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Comparison of Recursive Neural Networks and Random Forests for disruption prediction on C-Mod[1] JINXIANG ZHU, KEVIN MONTES, CRISTINA REA, ROBERT GRANETZ, Massachusetts Institute of Technology — A disruption prediction algorithm based on the Recurrent Neural Network method has been developed using a large database of both disruptive and non-disruptive discharges from Alcator C-Mod. The previous C-Mod disruption warning database had a different sampling scheme for the disruptive and non-disruptive shots. This sampling difference made some artificial effects to the training and testing of the Neural Network. To avoid this problem, we repopulated the disruption warning database with the same uniform sampling rate for both disruptive and non-disruptive shots. The Recurrent Neural Network algorithm was trained on flattop data consisting of 10 plasma signals, with a uniform 5 ms sampling rate. However, because of the fast time scale of C-Mod disruptions, only the last 50 ms of the disruptive shots was used in the training process. A shot-by-shot testing scheme has been developed to give a disruption warning alarm using an optimized control threshold, and we successfully achieve over 90% accuracy on the test dataset. A comparison with the results from a Random Forests algorithm will be shown, and the first results from the sensitivity analysis of a trained neural network will be presented.

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