Sistema Anelador para a Filtragem Online Baseada em Calorimetria do Detetor ATLAS

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The Atlas detector is the biggest of the LHC experiments. As a general purpose apparatus, one of it's goals is to prove the existence of the Higgs Boson. One valuable thing is to detect electrons because they are strong indicators of important interactions. This environment has a high event rate and a Trigger system is necessary to discard events that aren't interesting for further physics analysis.
In this context, the HLT Ringer is a set of algorithms that aims on detecting electrons on the second level of the ATLAS trigger using the calorimeter system. It is divided on two parts: feature extraction and hypothesis testing. The first part is responsible for representing the interaction using a ring based topology: it uses the most energetic cell of each calorimeter sampling as the center ring of each sampling and builds rings around these centers. It then accumulates the energy of the cells that belongs to each ring. At the end of this process, a total of 100 ring sums is available for the hypothesis testing part, which normalizes these values and propagates them through a neural network classifier: when the output of the network is above a given threshold, the interaction indicates a good electron candidate.
Studies indicate that Ringer can imply best false alarm rates with comparable or better efficiency rates from the ATLAS baseline algorithm. In order to make it even more suitable for the real execution of ATLAS, optimizations guided by detailed time performance analysis of the Ringer algorithm were made and it now has a execution time more than 50