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Anomaly detection based on machine learning for the CMS electromagnetic calorimeter online data quality monitoring (poster-ID30)

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Online monitoring of data quality is essential for experiments with complex detectors like the ones at the LHC. Such online monitoring allows prompt actions in case of issues that degrade the data quality. Shifters scrutinize histograms and plots automatically produced while acquiring data. Machine learning techniques can be used to help in the detection of anomalies. We will present a real-time autoencoder-based anomaly detection system that uses semi-supervised neural network developed for the CMS electromagnetic calorimeter. This anomaly detection system uses a novel method that exploits the time-dependent evolution of anomalies as well as spatial variations in the ECAL detector response. After having been validated with CMS data taking in 2018 and 2022, the system was deployed in 2023 during the LHC Run 3. The presentation will cover the description of the used techniques, the validation, and the performance observed during Run 3.

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