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A Direct Minimization of PAC-Bayesian Bounds for Multi-View Majority Vote Learning Algorithms

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Abstract

The PAC-Bayesian framework has profoundly influenced the field of statistical learning, particularly in enhancing generalization through majority voting methods. This manuscript focuses on the practical implementation and optimization of PAC-Bayesian theory in multi-view learning scenarios. We develop novel self-bounding algorithms and constrained optimization techniques to efficiently compute PAC-Bayesian bounds tailored for multi-view datasets. By leveraging Rényi divergence and introducing advanced first and second-order bounds, our approach demonstrates superior generalization performance and tighter bounds compared to traditional methods. Extensive experimental validation highlights the practical applicability and effectiveness of our methods, bridging theoretical insights with real-world applications in multi-view learning.

Keywords— majority vote, multi-view, ensemble methods, learning theory, PAC-Bayesian theory, Rényi divergence