

A device-independent pipeline for benchmarking AI-driven disruption prediction models - Matteo Bonotto

Motivations

- AI-based disruption prediction: real-time analysis of measures coming from the diagnostics and monitor the discharge to detect approaching disruptions.
- Next-generation devices: learning from the huge amount of data available in present and past devices to develop cross-machine disruption prediction tools.

Results

A highly engineered pipeline for developing AI-driven disruption prediction models, based on industrial data science best practices.

- Highly scalable to multiple tokamaks with little to no effort
- Highly accurate (for Alcator C-Mod, DIII-D, and EAST, improvement in terms of (i) missed alarms at 30ms and (ii) false alarms compared to reference model).

Challenges

- Ability to develop a device-independent pipeline for preprocessing, training and testing, which is not specific for each tokamak
- Managing highly imbalanced data
- Tuning the early detection alarm strategy
- Improving accuracy against reference models using the same architecture

