

From Cutting Planes Algorithms to Compression Schemes and Active Learning

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Cutting-plane methods are well-studied localization (and optimization) algorithms. We show that they provide a natural framework to perform machine learning —and not just to solve optimization problems posed by machine learning— in addition to their intended optimization use. In particular, they allow one to learn sparse classifiers and provide good compression schemes. Moreover, we show that very little effort is required to turn them into effective active learning methods. This last property provides a generic way to design a whole family of active learning algorithms from existing passive methods. We present numerical simulations testifying of the relevance of cutting-plane methods for passive and active learning tasks for image classification problems.