

## References

- [1] Amari, S. I. and Nagaoka, H. (2007) *Methods of Information Geometry*. American Mathematical Society.
- [2] Amit, Y. and Geman, D. (1997) Shape quantization and recognition with randomized trees. *Neural computation*, **9** 1545-1588.
- [3] Amit, Y., Grenander, U., and Piccioni, M. (1991) Structural image restoration through deformable templates. *Journal of the American Statistical Association*, **86** 376-387.
- [4] Amit, Y. and Trounev, A. (2007) POP: patchwork of parts models for object recognition. *International Journal of Computer Vision*, **75** 267-282.
- [5] Bell, A. and Sejnowski, T. J. (1997) The “independent components” of natural scenes are edge filters. *Vision Research*, **37** 3327-3338.
- [6] Besag, J. (1974) Spatial interaction and the statistical analysis of lattice systems (with discussion). *Journal of Royal Statistics Society B*, **36** 192-236.
- [7] Borenstein, E. and Ullman, S. (2002) Class-specific, top-down segmentation. *Proceedings of European Conference on Computer Vision*.
- [8] Buhlmann, P. and Yu, B. (2003) Boosting with the L2 loss: regression and classification. *Journal of the American Statistical Association*, **98** 324-340.
- [9] Candes, E. J. and Donoho, D. L. (1999) Curvelets - a surprisingly effective nonadaptive representation for objects with edges. *Curves and Surfaces*, L. L. Schumaker et al. (eds), Vanderbilt University Press, Nashville, TN, 1999.
- [10] Candes, E. J. Romberg, J., and Tao, T. (2006) Robust uncertainty principles: exact signal reconstruction from highly incomplete frequency information. *IEEE Transactions on information theory*, **52** 489-509.
- [11] Candes, E. J. and Tao, T. (2007) The Dantzig selector: statistical estimation when  $p$  is much larger than  $n$  (with discussion). *Annals of Statistics*, **35** 2313-351.
- [12] Chen, S., Donoho, D., and Saunders, M. A. (1999) Atomic decomposition by basis pursuit. *SIAM Journal on Scientific Computing*, **20** 33-61.
- [13] Chipman, H., Hamada, M., and Wu, C. F. J. (1997) A Bayesian variable selection approach for analyzing designed experiments with complex aliasing. *Technometrics*, **39** 372-381.
- [14] Coates, T. F., Edwards, G. J., and Taylor, C. J. (2001) Active appearance models. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, **23**:681-685.
- [15] Cortes, C. and Vapnik, V. (1995) Support vector networks. *Machine Learning*, **20** 273-297.
- [16] Daugman, J. (1985) Uncertainty relation for resolution in space, spatial frequency, and orientation optimized by two-dimensional visual cortical filters. *Journal of Optical Society of America*, **2** 1160-1169.
- [17] Dempster, A. P., Laird, N. M., and Rubin, D. B. (1977) Maximum likelihood from incomplete data via the EM algorithm (with discussion). *Journal of the Royal Statistical Society, B*, **39** 1-38.

- [18] Donoho, D. L. (1999) Wedgelets: Nearly minimax estimation of edges. *The Annals of Statistics*, **27** 859-897.
- [19] Donoho, D. L. and Johnstone, I. M. (1994) Ideal spatial adaptation by wavelet shrinkage. *Biometrika*, **81**, 425-455.
- [20] Donoho, D. and Huo, X. (1999) Combined image representation using edgelets and wavelets. In *Wavelet Applications in Signal and Image Processing VII*.
- [21] Donoho, D. L., Vetterli, M., DeVore, R. A., and Daubechie, I. (1998) Data compression and harmonic analysis. *IEEE Transactions on Information Theory*, **6** 2435-2476.
- [22] Doretto, G., Chiuso, A., Wu, Y. N., and Soatto, S. (2003) Dynamic textures. *International Journal of Computer Vision*, **51** 91-109.
- [23] Dubinsky, A. and Zhu, S. C. (2003) A multiscale generative model for animate shape and parts. *Proceedings of International Conference of Computer Vision*.
- [24] Efron, B. (1975) The efficiency of logistic regression compared to normal discriminant analysis. *Journal of the American Statistical Association*, **70** 892-898.
- [25] Efron, B., Hastie, T., Johnstone, I., and Tibshirani, R. (2004) Least angle regression (with discussion). *Annals of Statistics*, **32** 407-499.
- [26] Everingham, M., Zisserman, A., Williams, C. K. I., and Van Gool, L. (2006) The 2006 PASCAL Visual Object Classes Challenge (VOC2006) Results.
- [27] Fei-Fei, L., Fergus, R., and Perona, P. (2004) Learning generative visual models from few training examples: an incremental Bayesian approach tested on 101 object categories. *IEEE Conference on Computer Vision and Pattern Recognition, Workshop on Generative-Model Based Vision*.
- [28] Felzenszwalb, P., McAllester, D., and Ramanan, D. (2008) A discriminatively trained, multiscale, deformable part model. *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition*.
- [29] Fergus, R., Perona, P., and Zisserman, A. (2003) Object class recognition by unsupervised scale-invariant learning. *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition*, **2** 264-271.
- [30] Ferrari, V., Jurie, F., and Schmid, C. (2007) Accurate object detection with deformable shape models learnt from images. *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition*.
- [31] Ferryman, J. M. (2006) *Proceedings of Ninth IEEE International Workshop on Performance Evaluation of Tracking and Surveillance (PETS 2006)*.
- [32] Freund, Y. and Schapire, R. E. (1997) A decision-theoretic generalization of on-line learning and an application to boosting. *Journal of Computer and System Sciences*, **55** 119-139.
- [33] Friedman, J. H. (1987) Exploratory projection pursuit. *Journal of the American Statistical Association*, **82** 249-266.
- [34] Friedman, J., Hastie, T., and Tibshirani, R. (2000) Additive logistic regression: a statistical view of boosting (with discussion). *Annals of Statistics*, **28** 337-407.

- [35] Geman, S. and Graffigne, C. (1987) Markov random field image models and their applications to computer vision. *Proceedings of the International Congress of Mathematicians*, **1** 1496-1517.
- [36] Geman, S., Potter, D. F., and Chi, Z. (2002) Composition systems. *Quarterly of Applied Mathematics*, **60** 707-736.
- [37] George, E. I. and McCulloch, R. E. (1993) Variable selection via Gibbs sampling. *Journal of the American Statistical Association*, **88** 881-889.
- [38] Grenander, U. (1993) *General Pattern Theory*. Oxford University Press.
- [39] Guo, C., Zhu, S. C., and Wu, Y. N. (2003) Towards a mathematical theory of primal sketch and sketchability. *Proceedings of International Conference on Computer Vision*, 1228-1235.
- [40] Guo, C., Zhu, S. C., and Wu, Y. N. (2006) Primal sketch: integrating structure and texture. *Computer Vision and Image Understanding*, **106** 5-19
- [41] Huo, X. and Chen, J. (2005) JBEAM: multiscale curve coding via beamlets. *IEEE Transactions on Image Processing*, **14** 1665-77.
- [42] Konye, P. and Ashforth, K. (2008) *Funky Things to Draw*. Hinkler Books.
- [43] LeCun, Y., Bottou, L., Bengio, Y., and Haffner, P. (1998). Gradient-based learning applied to document recognition. *Proceedings of the IEEE*, 86:2278-2324.
- [44] Lewicki, M. S. and Olshausen, B. A. (1999) Probabilistic framework for the adaptation and comparison of image codes. *Journal of the Optical Society of America*, **16** 1587-1601.
- [45] Lin, L., Liu X. B., and Zhu S. C. (2009) Layered graph matching by composite cluster sampling. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, accepted.
- [46] Little, R. J. A. and Rubin, D. B. (1983) On jointly estimating parameters and missing data by maximizing the complete data likelihood. *The American Statistician*, **37** 218-220.
- [47] Mallat, S. (1989) A theory of multiresolution signal decomposition: the wavelet representation. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, **11** 674-693.
- [48] Mallat, S. and Zhang, Z. (1993) Matching pursuit in a time-frequency dictionary. *IEEE Transactions on Signal Processing*, **41** 3397-415.
- [49] Meng, X.-L. and van Dyk, D. (1997) The EM algorithm - an old folk-song sung to a fast new tune. *Journal of the Royal Statistical Society, B*, **59** 511-567.
- [50] Mumford, D. B. (1994) Pattern theory: a unifying perspective. *Proceedings of 1st European Congress of Mathematics*.
- [51] Olshausen, B. A. and Field, D. J. (1996) Emergence of simple-cell receptive field properties by learning a sparse code for natural images. *Nature*, **381** 607-609.
- [52] Olshausen, B. A. and Millman, K. J. (2000) Learning sparse codes with a mixture-of-Gaussians prior. *Advances in Neural Information Processing Systems*, **12** 841-847.
- [53] Pietra, S. D., Pietra, V. D., and Lafferty, J. (1997) Inducing features of random fields. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, **19** 380-393.

- [54] Porway, J., Wang, K., and Zhu S. C. (2009) Hierarchical and contextual model for aerial image understanding. *International Journal of Computer Vision*, under review.
- [55] Porway, J., Yao, B., and Zhu, S. C. (2009) Learning compositional models for object categories from small sample sets. In *Object Categorization: Computer and Human Vision Perspectives*, Sven Dickinson et al (eds.), Cambridge University Press.
- [56] Riesenhuber, M. and Poggio, T. (1999) Hierarchical models of object recognition in cortex. *Nature Neuroscience*, **2** 1019-1025.
- [57] Rosset, S. and Zhu, J. (2007) Piecewise linear regularized solution paths. *Annals of Statistics*, **35** 1012-1030.
- [58] Si, Z., Gong, H., Wu, Y. N., and Zhu, S. C. (2009) Learning mixed template for object recognition. *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition*.
- [59] Si, Z., Gong, H., Zhu, S. C., and Wu, Y. N., (2009) Learning active basis models by EM-type algorithms. *Statistical Science*, in press.
- [60] Srivastava, A., Grenander, U., and Liu, X. (2002) Universal analytical forms for modeling image probabilities. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, **24** 1200-1214.
- [61] Srivastava, A., Lee, A. Simoncelli, E., and Zhu, S. C. (2003) On advances in statistical modeling of natural images. *Journal of Mathematical Imaging and Vision*, **18** 17-33.
- [62] Suo, J. L., Zhu, S. C., Shan, S. and Chen X. (2009) A compositional and dynamic model for face aging. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, accepted.
- [63] Tibshirani, R. (1996) Regression shrinkage and selection via the lasso. *Journal of the Royal Statistical Society, B*, **58** 267-288.
- [64] Toll, D. (2006) *You Can Draw: Over 100 Drawings to Master*. Hinkler Books.
- [65] Torralba, A., Murphy, K. P., and Freeman, W. T. (2004) Sharing features: efficient boosting procedures for multiclass object detection. *Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition*, 762-769.
- [66] Vapnik, V. N. (2000) *The Nature of Statistical Learning Theory*, Springer.
- [67] Viola, P. A. and Jones, M. J. (2004) Robust real-time face detection. *International Journal of Computer Vision*, **57** 137-154.
- [68] Viola, P. A., Platt, J., and Zhang, C. (2005) Multiple instance boosting for object detection. *Advances in Neural Information Processing Systems*, 1417-1424.
- [69] Wolfe, P. J., Godsill, S. J., and Ng, W. J. (2004) Bayesian variable selection and regularization for time-frequency surface estimation. *Journal of the Royal Statistical Society, B*, **66** 575-589.
- [70] Wong, W. H. (1986) Theory of partial likelihood. *The Annals of Statistics*, **14** 88-123.
- [71] Wu, T. F. and Zhu, S. C. (2009) A numeric study of the bottom-up and top-down inference processes in and-or graphs. *International Journal of Computer Vision*, under review.
- [72] Wu, Y. N., Guo, C., and Zhu, S. C. (2008) From information scaling of natural images to regimes of statistical models. *Quarterly of Applied Math*, **66** 81-122.

- [73] Wu, Y. N., Si, Z., Fleming, C. and Zhu, S. C. (2007) Deformable template as active basis. *Proceedings of International Conference of Computer Vision*.
- [74] Wu, Y. N., Si, Z., Gong, H. and Zhu, S. C. (2009) Learning active basis model for object detection and recognition. *International Journal of Computer Vision*, in press.
- [75] Wu, Y. N., Zhu, S. C., and Liu, X. W. (2000) Equivalence of Julesz ensemble and FRAME models. *International Journal of Computer Vision*, **38** 245-261.
- [76] Xu, L., Wilkinson, D., Southey, F., and Schuurmans, D. (2006) Discriminative unsupervised learning of structured predictors. *International Conference on Machine Learning*.
- [77] Yao, B. and Zhu, S. C. (2009) Learning deformable action templates from cluttered videos. *Proceedings of International Conference of Computer Vision*.
- [78] Yao, Z. Y., Yang, X., Lin, L., Lee, M. W., and Zhu, S. C. (2009) I2T: image parsing to text description, *Proceedings of IEEE*, (invited for the special issue on Internet Vision).
- [79] Yu, C.-N. J. and Joachims, T. (2009) Learning structural SVMs with latent variables. *International Conference on Machine Learning*.
- [80] Zheng, M., Barrera, L. O., B. Ren, and Wu, Y. N. (2007) ChIP-chip: data, model, and analysis. *Biometrics*, **63** 787-796.
- [81] Zhu, S. C., Guo, C., Wu, Y. N., and Wang, Y. (2002) What are textons? *Proceedings of European Conference of Computer Vision*, 793-807.
- [82] Zhu, S. C. and Mumford, D. B. (1997) Prior learning and Gibbs reaction-diffusion. *IEEE Transactions on Pattern Analysis and Machine Intelligence*, **19** 1236-1250.
- [83] Zhu, S. C. and Mumford, D. B. (2006) A stochastic grammar of images. *Foundations and Trends in Computer Graphics and Vision*, **2** 259-362.
- [84] Zhu, S. C., Shi, K., and Si, Z. (2009) Learning explicit and implicit visual manifolds by information projection. *Pattern Recognition Letter*.
- [85] Zhu, S. C., Wu, Y. N., and Mumford, D. B. (1998) Minimax entropy principle and its application to texture modeling. *Neural Computation*, **9** 1627-1660.