New Black-box Modeling for Novelty Detection and Semi-Supervised Learning
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For many decades the problem of estimating a support for an unknown high-dimensional distribution was of a great interest in such fields of Machine Learning as Novelty Detection, Manifold Regularization and Semi-Supervised Learning. The One-Class and Laplacian Support Vector Machines are widely acknowledged kernel-based techniques to address this problem. However with the latter approaches it is difficult to model a mixture of distributions. We address this issue by presenting a new class of bilinear formulations where a new coupling term between classes is introduced. We focus on the Least-Squares formulation of the latter models which can be effectively translated into efficiently solved linear system of equations. We present experimental validation which justifies the usefulness and practical importance of the proposed methods both in the semi-supervised classification and novelty detection settings.