TITLE: Optimization Under Uncertainty

Riccardo Zecchina, Politecnico di Torino

ABSTRACT: Optimization under uncertainty deals with the problem of finding the minimum of a cost function which depends on some stochastic parameters, given some partial information about their value (e.g. their probability distribution). Problems of this kind pervade all areas of natural and applied sciences, but they are extremely difficult to solve (they often belong to a superset of the NP complexity class called PSPACE).

We consider problems with independently distributed stochastic parameters, and we propose a general method to solve them, provided they can be treated with the cavity method of statistical physics in the deterministic case.

We propose a novel algorithm which combines some features of Survey Propagation and of Belief Propagation, and which is capable of solving large scale instances of such problems, far beyond what is feasible with standard algorithms. As an illustration, we apply this approach to the stochastic matching problem.