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Electron identification with a convolutional neural network

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The identification of electrons plays an important role in a large fraction of the physics analyses performed at ATLAS. An improved electron identification algorithm is presented that is based on a convolutional neural network (CNN). The CNN utilizes the images of the deposited energy in the calorimeter cells around the reconstructed electron candidates for each of the electromagnetic and hadronic calorimeter layers. In addition, the CNN algorithm utilizes as input features the same high-level variables that are used by the likelihood (LLH) and deep neural network (DNN) algorithms currently used in ATLAS, as well as the information of up to five inner detector tracks that are matched to an electron candidate during its reconstruction. The CNN algorithm results in a significant improvement in identification performance, corresponding for example to an improvement in background rejection of factors of about 3 to 10 with respect to the LLH algorithm for its " Loose"working point, depending on the pseudorapidity and transverse momentum of the electron candidate.
Reference:
Electron Identification with a Convolutional Neural Network in the ATLAS Experiment, ATLAS Collaboration

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