Abstract Submitted
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Interpretable Disruption Prediction Using Random Forest on EAST and DIII-D.[1] CRISTINA REA, KEVIN MONTES, ROBERT GRANETZ, Massachusetts Institute of Technology, BRIAN SAMMULI, General Atomics, KEITH ERICKSON, PPPL, QIPING YUAN, DALONG CHEN, BIAO SHEN, WENHUI HU, BINGJIA XIAO, ASIPP — This contribution presents the Machine Learning-based disruption predictors working in real-time and near real-time on DIII-D and EAST tokamaks. The interpretable predictive algorithm used provides predictions of impending disruptions as well as which input features (i.e., plasma signals) are responsible for the prediction. This enables intelligent prioritization of the available control actuators in the Plasma Control System (PCS). Adopting explainable predictions is necessary to validate data-driven models for extrapolation to ITER and future fusion reactors. This Disruption Predictor using Random Forest (DPRF) algorithm operated in real-time on DIII-D during the 2018 experimental campaign [Rea et al., NF 2019], and was also interfaced with EAST PCS. For both these devices, DPRF's accumulated fraction of predicted disruptions is between 80-90% when optimized to simulate PCS alarms in offline testing [Montes et al., NF 2019]. Thanks to the feature contribution analysis, it is possible to identify and discriminate among different types of disruptions. Interpretable disruption prediction algorithms are mandatory to seamlessly integrate data-driven models and PCS actuators, thus supporting viable solutions for disruption avoidance on ITER.

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