

Sohan Seth

Pohjantie 8-10 B44, Espoo, Finland 02100
sohan.seth@gmail.com * 358 465247275 * www.sohanseth.com

Education *Doctor of Philosophy, Electrical and Computer Engineering,* Jul. 2011
University of Florida, Gainesville, FL, USA
Dissertation: *On Nonparametric Measures of Dependence and Conditional Independence:
Theory and Applications*
Adviser: Prof. José C. Príncipe,
Committee: Prof. John. G. Harris, Prof. Anand Rangarajan, Prof. Murali Rao
Master of Science, Electrical and Computer Engineering, Dec. 2008
University of Florida, Gainesville, FL, USA
Bachelor of Engineering, Instrumentation and Electronics Engineering, Jul. 2005
Jadavpur University, Kolkata, India

Employment *Postdoctoral Researcher,* Sep. 2011 – Present
Helsinki Institute for Information Technology,
Aalto University, Finland
Research Assistant, Aug. 2006 – Aug. 2011
University of Florida, Gainesville, FL, USA
Junior Research Fellow Nov. 2005 – Jul. 2006
Jadavpur University, Kolkata, India

Research *I am generally interested in machine learning and statistics for computational biology*
Methods Dependence and causality, hypothesis testing, matrix factorization, information
retrieval, kernel adaptive filtering, Bayesian learning
Applications Brain signal analysis, computational neuroscience, metagenomics

Skills \LaTeX , Vim, Linux
MATLAB, C, Python, R, SPARQL, LabView, Prolog, Lisp

Publications **Selected publications** (*complete list at the end*)
Sohan Seth, Niko Välimäki, Samuel Kaski, and Antti Honkela. Exploration and retrieval
of whole-metagenome sequencing samples. *Bioinformatics*, 2014.
Sohan Seth and José C. Príncipe. Learning dependence from samples. *International
Journal of Bioinformatics Research and Applications*, 2014.
Sohan Seth and José C. Príncipe. Conditional association. *Neural Computation*, pages
1882–1905, 2012.

Sohan Seth, Murali Rao, Il Park, and José C. Príncipe. A unified framework for quadratic measures of independence. *IEEE Transactions on Signal Processing*, pages 3624–3635, 2011.

Sohan Seth and José C. Príncipe. Assessing Granger non-causality using nonparametric measure of conditional independence. *IEEE Transactions on Neural Networks*, pages 47–59, 2011.

Sohan Seth, Il Park, Austin Brockmeier, Mulugeta Semework, John Choi, Joseph Francis, and José C. Príncipe. A novel family of non-parametric cumulative based divergences for point processes. In *Advances in Neural Information Processing Systems 23 (NIPS)*. 2010.

Teaching *Special course on multi view and multitask learning*, Fall 2012
Evaluating presentations by students, preparing and grading assignments

Adaptive signal processing, Spring 2010, 2011
Preparation and presentation of lectures when instructor is absent

Neural networks for signal processing, Fall 2009, 2010
Preparation and presentation of lectures when instructor is absent

Visits *University College London* Jul. 2013, Jun. 2014
John Shawe-Taylor

European Bioinformatics Institute Nov. 2013, Jun. 2014
Alvis Brazma and Ugis Sarkans

Activity *Program committee member*
ICANN 2014
ICANN 2013

Journal reviewing
IEEE Transactions on Neural Networks and Learning Systems,
IEEE Transactions on Cybernetics,
Machine Learning,
Neurocomputing,
Entropy,
Pattern Recognition Letters,
Journal of Neural Processing Letters,
International Journal of Pattern Recognition and Artificial Intelligence,

Conference reviewing
EUSIPCO 2014
IJCNN 2014
ECML 2013
IJCNN 2013
ICANN 2011
IJCNN 2010
MLSP 2009

Publications

Preprints

Sohan Seth, John Shawe-Taylor, and Samuel Kaski. Retrieval of experiments by efficient estimation of marginal likelihood. *arXiv, submitted to European Conference on Machine Learning*, 2014.

Sohan Seth and Manuel J. A. Eugster. Probabilistic archetypal analysis. *arXiv, submitted to Machine Learning*, 2014.

Ritabrata Dutta, **Sohan Seth**, and Samuel Kaski. Retrieval of experiments with sequential Dirichlet process mixtures in model space. *arXiv, submitted to Machine Learning*, 2014.

Il Park, **Sohan Seth**, and Steven Vaerenbergh. Bayesian extensions of kernel least mean squares. *arXiv*, 2013.

Book chapters

José C. Príncipe, Weifeng Liu, Puskal Pokharel, Jianwu Xu, and **Sohan Seth**. *Correntropy for random variables: properties and applications in statistical inference*, chapter Information Theoretic Learning: Renyi's Entropy and Kernel Perspectives. Springer Verlag, 2010.

Journal papers

Sohan Seth, Niko Välimäki, Samuel Kaski, and Antti Honkela. Exploration and retrieval of whole-metagenome sequencing samples. *Bioinformatics*, 2014.

Sohan Seth and José C. Príncipe. Learning dependence from samples. *International Journal of Bioinformatics Research and Applications*, 2014.

Il Park, **Sohan Seth**, Antonio R. C. Paiva, Lin Li, and José C. Príncipe. Kernel methods on spike train space for neuroscience: A tutorial. *IEEE Signal Processing Magazine*, 30, 2013.

Bilal Fadlallah, **Sohan Seth**, Andreas Keil, and José C. Príncipe. Quantifying cognitive state from eeg using dependence measures. *IEEE Transactions on Biomedical Engineering*, 59:2773–81, 2012.

Lin Li, Il Park, Austin Brockmeier, Badong Chen, **Sohan Seth**, Joe Francis, Justin Sanchez, and José C. Príncipe. Adaptive inverse control of neural spatiotemporal spike patterns with a reproducing kernel Hilbert space (RKHS) framework. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 2012.

Lin Li, Il Park, **Sohan Seth**, Justin Sanchez, and José C. Príncipe. Functional connectivity dynamics among cortical neurons: A dependence-graph analysis. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, pages 18–30, 2012.

Il Park, **Sohan Seth**, Murali Rao, and José C. Príncipe. Strictly positive definite kernels for point process divergence. *Neural Computation*, pages 2223–2250, 2012.

Sohan Seth and José C. Príncipe. Conditional association. *Neural Computation*, pages 1882–1905, 2012.

Sohan Seth and José C. Príncipe. Assessing Granger non-causality using nonparametric measure of conditional independence. *IEEE Transactions on Neural Networks*, pages 47–59, 2011.

Sohan Seth, Murali Rao, Il Park, and José C. Príncipe. A unified framework for quadratic measures of independence. *IEEE Transactions on Signal Processing*, pages 3624–3635, 2011.

Murali Rao, **Sohan Seth**, Jianwu Xu, Yunmei Chen, Hemant Tagare, and José C. Príncipe. A test of independence based on a generalized correlation function. *Signal Processing*, 91:15–27, January 2011.

Nabarun Bhattacharyya, **Sohan Seth**, Bipan Tudu, Pradip Tamuly, Arun Jana, Devdulal Ghosh, Rajib Bandyopadhyay, Manabendra Bhuyan, and Santanu Sabhapandit. Detection of optimum fermentation time for black tea manufacturing using electronic nose. *Sensors and Actuators B: Chemical*, 122:627–634, March 2007.

Conference papers

Rosha Pokharel, **Sohan Seth**, and José C. Príncipe. Quantized mixture kernel least mean square. In *Proceedings of the IEEE International Joint Conference on Neural Network (IJCNN)*, 2014.

Il Park, **Sohan Seth**, and Steven Vaerenbergh. Probabilistic kernel least mean squares algorithms. *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2014.

Rosha Pokharel, **Sohan Seth**, and José C. Príncipe. Mixture kernel least mean square. In *Proceedings of the IEEE International Joint Conference on Neural Network (IJCNN)*, 2013.

Bilal Fadlallah, Austin Brockmeier, **Sohan Seth**, Andreas Keil, and José C. Príncipe. An association framework to analyze dependence structure in time series. In *International Conference on Engineering in Medicine and Biology Society (EMBC)*, 2012.

Bilal Fadlallah, **Sohan Seth**, Andreas Keil, and José C. Príncipe. Analyzing dependence structure of the human brain in response to visual stimuli. In *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2012.

Badong Chen, Songlin Zhao, **Sohan Seth**, and José C. Príncipe. Online efficient learning with quantized KLMS and l_1 regularization. In *Proceedings of the IEEE International Joint Conference on Neural Networks (IJCNN)*, 2012.

Lin Li, Il Park, **Sohan Seth**, John Choi, Joseph Francis, Justin Sanchez, and José C. Príncipe. An adaptive decoder from spike trains to micro-stimulation using kernel least-mean-square KLMS algorithm. *IEEE International Workshop on Machine Learning for Signal Processing (MLSP)*, 2011.

Bilal Fadlallah, **Sohan Seth**, Andreas Keil, and José C. Príncipe. Robust EEG preprocessing for dependence-based condition discrimination. In *International Conference on Engineering in Medicine and Biology Society (EMBC)*, 2011.

Sohan Seth, Austin Brockmeier, John Choi, Mulugeta Semework, Joseph Francis, and José C. Príncipe. Estimating dependence in spike train metric spaces. *IEEE International Joint Conference on Neural Networks (IJCNN)*, 2011.

Verónica Bolón-Canedo, **Sohan Seth**, Noelia Sánchez-Marroño, Amparo Alonso-Betanzos, and José C. Príncipe. Statistical dependence measure for feature selection in microarray datasets. In *Proceedings of the European Symposium on Artificial Neural Networks, Computational Intelligence and Machine Learning (ESANN)*, 2011.

Il Park, **Sohan Seth**, Murali Rao, and José C. Príncipe. Estimating symmetric chi-square divergence for point processes. In *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2011.

Sohan Seth, Austin Brockmeier, and José C. Príncipe. A metric based approach toward point process divergence. In *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2011.

Sohan Seth, Il Park, Austin Brockmeier, Mulugeta Semework, John Choi, Joseph Francis, and José C. Príncipe. A novel family of non-parametric cumulative based divergences for point processes. In *Advances in Neural Information Processing Systems 23 (NIPS)*. 2010.

Sohan Seth and José C. Príncipe. Variable selection: A statistical dependence perspective. In *Proceedings of the International Conference on Machine Learning and Applications (ICMLA)*, 2010.

Sohan Seth and José C. Príncipe. A conditional independence perspective of variable selection. In *Proceedings of the IEEE International Workshop on Machine Learning for Signal Processing (MLSP)*, 2010.

Lin Li, Il Park, **Sohan Seth**, Justin Sanchez, and José C. Príncipe. Neuronal functional connectivity dynamics in cortex: An MSC-based approach. In *Proceedings of the IEEE International Conference on Engineering in Medicine and Biology Society (EMBC)*, 2010.

Sohan Seth and José C. Príncipe. A test of granger non-causality based on nonparametric conditional independence. In *Proceedings of the International Conference on Pattern Recognition (ICPR)*, 2010.

Sohan Seth and José C. Príncipe. A conditional distribution function based approach to design nonparametric tests of independence and conditional independence. In *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2010.

Jung Phil Kwon, **Sohan Seth**, Andreas Keil, and José C. Príncipe. Estimation of instantaneous power in the EEG to assess brain connectivity with high temporal resolution. In *Proceedings of the IEEE International Conference on Engineering in Medicine and Biology Society (EMBC)*, 2009.

Lin Li, Il Park, **Sohan Seth**, Justin Sanchez, and José C. Príncipe. Estimation and visualization of neuronal functional connectivity in motor task. In *Proceedings of the IEEE International Conference on Engineering in Medicine and Biology Society (EMBC)*, 2009.

Sohan Seth and José C. Príncipe. Estimation of density ratio and its application to design a measure of dependence. In *Proceedings of the IEEE International Workshop on Machine Learning for Signal Processing (MLSP)*, 2009.

Sohan Seth and José C. Príncipe. On speeding up computation in information theoretic learning. In *Proceedings of the IEEE International Joint Conference on Neural Networks (IJCNN)*, 2012.

Sohan Seth, Il Park, and José C. Príncipe. A new nonparametric measure of conditional independence. In *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2009.

Sohan Seth and José C. Príncipe. Compressed signal reconstruction using the correntropy induced metric. In *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)*, 2008.

Sohan Seth, Mustafa C. Ozturk, and José C. Príncipe. Signal processing with echo state networks in the complex domain. In *Proceedings of the IEEE International Workshop on Machine Learning for Signal Processing (MLSP)*, 2007.

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