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Online detector monitoring using AI: challenges, prototypes and performance evaluation for automation of online quality monitoring of the CMS experiment exploiting machine learning algorithms.

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Online Data Quality Monitoring (DQM) in High Energy Physics experiment is a key task which, nowadays, is extremely expensive in terms of human resources and required expertise.

We investigate machine learning as a solution for automatised DQM. The contribution focuses on the peculiar challenges posed by the requirement of setting up and evaluating the AI algorithms in the online environment; it also presents the successful application of modern machine learning techniques, in particular deep learning, to concrete examples of detector monitorables (e.g. based on the Muon Spectrometer) integrated in the production DQM infrastructure of CMS.

This pioneeristic work paves the way to the automatisation of many of the tasks currently performed in the online DQM system, allowing the check of large volumes of data in real-time and improving the ability to detect unexpected failures and reducing the manpower requirements simultaneously.

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