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Active Learning

According to psychology, learning can be defined as a relatively permanent change in behavior as a result of experience. Since the topic goes wide with different learners and environments, there are several categorized types of learning methods. Among them, “Active learning” can be taken as an approach to instruction that involves actively engaging students(learners) with the material they should learn. It explores how we can get more effective learning experience by giving the learner opportunities to apply, analyze and synthesize prior knowledge in order to create personal meaning. This involves discussions, debate, group works, problem solving, case studies, simulations, role plays and several other methods.

Though active learning was practiced since ancient times, this has emerged as the dominant educational paradigm in the 1990s. “Promoting Active Learning: Strategies for the College Classroom” (1993) by Chet Meyers and Thomas Byron Jones was one of the oldest references for active learning strategies. This book draws on classroom experiences and faculty suggestions in providing a practical guide to teaching strategies to encourage active learning in the college classroom. Methodologically, it is more suitable to teach critical thinking skills compared to the classical lecturing approach.

This approach is based on evidence from Learning science. Conceptually, active learning is not an easy target. Its theoretical roots are in constructivist learning theories. Constructivism has become a leading learning paradigm, and it views learning as a construction process of new knowledge in relation to previous knowledge. Constructivism criticizes the idea that learners receive knowledge from external sources and highlights understanding instead of memorizing.

A research experiment was conducted with two-class active learning with pre clustering algorithm. While the common approach for collecting data in active learning is to select samples close to the classification boundary, better performance can be achieved by taking into account the prior data distribution. The main contribution of this paper is a formal framework that incorporates clustering into active learning. The algorithm first constructs a classifier on the set of the cluster representatives, and then propagates the classification decision to the other samples via a local noise model. The proposed model allows to select the most representative samples as well as to avoid repeatedly labeling samples in the same cluster. During the active learning process, the clustering is adjusted using the coarse-to-fine strategy in order to balance between the advantage of large clusters and the

accuracy of the data representation. The results of experiments in image databases showed a better performance of our algorithm compared to the classical methods.

When considering real world practices of active learning in machine learning, in general, active learning systems aim to make machine learning more economical, since they can participate in the acquisition of their own training data. An active learner might iteratively select informative query instances to be labeled by an oracle (e.g.: a human annotator), for example. Work over the last two decades has shown that such approaches are effective at maintaining accuracy while reducing training set size in many machine learning applications. However, as it is begun to deploy active learning in real ongoing learning systems and data annotation projects, we are encountering unexpected problems–due in part to practical realities that violate the basic assumptions of earlier foundational work.

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