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CaloMonitoringShiftInstructions

Note

For offline shift, please follow instructions described at Shifters Offline

Introduction

The CaloMonitoring package consists of software tools aimed at monitoring properties of cells, clusters and towers in the ATLAS calorimeters at the full reconstruction level. The goal is to provide input to assessment algorithms that will give fast feed-back on the quality of cells and clusters/towers at all steps of data taking: from cosmics ray signals to single beam and collisions resulting from the operation of the LHC.

The currently available tools are:

- CaloCellVecMon: providing extensive set of distributions for the properties of fully reconstructed CaloCells per each layer of the calorimeters
- CaloClusterVecMon: providing set of distributions for the properties of CaloClusters
- CaloTowerVecMon: providing set of distributions for the properties of CaloTowers

Important Mailing Lists

Additional more general sources of info are

1. hn-atlas-DataQuality@cern.ch: the general atlas data quality list
2. hn-atlas-data-quality-operations@cern.ch : the data quality operation list (used during the full dress rehearsal exercise, not very much used now)
3. atlas-dq-automatic-notifications@cernNOSPAMPLEASE.ch
4. atlas-data-preparation

DQAlgorithms

Description

This algorithm relies on our expectation of at least approximate ϕ symmetry by looking for cells that are significant outliers within the distribution of bins at the same η. The code for the algorithm ism in the dqm_algorithms package (BinsDiffByStrips.cxx and BinsDiffByStrips.h). Specifically, the algorithm takes all bins from a given strip in eta, uses an iterative technique to estimate the mean and standard deviation of the values of the bins in the strip once outlier bins are removed (as well as their statistical error). It then assigns a quality flag (**red**, **yellow**, **green**, or **Undefined**) to each bin in the strip based on the size of its relative deviation from the mean value of the strip and its uncertainty.

Specifically

BinDeviation = (BinValue - StripMean) / StripVariance .

where BinValue is the value of the property under consideration in the given bin, StripMean is the average value of the property over all the bins of the strip, StripVariance is the standard deviation calculated from the values of the bins of the given strip, Sigma_CellDeviation is the uncertainty on BinDeviation calculated by propagating the errors from BinValue, StripMean and StripVariance. A bin will be labeled

- **red**: if BinDeviation > RedThreshold + 5 * Sigma_BinDeviation.
- **yellow**: If BinDeviation > GreenThreshold + 5 * Sigma_BinDeviation
- **green** : if BinDeviation < GreenThreshold - 5 * Sigma_BinDeviation
- **undefined** : if Abs(BinDeviation - GreenThreshold) < 5 Sigma_BinDeviation

The logic hierarcy for a given histogram assessment is as follows. If there is one or more red bin, the flag for the overall histogram is red, otherwise if there is one or more yellow bin, the histogram is yellow, otherwise, if more than half the cells in the histogram are Green, it's status will be Green or, if not, Undefined.

In addition an algorithm that clusters problematic bins (clustered problematic region) is also implemented. By default the clustering works as follows.

If a bin passes a SeedThreshold (which is default equal to the Red threshold) then it seeds a cluster (these clusters are used for publishing purposes only in the default setup, they define a region of cells that are problematic but since the requirement is that they be seeded by a red cell, the dq result for the histogram would already be red even if no clustering was done). If any neighboring bins to the seed bin pass the threshold to be added to a cluster, GrowthThreshold , they are added. Because of the way histograms are binned in root, we are guaranteed that all bins have exactly eight nearest neighbors (unless they are on an edge of the histogram which is not mapped to another edge, such as the upper and lower eta bounds of an eta-phi histogram). By default, GrowthThreshold is set to be equal to the green threshold, that is, any bin that has a clustered binl as a nearest neighbor that would be published separately as yellow will instead be merged into the cluster. The BinDeviation value assigned to a cluster is simply the sum of the deviations from all of the bins contained within that cluster.

The results of the algorithms are reported for each histogram being tested.

DQ Assessment strategy for and

Clusters and Towers provide an overall summary quality image of the whole calorimetry. Histograms taken from the CaloClusterMon folders and from the CaloTowerMon folders are used to assess the quality of the data. For each main DQ region one super-folder is defined that contains three folders. Each folder contains a certain number of plots. Three super-folders are available: CaloMonBAR (DQ assessment for the Barrel, |eta|<1.5), CaloMonECA (DQ Assessment for the EndCapA, eta in (1.5,5]), CaloMonECC (DQ Assessment for the EndCapC, eta in [-5,-1.5)). Each super-folder contains 4 subfolders

- CaloTopoClusters[BAR/ECA/ECC] : selection of plots from CaloClusterVecMon
- CombinedTowers[BAR/ECA/ECC] : selection of plots from CaloTowerVecMon
- EMTopoClusters[BAR/ECA/ECC] : selection of plots from CaloClusterVecMon

Instructions for DQ assessment of CaloClusters and CombinedTowers (flags)

The DQ assessment uses the results of the DQ tests performed on the plots produced by the different tools and configured in DQMF (offline) and DQMD (online). The offline and online configurations are currently set up to be the same.

Shifters Offline

Perform a Single Run Asssessment

#The shifter is expected to act according to the following instructions

- Go to the ATLAS Data Quality Monitoring Point of Entry.
- Under the heading Data Quality Tools go to DQ Web Displays,Tier 0 Histograms.
- Go to the run number you have chosen and click on the *express-express* link. (if stream name is express_express***, it means the datafile is not ready yet, and you need wait.)
- Go to the *Entire Run* link and navigate the DQ web display folder to *CaloMonitoring* and then down to *CaloMonShift*.
- The three super-folders available are
    - CaloMonBAR (DQ assessment for the Barrel, |eta|<1.5),
    - CaloMonECA (DQ Assessment for the EndCapA, eta in (1.5,5]),
    - CaloMonECC (DQ Assessment for the EndCapC, eta in [-5,-1.5))

- Each super-folder corresponds to a DQ flag in the general ATLAS Data Quality assessment. The automatic tests already provide an assessment that is visible in the DQ web display (red,yellow,green). The shifter is supposed to report the results of the automatic assessment and any additional features that are resulting from visual inspection.

- Perform the DQ Assessment for each super-folder (BAR/ECA/ECC)
- Go to the *Defect Database* link as in this example for run 209995

- Go to Upload, open *CALO*, for each item listed, go through the corresponding plot in CaloTopoClusters. During visual inspection, if you find spots with much higher energy or population than the rest in the same eta bin, report defect is present, and list the coordinate of the spot in comment line. When the bulk is checked, if the defect seen in ES1 disappears, report defect is absent. (**Password:CaloDq**)
- after checking all plots listed in Upload _Calo, go to Sign_off_a_run, choose CALO or CALO_BULK as system depending on whether you are are looking at ES1 (pass 1) or Bulk (pass 2). (Password:CaloDq)
- go to the logbook, click "Sign-Off Day" link of the run you just assessed, and then enter new comment (make sure choose the right process: ES1 or Bulk) :
- Subject: CaloGlobal is OK if all partitions(CALB, CALEA, CALECC) are fine, otherwise CaloGlobal: problem in XX (XX is the partition which has hot spots)
- Systems: CaloGlobal
- Comment: For each part(CALB, CALEA, CALEC), if no intolerable defects exist, report as OK. Otherwise, list the coordiante of intolerable defects (no need to list tolerable ones) and the corresponding plot link.

Below is how we define **tolerable** and **intolerable** defect where (X={CALB, CALEA, CALEC})

- **Intolerable**:
  - CALO_X_TopoClusterNoise_ET10 at least 1 noisy cell in the plot of number of clusters with cluster transverse energy cut > 10 GeV
  - CALO_X_TopoClusterNoise_ET15 at least 1 noisy cell in the plot of number of clusters with cluster transverse energy cut > 15 GeV
  - CALO_X_TopoClusterNoise_ET20 at least 1 noisy cell in the plot of number of clusters with cluster transverse energy cut > 20 GeV
- **Tolerable**:
  - CALO_X_TopoClusterNoise_E5 at least 1 noisy cell in the plot of number of clusters with cluster energy cut > 5 GeV
  - CALO_X_TopoClusterNoise_E10 at least 1 noisy cell in the plot of number of clusters with cluster energy cut > 10 GeV
  - CALO_X_TopoClusterNoise_E15 at least 1 noisy cell in the plot of number of clusters with cluster energy cut > 15 GeV

- CALO_X_TopoClusterNoise_E20 at least 1 noisy cell in the plot of number of clusters with cluster energy cut > 20 GeV
- CALO_X_TopoClusterNoise_ET5 at least 1 noisy cell in the plot of number of clusters with cluster transverse energy cut > 5 GeV
- CALO_X_TopoClusterNoise_AvgE_E0 at least 1 energetic cell in the plot of average cluster energy with cluster energy cut > 0 GeV
- CALO_X_TopoClusterNoise_LowStat: low statistics
- CALO_X_TopoClusterNoise_Unknown: inaccessible info
- CALO_X_TopoClusterNoise_Disabled: calorimeter is turned off

Here is an example of an intolerable defect due to the noise burst

- If there are still some intolerable defects in defects after Bulk reprocessing, please send an email with link of the run's logbook to Khadeejah AL-Ghadeer(khadeejah.alghadeer@gmailSPAMNOTNOSPAMPLEASE.com), Jun Guo(jun.guo@cernNOSPAMPLEASE.ch) and also write an elog: choose Data Quality as message type, offline as DQtype, LArg & Tile as System Affected, and put the logbook link as content.

- Run signoff: has to enter comment on logbook before 4:00pm
- Period signoff: Signoff time is informed by email sending to <hn-atlas-DataQuality@cern.ch>, and shifter of that day is supposed to make sure that there is no intolerable defect in runs of that period before DQ meeting, and then can signoff during the meeting.
- Weekly report on Wednesday DQ meeting

Investigation of a hot spot in the plots as a function of

In the case where the Tier-0 plots are not precise enough to identify when a defects was present during a run, a set of python scripts hotSpotInTAG.py is available for further investigation , where you have many option to set your command as following:

```
python -i ~trocme/public/ForLADIeS/hotSpotInTAG.py --run=[runNumber] --stream=[stream] --eta=[eta
python -i ~trocme/public/ForLADIeS/hotSpotInTAG.py -r [runNumber] -s [stream] -e [etaPositionOfHo
```

-h, --help show this help message and exit
-r RUN, --run=RUN Run number
-s STREAMS, --stream=STREAMS
Data stream : express/CosmicCalo/JetTauEtmiss/Egamma
-a AMI, --amiTag=AMI ami Tag - Simply set x/f to choose express/bulk processing
-e ETA, --eta=ETA Eta of hot spot
-p PHI, --phi=PHI Phi of hot spot (or MET bump)
-t THRESHOLD, --treshold=THRESHOLD Et/pt threshold (in MeV)
-d DELTA, --delta=DELTA Distance to look around hot spot (or MET bump)
-o OBJECT, --object=OBJECT TopoCluster/Jet/LoosePhoton/TauJet/MET
-m MIN, --min=MIN Min number of object in a LB
-n, --noplot Do not plot LB map
-l, --larcleaning Ignore LAr cleaning to find hot spot

Here an example of an investigation of a hot spot in the run 210308 in the region (eta,phi) = (0.45,2.90) Setup Athena on lxplus node :asetup 17.2.X.Y-VAL,rel_2, here

```
python -i ~trocme/public/ForLADIeS/hotSpotInTAG.py --run=210308 --eta=0.45  phi=2.9
```

where you will get the following message

```
Investigation on run 210308/express stream with ami TAG f

I found /castor/cern.ch/grid/atlas/tzero/prod1/perm/data12_8TeV/express_express/00210308/data12_8

I have looked for LBs with at least 5 TopoCluster in a region of 0.10 around (0.45,2.90) and Et/P
The LArCleaning (LArEventInfo != ERROR) for noise bursts has been activated
LB: 613 -> 295 hits (LAr flag in this LB : 28 veto / In these events : 0 Std / 0 SatTight)
LB: 614 -> 176 hits (LAr flag in this LB : 0 veto / In these events : 0 Std / 0 SatTight)
```

Responsible KhadeejahALghadeer

Reviewed by: Dr.Lee Sawyer, Jun Guo.

-- KhadeejahALghadeer - 08-Oct-2012

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