Distributed Learning with Minimum Error Entropy Principle

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Abstract: Minimum Error Entropy (MEE) principle is an important approach in Information Theoretical Learning (ITL). It is widely applied and studied in various fields for its robustness to noise. In this paper, we study a reproducing kernel-based distributed MEE algorithm, DMEE, which is designed to work with both fully supervised data and semi-supervised data. With fully supervised data, our proved learning rates equal the minimax optimal learning rates of the classical pointwise kernel-based regressions. Under the semi-supervised learning scenarios, we show that DMEE exploits unlabeled data effectively, in the sense that first, under the settings with weaker regularity assumptions, additional unlabeled data significantly improves the learning rates of DMEE. Second, with sufficient unlabeled data, labeled data can be distributed to many more computing nodes, that each node takes only O(1) labels, without spoiling the learning rates in terms of the number of labels.