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(G*) Training electron identification CNN in real data

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Electron objects are used in a large fraction of ATLAS publications. Better identification implemented in the electron triggers would allow to lower their transverse momentum threshold and increase their acceptance. In particular, analysis with many electrons in the final state such as the ones studying the Higgs, the W boson or Beyond de Standard Model phenomena can suffer from large, sometimes dominant, fake or non-prompt electron background and would benefit from improved electron identification.

To address this problem, our group developed a convolutional neural network (CNN) to identify electrons in ATLAS. Our CNN shows significant improvement in performance when compared to the algorithms currently used in ATLAS for electron identification. Our first iteration of the CNN is trained using a Monte Carlo simulation (MC) sample, and we aim to improve even further the performance by designing a real data sample to train our CNN on.

With that goal in mind, we study a real data sample pure in background electrons and compare it to the MC we used for training the first CNN. We show that such sample can be obtained by applying various trigger, and transverse energy and pseudo-rapidty cuts. We show that the distributions of the various high level input variables differs between the two datasets, particularly at low transverse energy. We then find similar results when comparing the mean calorimeter images of each dataset.

We conclude that the low transverse energy region is imperfectly modelled by the MC and thus, training a CNN in real data should yield substantial improvements in performance.

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Keyword-2

ATLAS

Keyword-3

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