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Autoencoder-based time series anomaly detection for ATLAS Liquid Argon calorimeter data quality monitoring

The ATLAS detector at the LHC has comprehensive data quality monitoring procedures for ensuring high quality physics analysis data. This contribution introduces a long short-term memory (LSTM) autoencoder-based algorithm designed to identify detector anomalies in ATLAS liquid argon calorimeter data. The data is represented as a multidimensional time series, corresponding to statistical moments of energy cluster properties. The model is trained in an unsupervised fashion on good-quality data and is evaluated to detect anomalous intervals of data-taking. The liquid argon noise burst phenomenon is used to validate the approach. The potential of applying such an algorithm to detect arbitrary transient calorimeter detector issues is discussed.

AI keywords

anomaly detection, data quality monitoring, LSTM, autoencoder, time series

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Track Classification: Patterns & Anomalies