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# Comparing long short-term memory and convolutional neural networks in SYM-H index forecasting

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Geomagnetic indices can have a central role in the mitigation of ground effects due to space weather events, for instance when their reliable forecasting will be achieved. To this purpose, machine learning techniques represent a powerful tool. Here, we use two conceptually different neural networks to forecast the SYM-H index: the long short-term memory (LSTM) and the convolutional neural network (CNN). We build two models and train both of them using two different sets of input parameters including interplanetary magnetic field components and magnitude and differing for the presence or not of previous SYM-H values. Both models are trained, validated, and tested on a total of 42 geomagnetic storms among the most intense that occurred between 1998 and 2018. Results show that both models are able to well forecast SYM-H index 1 hour in advance. The main difference between the two stands in the better performance of the one based on LSTM when SYM-H index is included in the input parameters and, contrarily, in the better performance of the one based on CNN for predictions based only on interplanetary magnetic field data.