Reading list

VIKAS C. RAYKAR, University of Maryland, CollegePark
vikas@cs.umd.edu

The reading list covers three topics: fast methods, machine learning, and scientific computing. The first list contains a few key papers covering non-parametric approaches like kernel density estimation, Gaussian processes, and kernel methods. The second list covers papers which deal with fast methods to speedup tasks in machine learning. The third list contains some papers on iterative methods. A few miscellaneous papers are also included.

[**Reading List**]: May 4, 2005

---

1. NONPARAMETRIC METHODS IN COMPUTATIONAL STATISTICS AND MACHINE LEARNING

(1) T. Poggio and S. Smale. The mathematics of learning: Dealing with data. *Notices of the American Mathematical Society*, 50(5):537–544, 2003
A brief overview of learning.

1.1 Kernel density estimation

(1) M. P. Wand and M. C. Jones. *Kernel Smoothing*. Chapman and Hall, London, 1995
A comprehensive monograph on kernel density estimation and kernel regression.

(2) A. J. Izenman. Recent developments in nonparametric density estimation. *Journal of American Staistical Association*, 86(413):205–224, 1991
A good review of nonparametric density estimators.

(3) M. C. Jones, J. S. Marron, and S. J. Sheather. A brief survey of bandwidth selection for density estimation. *Journal of American Statistical Association*, 91(433):401–407, March 1996
Review of bandwidth selection strategies for univariate kernel density estimation.

(4) S.J. Sheather and M.C. Jones. A reliable data-based bandwidth selection method for kernel density estimation. *Journal of Royal Statistical Society Series B*, 53(3):683–690, 1991
The current state-of-the-art bandwidth selector.

1.2 Gaussian process regression

(1) C. E. Rasmussen and C. K. I. Williams. *Gaussian Processes for Machine Learning*. The MIT Press, 2006
Book on Gaussian processes. Chapter 2 deals with regression.

1.3 Support Vector machines

(1) J. Shawe-Taylor and N. Cristianini. *Kernel Methods for Pattern Analysis*. Cambridge University Press, 2004
A comprehensive coverage of all kernel methods. Chapter 7 deals with SVMs.

(2) Olivier Chapelle. Training a support vector machine in the primal. 2005
SVM primal training.

2. FAST N-BODY LEARNING

2.1 Series based methods

(1) L. Greengard. Fast algorithms for classical physics. *Science*, 265(5174):909–914, 1994
Overview of fast multipole methods.

(2) R. K. Beatson and L. Greengard. *Wavelets, Multilevel Methods and Elliptic PDEs*, chapter A short course on fast multipole methods, pages 1–37. Oxford University Press, 1997
Tutorial on fast multipole methods.

(3) N. Gumerov and R. Duraiswami. *Fast Multipole Methods for the Helmholtz Equation in Three Dimensions*. Elsevier Science, 2005
Text book treatment of fast multipole methods.

(4) L. Greengard and J. Strain. The fast Gauss transform. *SIAM Journal of Scientific and Statistical Computing*, 12(1):79–94, 1991
This is the paper on fast Gauss transform which forms the basis for our work.

(5) B. J. C. Baxter and G. Roussos. A new error estimate of the fast gauss transform. *SIAM Journal of Scientific and Statistical Computing*, 24(1):257–259, 2002
The error bound derived in the original paper was shown to be incorrect and a new bound was derived in this paper.

(6) J. Strain. The fast gauss transform with variable scales. *SIAM J. Sci. Stat. Comput.*, 12(5):1131–1139, Sep. 1991
The extension of the fast Gauss transform to handle variable bandwidths.

(7) C. Yang, R. Duraiswami, and L. Davis. Efficient kernel machines using the improved fast Gauss transform. In *Advances in Neural Information Processing Systems*, pages 1561–1568, 2005
Extension of the fast Gauss transform to high dimensions.

2.2 Dual-tree based methods

(1) A. Gray and A. Moore. N-body problems in statistical learning. In *Advances in Neural Information Processing Systems*, pages 521–527, 2001
Gives a list of N-body problems in machine learning.

(2) A. G. Gray and A. W. Moore. Nonparametric density estimation: Toward computational tractability. In *SIAM International conference on Data Mining*, 2003
Dual-tree recursion algorithm for kernel density estimation.

2.3 Sparse data methods

(1) C. E. Rasmussen and C. K. I. Williams. *Gaussian Processes for Machine Learning*. The MIT Press, 2006
Chapter 8 in this new book summarizes methods based on based on sparse representation of the dataset.

2.4 Recent NIPS papers on N-body learning

(1) D. Lee, A. Gray, and A. Moore. Dual-tree fast Gauss transforms. In Y. Weiss, B. Schölkopf, and J. Platt, editors, *Advances in Neural Information Processing Systems 18*. MIT Press, Cambridge, MA, 2006

(2) Y. Shen, A. Ng, and M. Seeger. Fast Gaussian process regression using KD-trees. In Y. Weiss, B. Schölkopf, and J. Platt, editors, *Advances in Neural Information Processing Systems 18*. MIT Press, Cambridge, MA, 2006

(3) N. De Freitas, Y. Wang, M. Mahdaviani, and D. Lang. Fast Krylov methods for N-body learning. In Y. Weiss, B. Schölkopf, and J. Platt, editors, *Advances in Neural Information Processing Systems 18*. MIT Press, Cambridge, MA, 2006

3. ITERATIVE METHODS

(1) C. T. Kelley. *Iterative Methods for Linear and Nonlinear Equations*. SIAM, 1995
A concise book on iterative methods. I will be mainly focussing on the conjugate-gradient method.

(2) Y. Saad. *Numerical Methods for Large Eigenvalue Problems*. Manchester University Press, 1992
A classic book on iterative methods for eigen values.

(3) V. Simoncini and D. B. Szyld. Theory of inexact Krylov subspace methods and applications to scientific computing. *SIAM J. Sci. Comput.*, 25(2):454–477, 2004
Useful to assess the effect of approximations of iterative methods.