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Solar geomagnetic activity prediction using the fractal analysis and neural network

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The main goal of this work is to predict the Solar geomagnetic field activity using the neural network combined with the fractal analysis, first a multilayer perceptron neural network model is proposed to predict the future Solar geomagnetic field, the input of this machine is the geographic Coordinates and the time .The output is the three geomagnetic field components and the total field intensity recorded by the Orsted Satellite Mission.
Holder Exponents of the measured geomagnetic field components and the total field intensity are calculated using the continuous wavelet transform.
The Set of Holder exponents is used to train a Kohonen's Self-Organizing Map (SOM) neural machine which will become a classifier of the solar magnetic activity nature.
The SOM neural network machine is used to predict the future solar magnetic storms, in this step the input is the calculated set of the Holder exponents of the predicted geomagnetic field components and the total field intensity.
Obtained results show that the proposed technique is a powerful tool and can enhance the solar magnetic field activity prediction.
Keywords: Solar geomagnetic activity, neural network, prediction, Orsted, Holder Exponents, Solar magnetic storms.