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Machine learning techniques for data quality monitoring at the CMS detector

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The CMS experiment employs an extensive data quality monitoring (DQM) and data certification (DC) procedure. Currently, this approach consists mainly of the visual inspection of reference histograms which summarize the status and performance of the detector. Recent developments in several of the CMS subsystems have shown the potential of computer-assisted DQM and DC using autoencoders, spotting detector anomalies with high accuracy and a much finer time granularity than previously accessible. We will discuss a case study for the CMS pixel tracker, as well as the development of a common infrastructure to host computer-assisted DQM and DC workflows. This infrastructure facilitates accessing the input histograms, provides tools for preprocessing, training and validating, and generates an overview of potential detector anomalies.

Experiment context, if any

CMS (CERN)

References

Poster and proceedings at PM2021: <https://cds.cern.ch/record/2815415?ln=en>Public CMS note: <https://cds.cern.ch/record/2812026?ln=en>

Significance

We show how machine learning or other computer-assisted techniques can be applied for data quality monitoring (DQM). A case study for the CMS pixel tracker has been presented recently in a poster at PM2021. Here, the intention is to focus more on the general infrastructure and strategy to enable machine learning assisted DQM across all CMS subdetectors.

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