Bocconi

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Bocconi University
Room 4-E4-SR03
Via Röntgen 1, Milano (4° floor)

Learning-Augmented Algorithms via Algorithm-Switching

Speaker

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Abstract

The research domain of learning augmented algorithms aims to combine the efficacy of machine learning approaches in handling practical inputs and the performance guarantees offered by traditional worst-case analysis in online algorithms. For numerous problems, machine learning techniques can readily generate predictions about the structure of the input. By leveraging these predictions, algorithms can adapt their decision-making processes, yielding enhanced performance provided that these predictions are sufficiently accurate. Yet, decision-making systems that are based on such predictions, need to achieve a decent performance also in the case that the predictions turn out to be highly inaccurate.

Several algorithmic results in the area can be seen as a meta-algorithm, dynamically ``combining'' a number of different algorithms. These individual algorithms often exhibit varying degrees of reliance on the predictions, ranging from complete trust to outright disregard. How these algorithms are combined into a meta-algorithm generally depends on the specific problem and the individual performance of each algorithm on the so-far encountered input. In this talk, we present different variations of this approach from the literature, highlight their differences and discuss the pivotal properties of problems and algorithms for the analysis of each distinct use case.

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