AN INTEGRATED APPROACH FOR GENERIC OBJECT DETECTION USING KERNEL PCA AND BOOSTING (FriPmPO1)

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Abstract :
In this paper we present a novel framework for generic object class detection by integrating Kernel PCA with AdaBoost. The classifier obtained in this way is invariant to appearance, illumination conditions and surrounding clutter. A nonlinear shape subspace is learned for positive and negative object classes using kernel PCA. Features are derived by projecting example images onto the learned subspaces. Base learners are modeled using Bayes classifier. AdaBoost is then employed to discover the features that are most relevant for the object detection task at hand. Proposed method has been successfully tested on wide range of object classes (cars, airplanes, pedestrians, motorcycles etc) using standard data sets and has shown remarkable performance. Using small training set, classifier learned in this way was able to generalize the intra-class variation while still maintaining high detection rate. In most object categories we achieved detection rates of above 95% with minimal false alarm rates. We demonstrate the effectiveness of our approach in terms of absolute performance indices and comparative performance against current state of the art approaches.