The University of Chicago
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Ph.D. Seminar

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One-Class Boosting and its Application to Classification Problems

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ABSTRACT

We promote the concept of one-class learning and explore the role of background examples in learning processes. We propose to fit a stepwise additive model to minimize an adaptive quadratic loss. Experimental results on the NIST dataset show that our algorithm achieves comparable accuracy to AdaBoost, while it requires no individual training examples; is robust to noise in the training data, and is computationally very efficient. Exponential loss is introduced to address the situation when there are small clusters in the object class. Randomization scheme is incorporated to handle high dimension of data. The resulted OneClassBoost converges much faster than AdaBoost, and achieves superior performance to AdaBoost in presence of small training set. We have constructed a frontal face detection system using OneClassBoost, and achieved comparable accuracy to the state of the art. Behind the success of OneClassBoost, we believe that, simple statistics on background, rather than individual background examples, drive to shape the classification boundary.