循序最小化直推式支援向量機的研究

Le Hoang Hiep、陳木松

E-mail: 322113@mail.dyu.edu.tw

摘 要

支援向量機是以統計學理論為主的一種機器學習法則。支援向量機的設計能夠獲得較好的性能於在機器學習和資料探勘中。然而應用支援向量機的最大問題是資料不足或是很難收集，而且資料樣本可能會隨時間而改變。因此有許多學者提出不同形式的支援向量機，其中循序最小化直推式支援向量機(SMTSVM)是直推式支援向量機(TSVM) 演算法其中之一。 循序最小化直推式支援向量機有兩個重要的步驟為更新兩個無標示樣本資料的拉格朗日係數數與計算其經驗風險。假如經驗風險遞減時，則我們在這兩個無標示樣本資料中選擇較高的鬆弛變數改變，否則增加調整函數的值並重新訓練樣本資料。 為能驗證循序最小化直推式支援向量機的效率與有效性，本文測試線性可分離/不可分離的資料的分類及USPS樣本資料，並且與直推式支援向量機、PTSVM、及線上直推式支援向量機等，比較其效率。

關鍵詞 : 支援向量機、直推式支援向量機、循序最小化直推式支援向量機

目錄

參考文獻

[1]Kumar S. Neural Networks: A Classroom. McGraw-Hill Publishing Company Limited, International Edition, ISBN 007-048292-6, 2005.

[2]Richard O. Duda, Peter E. Hart, David G. Stork. Pattern Classification. John Wiley & Sons, Inc. 2nd Edition, 2001.

[3]Yisong Chen, Guoping Wang and Shihai Dong. Learning with progressive transductive support vector machine. Pattern Recognition Letters 24, 2003, pp.1845 – 1855.

[4]Ye Wang, Shang-Teng Huang. Training TSVM with the proper number of positive samples. Pattern Recognition Letters 26, 2005, pp.2187 – 2194.

[5]Gert Cauwenberghs, Tomaso Poggio. Incremental and Decremental Support Vector Machine Learning. In T. K. Leen, T. G. Dietterich, and V. Tresp, editors, Advances in Neural Information Processing Systems, volume 13, pages 409-415. MIT Press, 2001.

[6]T. Joachims. SVM-Light: An implementation of Support Vector Machines. Department of Computer Science, Cornell University. http://svmlight.joachims.org/.

[7]Chih-Chung Chang and Chih-Jen Lin. LIBSVM – A Library for Support Vector Machines. Department of Computer Science and and Information Engineering, National Taiwan University. http://www.csie.ntu.edu.tw/~cjlin/libsvm/.

[8]Dayan P. Unsupervised learning. The MIT Encyclopedia of the Cognitive Sciences. Wilson, RA & Keil, F, editors.

[9]T. T. Nguyen, M.S. Chen. Online Transductive Support Vector Machine. Conference on Engineering Science/Technology, Da-Yeh University, Changhua, Taiwan, June 2008.

[10] http://en.wikipedia.org/wiki/Machine_learning.

[11] http://en.wikipedia.org/wiki/Semi-supervised_learning.
[12]N. Kasabov and S.N Pang. Transductive Support Vector Machines and Applications in Bioinformatics for Promoter Recognition. Neural Information Processing. Vol. 3, No. 2, May 2004.
[13]Christopher J.C. Burges. A Tutorial on Support Vector Machines for Pattern Recognition. Data Mining and Knowledge Discovery, volume 2, number 2, page 121 – 167, June, 1998.
[14]T. Joachims, “ Transductive inference for text classification using support vector machines ” in Proc. ICML, pp. 200-209, 1999.
[15]V. N. Vapnik, Statistical Learning Theory. New York: Wiley, 1998.
[16]Q.M. Ha, N. Partha and Y. Yuan. Mercer ’ s Theorem, Feature Maps, and Smoothing. Lecture Notes in Computer Science, Springer Berlin / Heidelberg Publisher, Volume 4005/2006, page 154 – 168, 2006.
[17]John C. Platt. Fast training of support vector machines using sequential minimal optimization. In B. Scholkopf, C. J. C. Burges, and A. J. Smola, editors, Advances in Kernel Methods — Support Vector Learning, pages 185 – 208, Cambridge, MA, 1999. MIT Press.
[18]G. Teng, Y.H. Liu, J.B. Ma, F. Wang, H.T Yao. Improved Algorithm for Text Classification Based on TSVM. First International Conference on Innovative Computing, Information and Control (ICICIC'06), IEEE, 2006.
[19]Xinjun Peng and Yifei Wang. Learning with Sequential Minimal Transductive Support Vector Machine. FAW 2009, LNCS 5598, pp. 216 – 227, Springer – Verlag Berlin Heidelberg, 2009.
[20]Fernando Pe'rez-Cruz, Angel Navia-Va'zquez, Ani'bal R. Figueiras-Vidal, Antonio Arte's-Rodri'guez. Empirical Risk Minimization for Support Vector Classifiers. IEEE Transactions on Neural Networks, Vol. 14, No 2, March, 2003.
[21] http://en.wikipedia.org/wiki/Empirical_risk_minimization.
[22]USPS Data, http://www.ee.columbia.edu/~xlx/ee4830/hws/hw3.html.
[23] http://crsouza.blogspot.com/2010/03/kernel-functions-for-machine-learning.html.
[24]Vladimir Vovk, Alex Gammerman and GlennShafer. Algorithmic Learning in a Random World. pp. 291, Springer, March 2005.
[25]Fan Sun, Maosong Sun. Transductive Support Vector Machines Using Simulated Annealing. CIS 2005, Part I, LNAI 3801, pp. 536 – 543, Springer – Verlag Berlin Heidelberg, 2005.