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Outlier detection in heavy-ion collisions with unsupervised learning

Saturday, 5 September 2020 16:30 (25 minutes)

High energy nuclear collision experiments produce large amounts of data which are often challenging to handle. We present machine learning algorithms using unsupervised learning to find so-called outlier events which might occur e.g. due to detector malfunction or imperfect centrality determination. Their detection can be crucial for the correct determination of sensitive observables. We implement and compare Principle Component Analysis (PCA) and Autoencoders (AEN) which both are dimensional reduction algorithms. Training data is provided from the UrQMD transport model with artificially generated outliers due to wrong centrality determination, detector malfunction, and general data loss. A Receiver-Operating-Characteristic curve allows us to compare the performance between different models and different selection criteria. The results show that for the selected application, the reconstruction error criterion is most suitable for outlier detection tasks. Furthermore, the number of encoded dimensions significantly influences the performance of outlier detection tasks. A small number of total parameter that still keeps enough significance appears best suited to separate outlier and signal events.

Is this abstract from experiment?

No

Internet talk

Yes

Name of experiment and experimental site

N/A

Is the speaker for that presentation defined?

Yes

Details

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