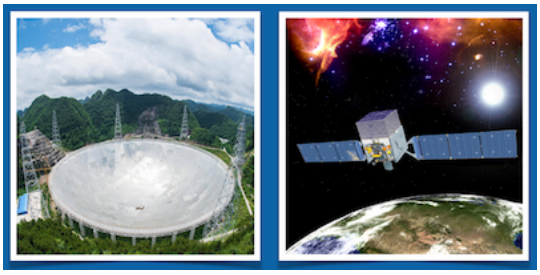

ID contributo: **8** Tipo: **non specificato**

Nonparametric Semi-Supervised Classification with Application to Signal Detection in High Energy Physics

venerdì 8 settembre 2017 12:00 (30 minuti)

Since the early Sixties, the Standard Model has represented the state of the art in High Energy Physics. It describes how the fundamental particles interact with each others and with the forces between them, giving rise to the matter in the universe. Despite its empirical confirmations, there are indications that the Standard Model does itself not complete our understanding of the universe. Model independent search aims to explain the shortcomings of this theory by empirically looking for any possible signal which behaves as a deviation from the background process, representing, in turn, the known physics.

From a statistical perspective, this problem can be in principle formulated within an unsupervised framework of clustering. However, while the the signal, if present, is unknown, the background process is always present and well-known, so that a virtually infinite sample of data can be simulated from the latter process with Montecarlo techinques. Hence, available data have two different sources: an unlabelled sample which might include observations from both the processes, and an additional labelled, sample from the background only. A semisupervised approach can be particularly suitable in this context, for discriminating the two class labels; semisupervised classification techniques lie between unsupervised and supervised ones, sharing some characteristics of both the approaches. In this work we propose a procedure where additional information, available on the background, is integrated within a nonparametric clustering framework to detect deviations from known physics. Also, we propose a variable selection procedure that allows to work on a reduced subspace.

The effectiveness of the whole methodology is shown via its application on a set of data related to a simulated experiment of a proton-proton collision.

Autore principale: CASA, Alessandro (University of Padova)

Coautore: MENARDI, Giovanna (University of Padova)

Relatore: CASA, Alessandro (University of Padova)

Classifica Sessioni: G. Galilei