Prediction of Some Solar Activity Parameters using a Backpropogation Model

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Abstract: Solar atmosphere is permanently influenced by a multitude of process caused by solar activity and have been observed since 18th centaury on a regular basis. Solar activity forecasting is an important topic for various scientific and technological areas, such as electric power transmission lines, high frequency radio communications and geophysical applications. Moreover, space activities related to operations of low Earth orbiting satellites also significantly influenced by solar activity. The solar cycle is very difficult to predict on the basis of techniques of time series, due to the high frequency content, noise contamination, high dispersion level and high variability both in phase and amplitude. The effect of solar activity on space activities related to operations of low Earth orbiting satellites are quiet very large, since satellites in low Earth orbits often provide crucial contribution in communication, national defense and Earth mapping. Also such satellites provide an abundance of scientific data. During higher solar activity, the increased ultraviolet emission from sun heat up Earth's upper atmosphere, and this causes the atmosphere to expand. These phenomena results in the increase of drag on the low Earth orbiting satellites, thereby leading to early re-entry into Earth's atmosphere. Therefore better predictions of solar activity are essential to help spacecraft mission planning and design. Solar activity is measured by the parameters like sunspot numbers, F10.7cm flux etc. The prediction of solar activity is complicated by the lack of a quantitative theoretical model of the sun's magnetic cycle. Hence, forecasting methods like artificial neural networks are giving highly promising predictions. In this study, a backpopogation based neural network model is being developed to forecast the daily, monthly and yearly sunspot numbers and F10.7 values..

References:

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