

A novel machine learning approach to solar flare prediction

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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 couple 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

- [1] Y. Yuan et al., *Automated flare forecasting using a statistical learning technique*, Research in Astronomy and Astrophysics, 10 (2010) 785-796.
- [2] M. G. Bobra, S. N. Couvidat, *Solar Flare Prediction Using SDO/HMI Vector Magnetic Field Data with a Machine-Learning Algorithm*, The Astrophysical Journal, 798 (2015).