论文

隐私团校准的模糊MEB学习

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摘要:

在一定条件下, 基于最小累积平方误差(ISE) 准则的高斯核密度估计与最小包含球(MEB) 等价. 在此基础上提出了一种含团状隐私数据保护的MEB学习方法, 称为隐私团校准的MEB(PCC-MEB) 方法; 同时, 通过引入模糊隶属度函数将PCC-MEB 拓展为模糊的PCC-MEB(FPCC-MEB), 从而解决二类及多类问题中区域不可分问题. 人造和真实数据集上的实验结果表明, 所提出方法具有较好的性能.

关键词: 最小包含球；核密度估计；隐私数据团；核方法；模糊

Privacy cloud calibration fuzzy learning for MEB

Abstract:

Under given conditions, Gaussian kernel density estimate with minimum integrated square error(ISE) criterion can
be equivalent to the minimum enclosing ball(MEB). Based on this conclusion, a learning method of MEB with privacy cloud
data is proposed, called privacy cloud calibration MEB(PCC-MEB). Meanwhile, PCC-MEB is extended to fuzzy privacy
cloud calibration MEB(FPCC-MEB) by introducing a fuzzy membership function, which can resolve unclassifiable zones
among classes. Experimental results on the artificial and real-word data sets show the effectiveness of presented method.

Keywords: minimum enclosed ball(MEB)；kernel density estimator；privacy data cloud；kernel method；fuzzy

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参考文献:

[1] Rüping Stefan, "SVM Classifier Estimation from Group Probabilities," In: Proceedings of the 27th International Conference on Machine Learning (ICML 2010), Haifa, Israel, 2010. [2] Quadrianto Novi, Smola Alex J., Caetano Tibrio S., Le Quoc V., "Estimating labels from label proportions," In: Proceedings of the 25th Annual International Conference on Machine Learning (ICML 2008), pp. 776783, Omnipress, 2008. [3] Quadrianto, Novi, Smola, Alex J., Caetano, Tibrio S.,and Le, Quoc V. Estimating labels from label proportions. Journal of Machine Learning Research, 10:2349－2374, Oct 2009. [4] Hendrik Kück, Nando de Freitas, "Learning about individuals from group statistics," In:

Uncertainty in Artificial Intelligence (UAI), pp. 332339, Arlington, Virginia, 2005, AUAI Press. [5] David M.J. TAX, Robert P.W. Duin, "Support Vector Data Description," Machine Learning, 2004, 54(1): 45–66. [6] Fu-Lai Chung, Shi-Tong Wang, Zhao-Hong Deng, De-Wen Hu, "Fuzzy Kernel Hyperball Perceptron," Applied Soft Computing, 2004, 5: 67-74. [7] Alan Julian Izenman, "Recent Developments in Nonparametric Density Estimation," Journal of the American Statistical Association, Vol. 86, No. 413 (Mar., 1991), pp. 205-224. [8] Mark Girolami, Chao He, "Probability density estimation from optimally condensed data samples," IEEE Trans. Pattern Anal. Mach. Intell. 25 (10) (2003) 1253–1264. [9] JooSeuk Kim, Clayton Scott, "Kernel classification via integrated squared error," IEEE Workshop on Statistical Signal Processing, Madison, WI, August 2007. [10] JooSeuk Kim, Clayton Scott, "Robust kernel density estimation," Proc. IEEE International Conference on Acoustics, Speech, and Signal Processing (ICASSP 2008), Las Vegas, 2008. [11] Ivor Wai-Hung Tsang, James Tin-Yau Kwok, Pak-Ming Cheung, "Core vector machines: Fast SVM training on very large data sets," J. Mach. Learn. Res., 2005, 6: 363–392. [12] Ivor Wai-Hung Tsang, James Tin-Yau Kwok, Jacek M. Zurada, "Generalized core vector machines," IEEE Transactions on Neural Networks, Sept 2006, 17 (5):1126–1140. [13] Zhao-Hong Deng, Fu-Lai Chung, Shi-Tong Wang, "FRSDE: Fast Reduced Set Density Estimator using Minimal Enclosing Ball Approximation," Pattern Recognition, 2008, 41:1363-1372. [14] Fu-Lai Chung, Zhao-Hong Deng, Shi-Tong Wang, "From Minimum Enclosing Ball to Fast Fuzzy Inference System Training on Large Datasets," IEEE Transactions on Fuzzy Systems, Feb 2009, 17(1):173–184. [15] Corinna Cortes, Vladimir Vapnik, "Support vector networks," Machine Learning, 20(3), 1995: 273–297. [16] Sch?lkopf B., A. J. Smola, R. C. Williamson, P. L. Bartlett, "New Support Vector Algorithms," Neural Computation 12(5), 1207-1245 (May 2000). [17] Chih-Chung Chang, Chih-Jen Lin, "Training -Support Vector Classifiers: Theory and Algorithms," Neural Computation, 2002, 14: 1959–1977. [18] Frank A., Asuncion A.(2010), UCI Machine Learning Repository, http://www.ics.uci.edu/ ~mlearn/MLRepository.html, Irvine, CA: University of California, School of Information and Computer Science.

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