. Tentative title of thesis: *Dynamic clustering - variable selection methods for mixture network models with applications to cancer genomics.*
- Tobias Abenius, 2010-present. Tentative title of thesis: *Large-scale integrated network modeling of genomic and genetic cancer profiles.*
- Teresia Kling, 2010-present. (co-advisor, main advisor Sven Nelander). Tentative title of thesis: *System-scale modeling of cancer.*
- Alexandra Jauhainen (co-advisor). *Statistics in gene expression, metabolomics, and comparative genomics in evolution.* Degree conferred September 2010. Positions: postdoctoral researcher, Department of Statistics, University of Michigan (2010), postdoctoral researcher, Karolinska Institute, (2011-present). .
- Teresia Kling. 2010-present. (co-advisor, main advisor Sven Nelander).
- Patrik Johansson. 2012-present. (co-advisor, main advisor Sven Nelander).
- Satishkumar Baskaran, 2012-present. (co-advisor, main advisor Sven Nelander).

Master students

- Linus Lundin, 2013-present. *Musical therapy for Parkinson patients.*
- Patrik Johansson, 2011-2012. *Integrated modeling of DNA methylation, mRNA and microRNA expression profiles in human cancer.* Current position, PhD student at the Nelander lab, Uppsala University.
- Viktor Skokic. 2011-2012. *An investigation of self assessed quality of life among long term testicular cancer survivors and it's relation to chemotherapy.* Current position, analyst with Prof. Gunnar Steineck, Oncology, Karolinska Institute.
- Johanna Sigmundsdottir 2011-2012. *Joint segmentation modeling of epilepsy episodes and physiological response to music.*
- Tobias Abenius (secondary advisor), 2009-2010 *Endogenous perturbation analysis of cancer.*
- Eric Burlow, 2010. *Sparse logistic regression modeling with applications to internet advertisement.*

- Owen Martin, 2007.
- Diane Richardson, 2006. Current position, Project Director - Research, Pharmacoeconomics and Outcomes Research, Thomas Jefferson University

Ph.D. Committee

- Szilard Nemes, Sahlgrenska Academy, degree conferred December 2012.
- P.O. Lindberg, Transport Research, Royal Institute of technology, conferred June 2012.
- Opponent for Mattias Landfors, Statistics, Umeå University, conferred April 2012
- Xia Shen, Genetics, Uppsala University, conferred April 2012
- Loyal Goff, Molecular and Cell Biology, Rutgers, conferred April 2008
- Weihua Tang, Statistics, Rutgers, conferred May 2006
- Susanna Eyheramendy, Statistics, Rutgers, conferred May 2004

Select Presentations

- Keynote speaker, Sonja Kovalevska dagarna, Umeå, Nov 2012.
- Keynote speaker, Nordstat, June 2012
- Invited speaker, Karolinska Institute, May 2012
- Invited speaker, Stockholm University, April 2012
- Invited speaker, Uppsala University, February 2012
- Invited speaker, JSM Vancouver, August 2010
- Invited speaker, FMS Spring conference, March 2009.
- Invited speaker, Biostatistics Day, Rutgers University, April 2008
- Invited panelist, Columbia symposium on Careers in Statistics, April, 2008
- Invited speaker, ENAR 2008
- Invited speaker, University of Bergen, January 4, 2008
- Invited speaker, Section for Statistical Genetics, UAB, Oct 2007
- Discussant, ISI-Bernouilli, August 2007
- Invited speaker, JSM, August 2007
- Invited speaker, PICASSO seminar, Princeton, April 2007
- Invited speaker, NISS, April 2007
- Invited speaker, NYU Biostatistics seminar, November 2006
- Invited speaker, Computational Genomics meeting, Banff, July 2006
- Invited speaker, Interface, Pasadena, May 2006
- Invited speaker, UMDNJ, biostatistics seminar, May 2006
- Selected presenter, 8th annual conference on computational genomics, MIT, Nov 2005
- Invited speaker, Yale university, Biostatistics seminar, Nov 2005
- Invited speaker, Barcode of Life - data analysis working group meeting, Paris, Oct 2005
- Invited speaker, UAB genomics workshop, Mohonk, September 2005

- Invited speaker, Mount Sinai, Statistics seminar, May 2005
- Invited speaker, U. Wisconsin, Biostatistics seminar series, April 2005
- Invited speaker, PSU Department of Statistics, Jan 2005
- Invited speaker, First annual Central New Jersey systems biology symposium, Institute for advance sciences, Princeton, Sep 2004
- Invited speaker, Joint statistical meetings, Toronto Aug 2004.
- Invited speaker, Department of Biostatistics, Karolinska institutet, Stockholm, Aug 2004
- Invited speaker, Infocast symposium on microarray data analysis, June 2004

Editorial Activities:

- Editor for Journals of Statistical Software
- AE for Scandinavian Journal of Statistics

Referee for

Bioinformatics, Biometrics, BMC Bioinformatics, Drug Discovery Today, EURASIP Journal of Signaling Processing, IEEE Transactions on Computational Biology and Bioinformatics, IEEE Transactions on Medical Imaging, IEEE Transactions on Signal Processing, Journal of the American Statistical Association, Journal of Computational and Graphical Statistics, Journal of Multivariate Analysis, Pattern Recognition Letters, PLoS Genetics, RECOMB, Statistical Applications in Genetics and Molecular Biology, Technometrics

External reviewer for

NSF (National science foundation), NSERC (Natural Sciences and Engineering Research Council of Canada), NCI (National Cancer Institute), NSA (National Security Agency).

Service:

Scientific leadership, administration

- Institutionsrådet, 2011-present
- External review board for graduate education accreditation, Skövde University, 2010
- Graduate Curriculum committee, 2002-2009
- Acting director of the Office for Statistical Consulting, July 2007-June 2008
- Seminar chair, 2006-2007
- Department website committee, 2003-2005, 2007
- Search committee, 2003-2005, 2007
- Computing committee, 2003-2006
- Biostatistics committee, 2003-2006
- Graduate student admissions committee, 2004

Service to the Profession

- Tenure review committee, Northwestern University, February 2013

- External committee member for associate professorship hiring, University of Oslo, 2011.
- Member, IMS - committee Special Lecture series, 2009-2011.
- Participating faculty, Master's program in Mathematical Finance, Rutgers University, 2007-2009
- Chair, IMS - New Researchers Conference Committee, 2007-2009, (applied and managed funding, reporting to funding agencies, coordination and organization of event).
- Session organizer, IMS-Bernoulli society meeting, Aug 2007
- Member, IMS - New Researchers Conference Committee, 2006-2008
- Session organizer, Classification of Society of North America, May 2006
- Organizer of the DIMACS meeting for the data analysis working group, Barcode of Life, Sept. 2005
- Member of the steering committee for the Barcode of Life data analysis working group, 2005-2006
- Co-organizer of the Rutgers Microarray workshop, Dec 2004
- Outreach: Rutgers faculty traveling seminar, visiting high schools and policy makers, 2004.

Research Program

My research program centers on model selection problems that arise in the analysis of high-dimensional data, primarily with applications to genomic studies. I am also interested in developing general clustering methodology, using flexible mixture models or nonparametric techniques such as data depth. I enjoy collaborative research, which often serves as a source of inspiration for methodology research. My collaborative projects range from data integration in systems biology, modeling of naturalistic driving studies for traffic safety, analysis of pest populations in North-American blueberry fields; and, most recently, analysis of music as a therapeutic aid for parkinson and stroke patients.

A. Statistical modeling of high-dimensional biological data.

With Sven Nelander's group (Uppsala SciLifeLab), I investigate system scale network models for human cancer. We recently published a paper in MSB (A.ii), integrating mRNA expression data with DNA copy-number to construct network models whose structure can be summarized as prognostic scores (predicting patient survival, see software package A.iii). We are currently working to extend this to include even more data types, e.g. methylation, microRNA data and SNPs (3 manuscripts in preparation with PhD students in the Jörnsten and the Nelander groups). We are actively collaborating with the Cancer Genome Atlas project (TCGA), and will be submitted a manuscript on Comparative Cancer Networks as part of the TCGA Multi-Cancer effort. Another research track our groups pursue is experimental planning in systems biology (A.i). With Mikael Benson's group (Linköping University, Center for Individualized Medicine), I also work on data integration problems geared at identifying biomarkers (disease-drivers), here focusing on allergy (A.iv).

(A.i) Gerlee, P., Schmidt, L., Monsefi, N., Kling, T., **Jörnsten, R.**, Nelander, S. (2012) Efficient experimental screening: fast, system-scale discovery of synergistic target pairs. *Revised for PloS One*

(A.ii) **Jörnsten, R.**, Abenius, T., Kling T., Schmidt, L., Johansson, E., Nordling, T., Nordlander, B., Sander, C., Gennemark, P., Funa, K., Nilsson, B., Lindahl, L., Nelander, S. (2011) Network modeling of the transcriptional effects of copy number aberrations in glioblastoma. *Molecular Systems Biology 7: 486 doi:10.1038/msb.2011.17*

(A.iii) Abenius, T., **Jörnsten, R.**, Schmidth, L., Nelander, S. (2012) System scale network modeling using EPoC. *Proceedings of the 11th ICSB, Springer series Advances in Experimental Medicine and Biology.*

(A.iv) Barrenäs, F., Couto Alves, A., Chavali, S., Coin, L, Jarvelin, M-R., **Jörnsten, R.**, Langston, M.A., Ramasamy, A., Rogers, G., Wang H., Benson, M. (2012) Highly interconnected complex disease genes are enriched for disease-associated polymorphisms. *Genome Biology 2012, 13(46), doi:10.1186/gb-2012-13-6-r46*

B. Model selection in pathway modeling, clustering and classification.

My second research agenda centers on model selection. I am particularly interested in integrating information theory and data coding techniques into statistical model selection. Together with former student, Alexandra Jauhianen (now a post-doc at Karolinska Institutet), the coding-based model selection framework I introduced in a JCGS article (B.ii) is extended to integrate mRNA and metabolic data for the identification of pathways that are "activated" under certain experimental conditions (B.i). With my student Jose Sanchez, I also work at extending the flexible mixture model

framework (MIXL and MIXT) (B.iii) for variable selection in clustering. We call this problem "dynamical clustering", referring to the fact that clustering is dependent on the variables or features included in the analysis (manuscript in preparation). We employ these methods for cancer subtype-specific network modeling (Manuscript in preparation, preliminaries presented at Nordstat2012 and ISI2012).

(B.i) Jauhianen, A., Nerman, O., Michailidis, G., **Jörnsten, R.** (2012) Transcriptional and metabolic data integration and modeling for pathway identification. *Biostatistics, doi: 10.1093/biostatistics/kxs016*

(B.ii) **Jörnsten, R.** (2009) Simultaneous subset selection via rate-distortion theory, with application to clustering and significance analysis of gene expression data. *Journal of Computational and Graphical Statistics. September 1, 2009, 18(3): 613-639.* doi:10.1198/jcgs.2009.07043.

(B.iii) **Jörnsten, R.**, and Keles, S. (2008) MIXL, Multi-level mixture modeling, with application to the analysis of multi-factor gene expression studies. *Biostatistics 9(3): 540-554.*

C. Collaborative projects

I am involved in several collaborative projects. Ongoing projects include data integration in systems biology with the Benson group (C.i). I am also working with Gunnar Steineck (Oncology center, Sahlgrenska), analyzing the long-term effects of chemotherapy (my student Viktor Skokic is joining the Steineck lab as an analyst fall 2012). I recently joined two projects at CBR (Center for Brain Repair and Rehabilitation), investigating how music can be used to help Parkinson patients and patients with stroke to retain or recover motor functions. We are currently preparing two manuscript. The first, called "The Musical Score of the Body", has already been presented at several conferences and the project has appeared on Swedish national television (SVT Rapport), in newspapers (e.g. SvD), at the Science Festival (Vetenskapsfestivalen, 2012), and will appear in the popular science press (Forskning och Framsteg) (C.ii, C.iii). The second publication investigates how music therapy can aid fine-motor training for Parkinson patients.
In addition to the above, I am involved in a multi-team research project on traffic safety measures with Safer and Volvo (co-PI, funded through the TRSB). I am also an advisor and consultant for a naturalistic driving study at Volvo-cars (personvagnar).

(C.i) Barrenäs, F., Bruhn, S., Lachlan, C., Couto Alves, A., Gustafsson, M., **Jörnsten, R.**, Zhao, Y., and Benson, M. (2011) Combinatorial genomic analysis of allergen-challenged CD4+ cells. *Submitted to Molecular Systems Biology.*

(C.ii) Vickhoff, B., Malmgren, H., Åström, R., Nyberg, G., Ekström, S.R., Engvall, M., Snygg, J., Nilsson, M., **Jörnsten, R.** (2013) Music structure determines heart rate variability of singers. *Revised for Frontiers, Auditory and Cognitive Neuroscience.*

(C.iii) Vickhoff, B., **Jörnsten, R.**, Snygg, J., Åström, R., Sommermeyer, D., Nyberg, G., Theorell, T., Nilsson, M. (2012). The Musical Score of the Body. (Kroppens Partitur) *Manuscript in preparation - press appearances: SVT Rapport (Swedish television), SvD (newspaper), Radio (SR-P3), Science Festival (Vetenskapsfestivalen 2012), "Forskning och Framsteg" (Swedish popular science journal).*

(C.iv) Abel, F., Dalevi, D., Nethander, M., **Jörnsten, R.**, De Preter K., Vermulen, J., Stallings, R., Kogner, R., Maris, J., Nilsson, S. (2011) A 6-gene signature identifies four molecular subgroups of neuroblastoma. *Cancer Cell Int. 11(1):9*

(C.v) Rodriguez-Saona, C.R., Polavarapu, S., Barry J.D., Pol, D., **Jörnsten, R.**, Oudemans, P.V., Liburd, O.E. (2010) Color preference, seasonality, spatial distribution and species composition of thrips (Thysanoptera: Thripidae) in northern highbush blueberries. *Crop Protection, 29(11):133-1340, Nov 2010*