

Resume of Eizaburo Doi

March 21, 2007

EDUCATION

- March 1996: B. S. in Biology, Faculty of Science, Kyoto University, Japan.
- March 1999: M. A. in Psychology, Graduate School of Letters, Kyoto University, Japan.
- March 2003: Ph.D. in Informatics, Graduate School of Informatics, Kyoto University, Japan.
Dissertation: *A Study of Computational Neural Network Models on Spatio-Chromatic Properties of the Early Visual System*.
Advisors: Prof. Toshio Inui, Prof. Te-Won Lee.
Committee: Prof. Toshio Inui (Chair), Prof. Takashi Matsuyama, Prof. Hiroshi G. Okuno.

RESEARCH EXPERIENCE

- February 2001 – March 2003: Visiting Scholar,
Institute for Neural Computation, University of California, San Diego.
Advisors: Prof. Te-Won Lee, Prof. Terrence J. Sejnowski.
- April 2003 – Present: Postdoctoral Research Associate,
Center for the Neural Basis of Cognition, Carnegie Mellon University.
Advisor: Prof. Michael S. Lewicki.

PUBLICATIONS

Journal

1. E. Doi, T. Inui, T.-W. Lee, T. Wachtler and T. J. Sejnowski. "Spatiochromatic receptive field properties derived from information-theoretic analyses of cone mosaic responses to natural scenes." *Neural Computation*, 2003, vol.15, pp.397-417.
2. E. Doi, D. C. Balcan and M. S. Lewicki. "Robust coding over noisy overcomplete channels." *IEEE Transactions on Image Processing*, 2007, vol. 16, pp. 442-452.

Conference paper

1. E. Doi and T. Inui. "Self-organization of spatio-chromatic receptive fields in the early visual system by ICA." *Technical report of IEICE, NC98-170*, pp.131-138. Tokyo, Japan. March 1999.
2. E. Doi and T. Inui. "Whitening and independent component filters of simulated cone mosaic output have spatio-chromatic properties of pLGN and V1." *7th International Conference on Neural Information Processing*, pp.500-505. Taejon, Korea. November 2000.

3. E. Doi and M. S. Lewicki. "Sparse coding of natural images using an overcomplete set of limited capacity units." *Neural Information Processing Systems (NIPS*2004) Conference*, British Columbia, Canada. December 2004.
4. E. Doi and M. S. Lewicki. "Relations between the statistical regularities of natural images and the response properties of the early visual system." *Japanese Cognitive Science Society, SIG Pattern Recognition and Perception Models*, pp.1-8. Kyoto, Japan. July 2005.
5. E. Doi, D. C. Balcan, and M. S. Lewicki. "A theoretical analysis of robust coding over noisy overcomplete channels." *Neural Information Processing Systems (NIPS*2005) Conference*, British Columbia, Canada. December 2005.
6. E. Doi and M. S. Lewicki. "A theory of retinal population coding." *Neural Information Processing Systems (NIPS*2006) Conference*, British Columbia, Canada. December 2006.

Other presentation

1. Poster E. Doi and T. Inui. "Self-organization of form and color channels in the early visual system." *Japanese Psychological Association 63rd Annual Meeting*. Nagoya, Japan. September 1999.
2. Poster E. Doi and T. Inui. "Comparison between neurophysiological data and redundancy reduction process with simulated cone mosaic outputs." *Joint Meetings of the 23rd Annual Meeting of the Japan Neuroscience Society and the 10th Annual Meeting of the Japanese Neural Network Society*. Yokohama, Japan. September 2000. *In Neuroscience Research, supplement*, vol.24.
3. Poster E. Doi, T. Inui, T.-W. Lee, T. Wachtler and T. J. Sejnowski. "Spatial and chromatic filters derived from an information-theoretic analysis of natural scenes." *Society for Neuroscience Abstracts*. San Diego, U.S.A. November 2001.
4. Poster E. Doi. "Spatio-chromatic receptive field properties derived from cone mosaic responses." *Gordon Research Conference: Sensory Coding and the Natural Environment – Probabilistic Models of Perception*. Massachusetts, U.S.A. July 2002.
5. Dissertation E. Doi. "A Study of Computational Neural Network Models on Spatio-Chromatic Properties of the Early Visual System." Kyoto University, Japan. March 2003.
6. Poster E. Doi and M. S. Lewicki. "Sparse subpopulation coding of natural images with low-bit neuronal representation." *Gordon Research Conference: Sensory Coding and the Natural Environment*. Oxford, U.K. September 2004.
7. Invited Talk E. Doi and M. S. Lewicki. "Robust coding over noisy channels with sparse overcomplete representation." *Neural Information Processing Systems (NIPS*2004) Workshop "In Overcomplete Representations"*. British Columbia, Canada. December 2004.
8. Poster E. Doi and M. S. Lewicki. "Population coding of natural images with sensory and

channel noise.” *Computational and Systems Neuroscience (COSYNE)*, Utah, U.S.A. March 2006.

9. Poster E. Doi and M. S. Lewicki. “A model of retinal ganglion cells that achieves de-blurring, de-noising, and robustness.” *Gordon Research Conference: Sensory Coding and the Natural Environment*. Montana, U.S.A. August 2006.
10. Poster E. Doi, D. C. Balcan, and M. S. Lewicki. “Optimal filters under biological constraints predict population coding of retinal ganglion cells.” *Society for Neuroscience Abstracts*. Georgia, U.S.A. October 2006.
11. Talk E. Doi. “A top-down account of the retinal coding.” *The Center for the Neural Basis of Cognition Retreat*, Pennsylvania, U.S.A. October 2006.
12. Talk E. Doi. “Retinal information processing.” *Neural Information Processing Systems (NIPS*2006) Workshop “Decoding the neural code”*, British Columbia, Canada. December 2006.
13. Talk E. Doi. “Mutual information or mean squared error?” *Neural Information Processing Systems (NIPS*2006) Workshop “Decoding the neural code”*, British Columbia, Canada. December 2006.