

# Joint Optimized Locally Linear Classifier

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**Abstract.** Support Vector Machine(SVM) is widely used in classification task. SVM outperforms other similar algorithms(eg. logistic regression) thanks to kernel tricks support, which allows us to extend linear SVM to kernel SVM, leading to a better performance on nonlinear data. However, kernel SVM suffers from high computational complexity. To address this problem, locally linear classifier have been proposed to approximate the decision boundary based on a predefined local coding schema. Existing methods usually employ a supervised or unsupervised anchor points learning strategy, followed by a fixed number of nearest neighbor anchor point searching. In this paper, we propose a unified local coding schema and refine current state-of-art locally linear classifier by introducing an adaptive algorithm to find the optimum number of nearest neighbor anchor points for each individual sample. Our joint optimized locally linear classifier model can be learned in an online fashion by stochastic gradient decent method.

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