



A mini-course on decision-making and active learning

Machine Learning has come of age and is found everywhere, in applications and basic sciences alike. While its practical successes are spectacular, understanding reasons (including for failure) are harder to cope with. It is therefore important to have a clear view of the fundamentals of the field to grasp its foundations and basic aspects. The scope of this mini-course is to provide such an introduction by stressing aspects related to active learning and decision-making before going to reinforcement learning. Examples from life sciences will illustrate various aspects of the problems.

Lecture 2

Thursday, 23 May 2024 - h. 15:30

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“The physics of sensing: Fundamental limits and the role of active decisions.”

Abstract

Sensing the amount and concentration of molecules in the environment is a classical problem in biophysics. Classical limits on precision and speed were found by Berg and Purcell in 1977, and many further works have elaborated on their pioneering paper, which is based on passive estimates and decisions. Systematic (and more effective) policies of decision are provided by active learning, namely the sequential probability ratio test. The lecture will discuss all of the above, introduce the problem, and present the various results and open issues.