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Automating ATLAS control room anomaly detection with deep learning

To ensure high-quality data acquisition at ATLAS, the detector status is monitored by a team of shifters in the control room where they watch plots of the incoming data and compare them with the expected standards. We propose the use of an online anomaly detection model to facilitate the detection of issues during data-taking and decrease the workload of the control room staff. Our model is a predictive long short-term memory autoencoder that takes in time-series data on a range of Level-1 rates and instantaneous luminosity and then, via unsupervised learning, learns to predict how those rates will change such that the level of error between the prediction and real data can be used to classify the data as clean or anomalous. We show that our model effectively detects anomalies in all features and that such an approach shows promise for online use in the control room. This model can easily be adapted to run in real-time, alerting shifters to potential anomalies as the data comes in.

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