A novel machine learning approach to solar flare prediction

Federico Benvenuto 1, Michele Piana1,2, Cristina Campi3 and Anna Maria Massone 2

1 Dipartimento di Matematica, Universitàdegli Studi di Genova
2 CNR - SPIN Genova.
3 Dipartimento di Medicina, Università degli Studi di Padova. cristina.campi@unipd.it

Solar flares are flashes of brightness on the surface of the sun. These events, although occurring far from the Earth, could be a threat for our planet, affecting satellite operations, aviation and communication technologies. For this reason, the space weather community looks for methods for their forecasting. Several machine learning methods have been employed for the flare prediction task [1, 2] and in this talk we present a novel approach, whose aim is to provide predictions and feature weights computation in a completely automatic and skill-score independent way. The idea is to coupled together a supervised learning method with an unsupervised technique. The supervised method provides the weights with which each feature contributes to the prediction, while the unsupervised one partitions the regression outcome through the minimization of a cost function and without focusing on the optimization of a specific skill score. We tested this hybrid approach against standard machine learning methods using NOAA Space Weather Prediction Center data.

References