

GEOMAGNETIC DST INDEX FORECAST USING A MULTILAYER PERCEPTRONS ARTIFICIAL NEURAL NETWORK

Amita Muralikrishna - CAP / DGE, Instituto Nacional de Pesquisas Espaciais

Alisson Dal Lago - Instituto Nacional de Pesquisas Espaciais

José Demisio Simões da Silva - Instituto Nacional de Pesquisas Espaciais

E-mail for contact: amita.mk@gmail.com

Abstract

The best known manifestations of the impact of solar wind on the magnetosphere are the geomagnetic storms. The prediction of geomagnetic field behavior allows the alert of geomagnetic storms occurrence, as those phenomena can cause many damages in the planet. The Artificial Intelligence tools have been applied in many multidisciplinary studies, covering several areas of knowledge, as a choice of approach to the solution of problems with characteristics like non-linearity, imprecision, and other features that can not be easily solved with conventional computational models. Techniques such as Artificial Neural Networks, Expert Systems and Decision Trees have been used in the Space Weather studies to perform tasks such as forecasting geomagnetic storms and the investigation of rules and parameters related on its occurrence. The main focus of this work is on forecasting the geomagnetic field behavior, represented this time by the Dst index, using for that task, mainly, the interplanetary magnetic field components and solar wind data. The tool chosen here to solve the non-linear problem was a Multi-layer Perceptrons Artificial Neural Network, trained with the backpropagation algorithm. Unlike what was done in other studies, we chose to predict calm and disturbed periods like, for example, a full month of data, for application in a real time forecasting system. It was possible to predict the geomagnetic Dst index one or two hours before with great percentage efficiency.