

Liblinear-Prior

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1 Overview

Liblinear-Prior is an extension to the Liblinear 1.8 library. Specially, it supports the confidence factor being considered into the Linear SVM formulation.

In classic L2-regularized-L2-cost linear SVM objective function, the cost factor C is always a constant:

$$\begin{aligned} \min_{\mathbf{w}, b} \quad & \frac{1}{2} \|\mathbf{w}\|^2 + C \sum_{i=1}^n (\xi_i)^2 \\ \text{s.t.} \quad & y_i(\mathbf{w}^T \mathbf{x}_i + b) \geq 1 - \xi_i, i = 1, \dots, n \\ & \xi_i \geq 0, i = 1, \dots, n \end{aligned} \tag{1}$$

In some applications, we treat individual examples differently. This prior knowledge can be represented by a confidence score $\xi_i \in [0, 1]$ that is associated with example (\mathbf{x}_i, y_i) . The closer ξ_i is to 1, the more important example (\mathbf{x}_i, y_i) is. Therefore, the formulation can be modified to incorporate ξ .

$$\begin{aligned} \min_{\mathbf{w}, b} \quad & \frac{1}{2} \|\mathbf{w}\|^2 + C \sum_{i=1}^n (\nu_i \xi_i)^2 \\ \text{s.t.} \quad & y_i(\mathbf{w}^T \mathbf{x}_i + b) \geq 1 - \xi_i, i = 1, \dots, n \\ & \xi_i \geq 0, i = 1, \dots, n \end{aligned} \tag{2}$$

2 Use of Package

Currently, Liblinear-Prior supports extension with optimizations '-s 0' and '-s 2'. To pass the confidence information, simply add the confidence vector as a column to the label vector. For example, if the label vector has a dimension of 25×1 , one should pass the label vector argument as a 25×2 matrix, where the first column is the label vector, and the second column is the additional confidence vector. It should be noted that the confidence vector values should take on a range $[0, 1]$.

Run the MATLAB script `demoLiblinearPrior.m` for a demonstration.

3 Related Literature

Although it is not required, the user is encouraged to cite the following paper:

Meng Wang, Wei Li and Xiaogang Wang. “Transferring a Generic Pedestrian Detector Towards Specific Scenes”. Proceedings of IEEE Conference on Computer Vision and Pattern Recognition 2012. June 17 - 21, 2012, Providence, Rhode Island, USA.

4 License

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