Machine Learning Jet Images

THIAGO TOMEI

UNESP

Reproducing the results of the paper

Jet-images: computer vision inspired techniques for jet tagging

- doi:10.1007/JHEP02(2015)118

Algorithm: jets as images

Calorimeter-based approach

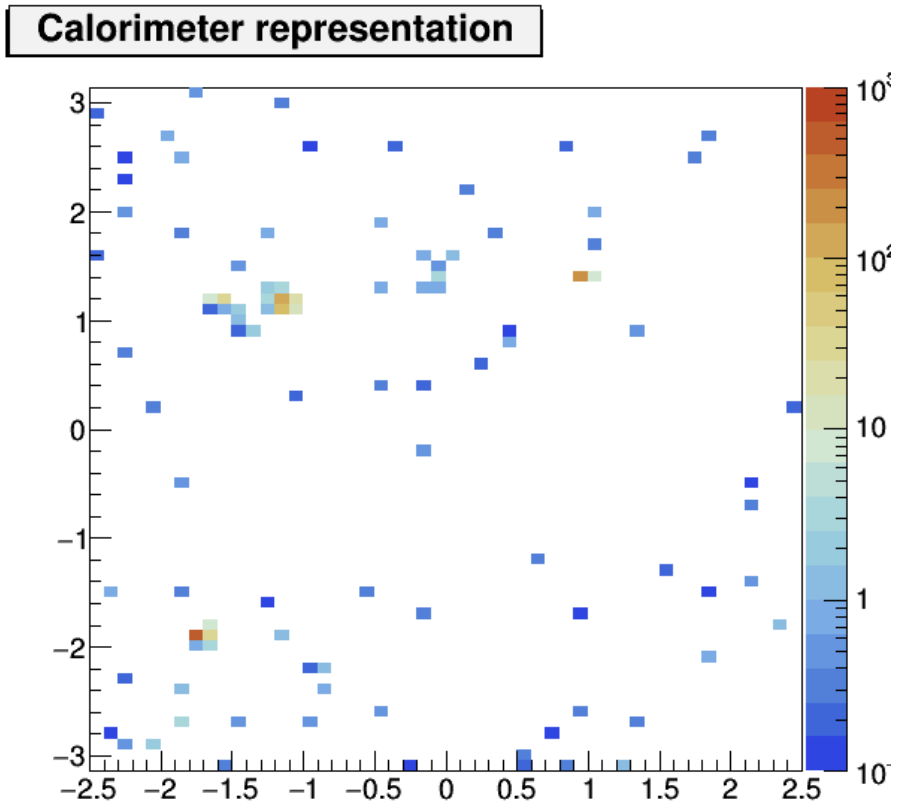
- Calo towers: dEta X dPhi = 0.1 X 0.1, spanning eta = [-2.5, 2.5] , phi = [-pi, pi]
- Each calo tower is considered a pixel
- All images have same dimensionality
- Information used per pixel is the total deposited transverse energy

Jet algorithm

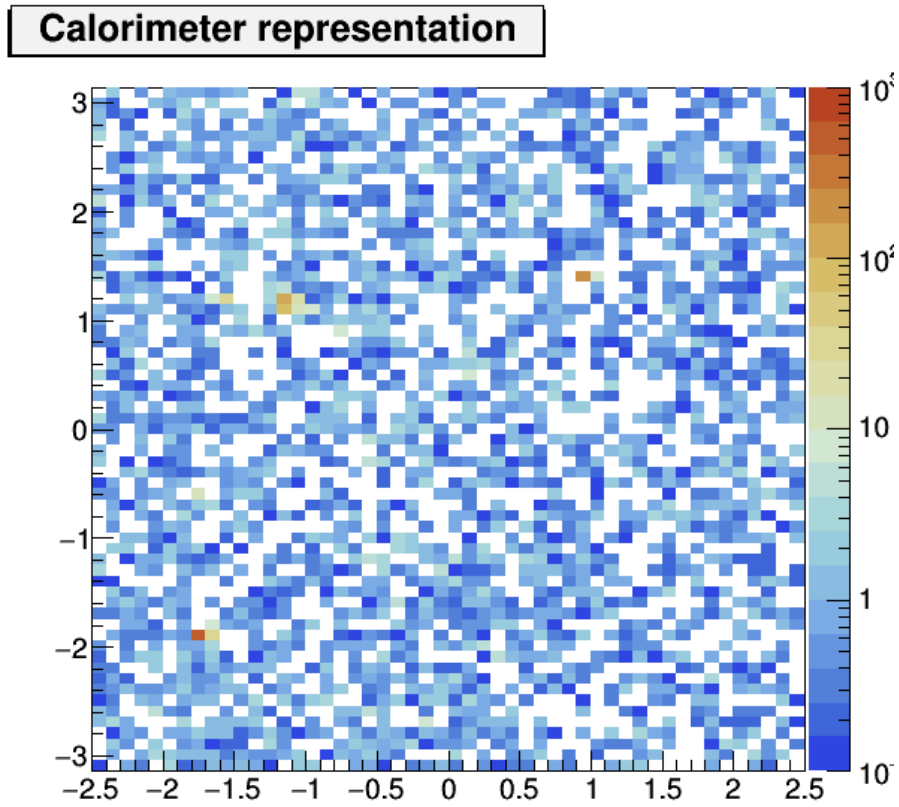
- Anti-kt, R = 0.8
- Find jet based on massless calo towers
- Save cell coincident with jet axis plus +-8 towers in each direction

Full calorimeter

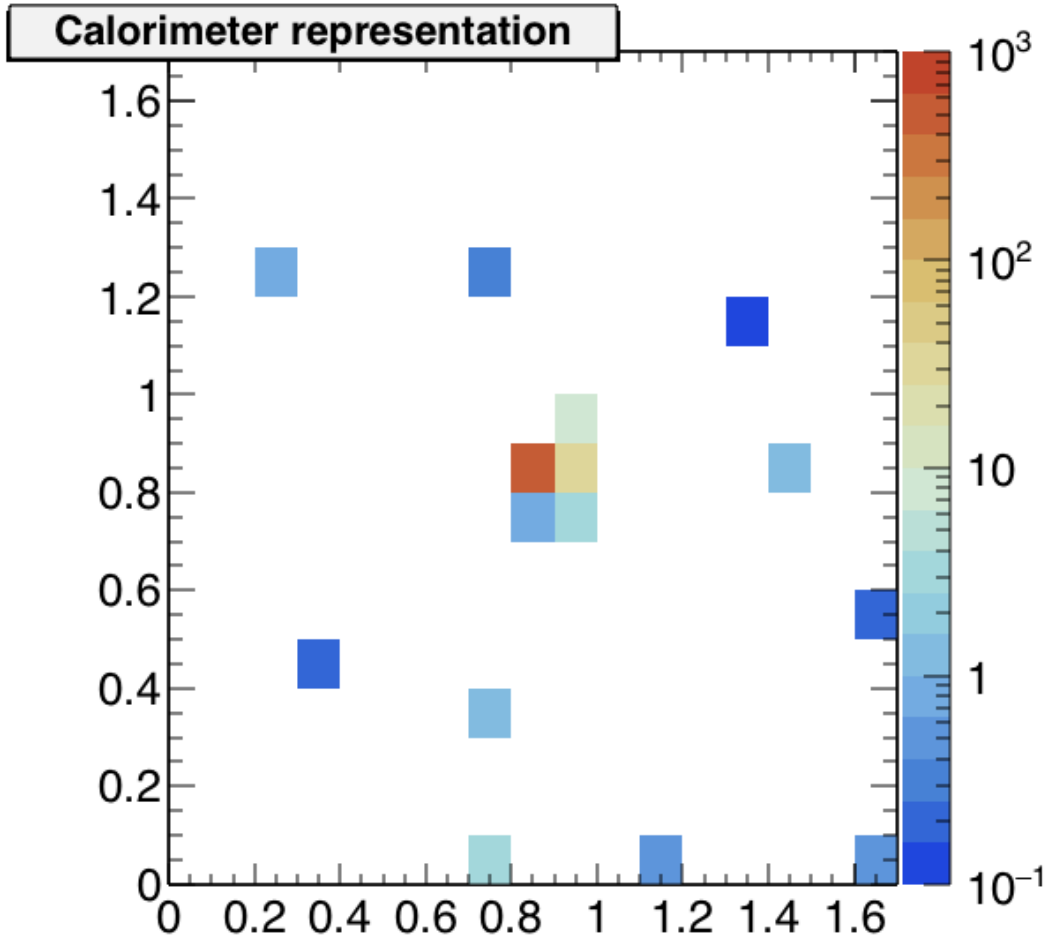
No PU



PU 30



Single jet



Code is added in ML-fatjets

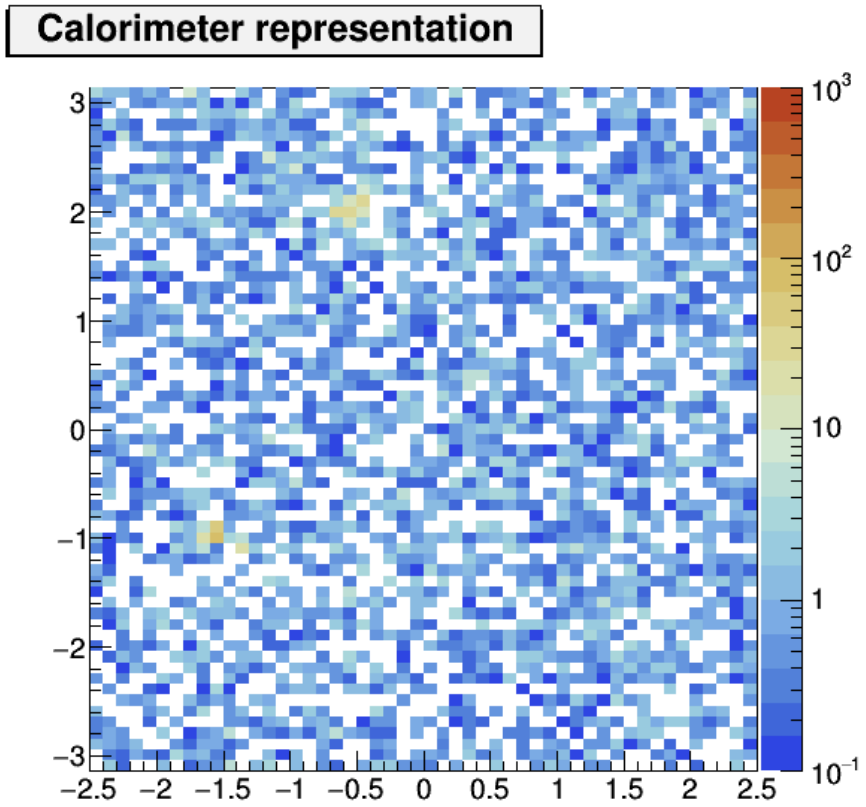
- generateJetImage.cc (standalone executable)
  - Depends on ROOT, Pythia8, FastJet
- drawCaloJet.C (ROOT macro)

Next steps (preprocessing)

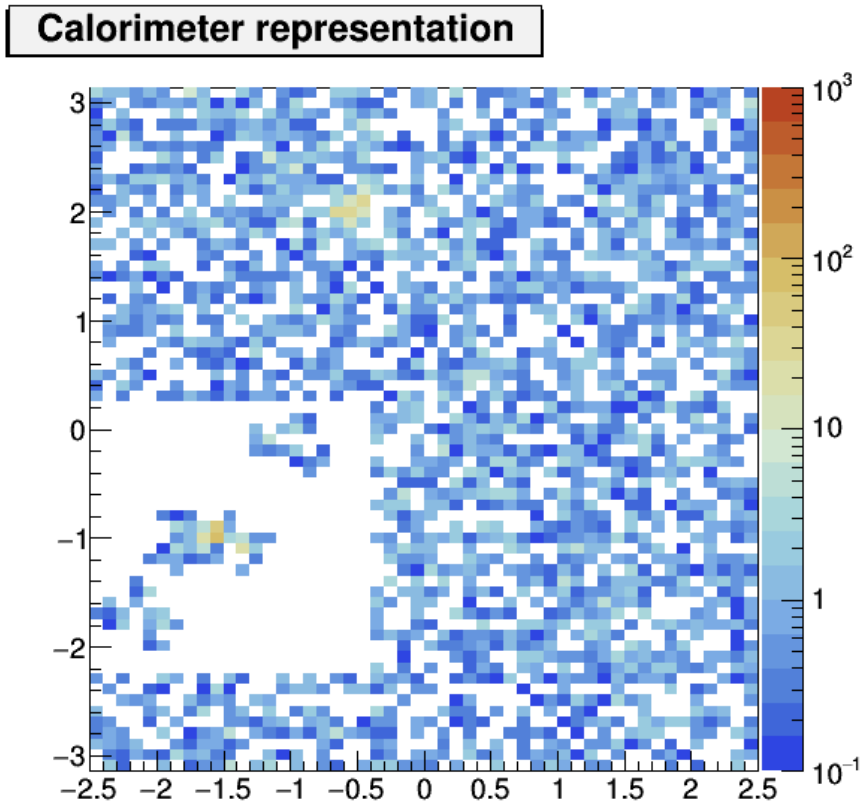
- Noise Reduction
- Point of Interest Finding
- Alignment
- Equalization
- Binning

Cambridge-Aachen 1.2, PU=30

Standard view

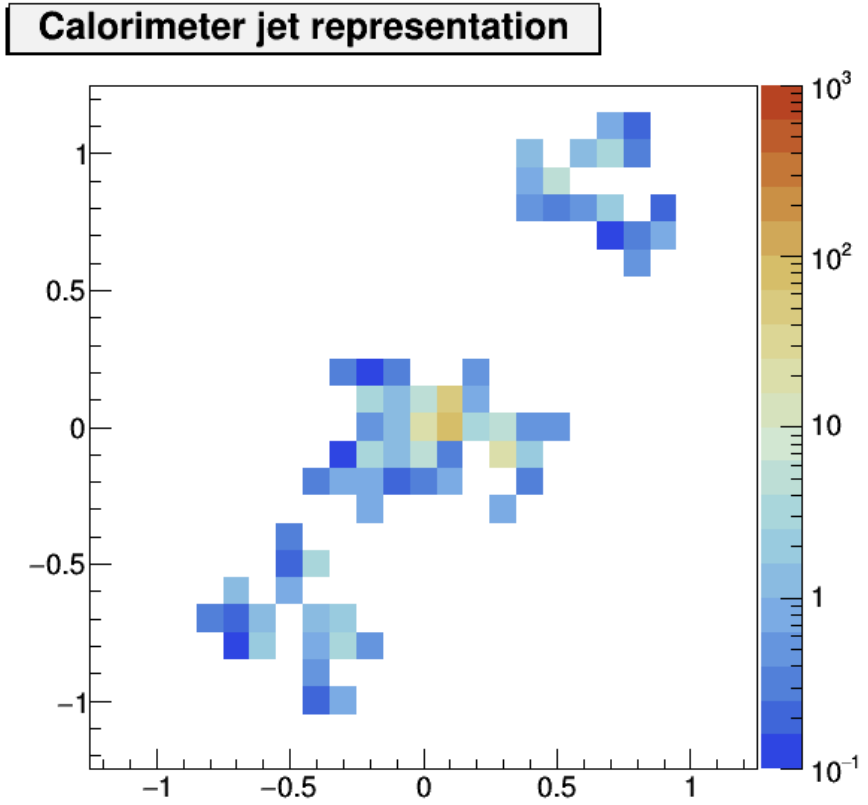


After noise reduction

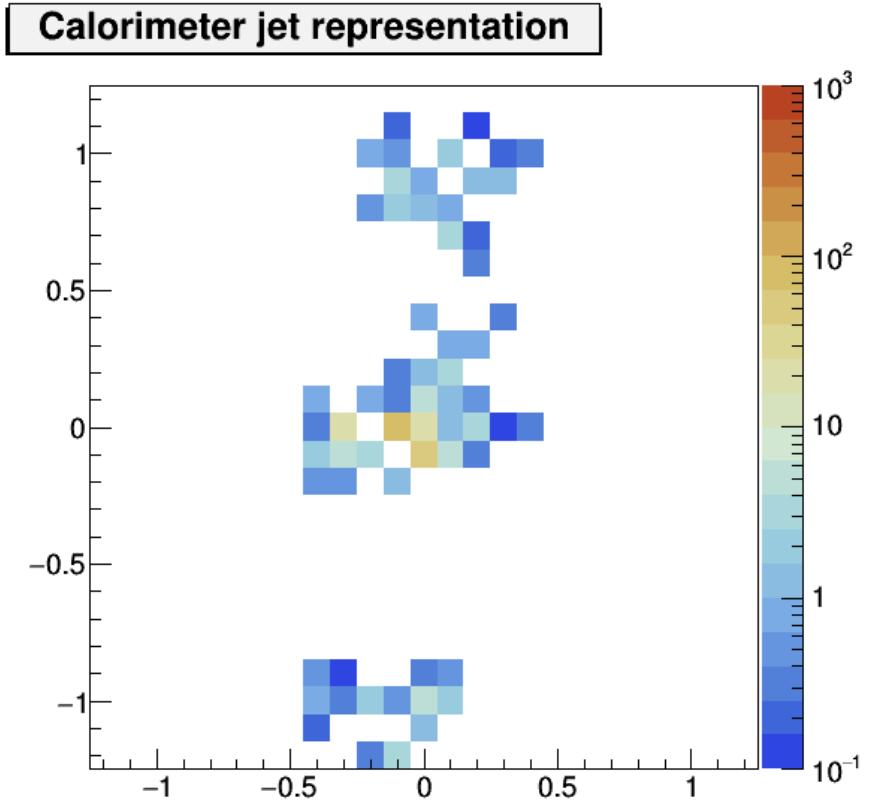


Preprocessing (1)

Translate to local jet coordinates

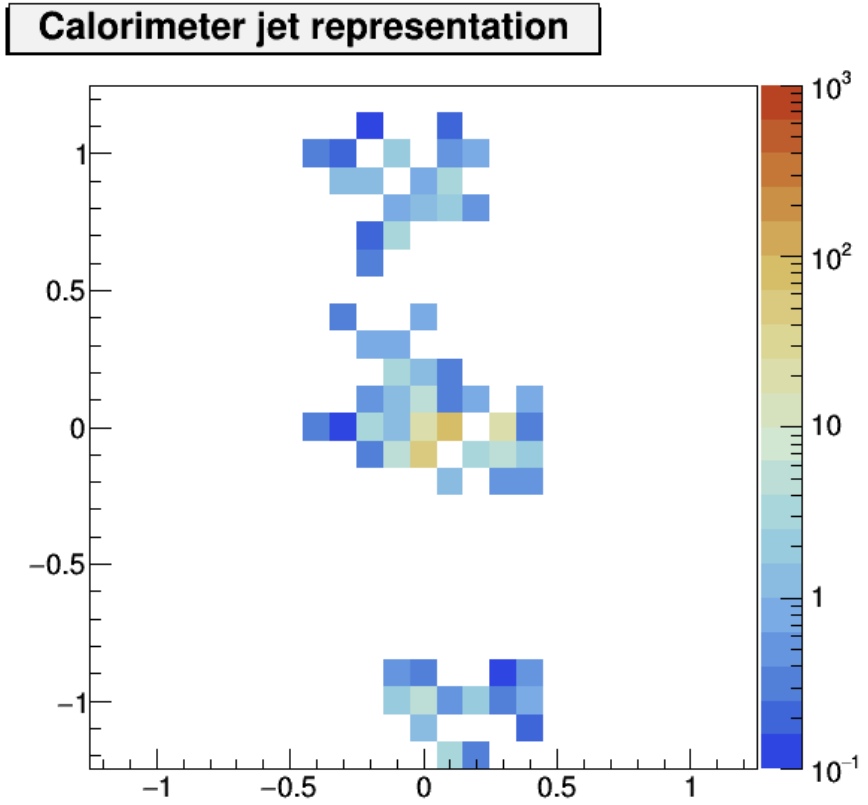


Rotate and align

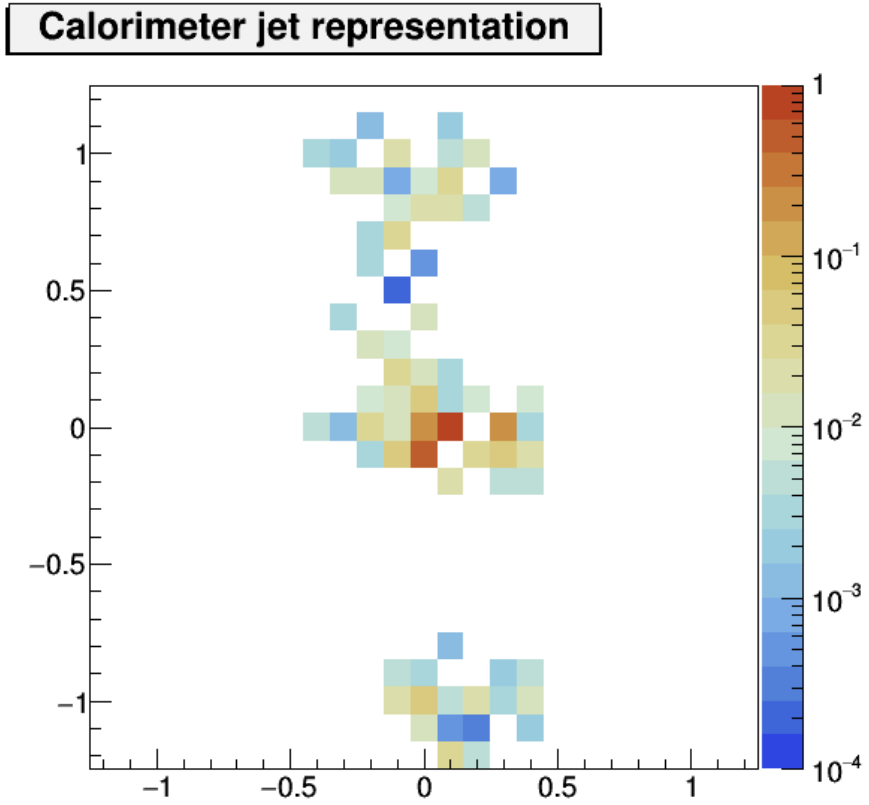


Preprocessing (2)

Reflect in vertical axis



Normalize



Next steps

Run to make big samples

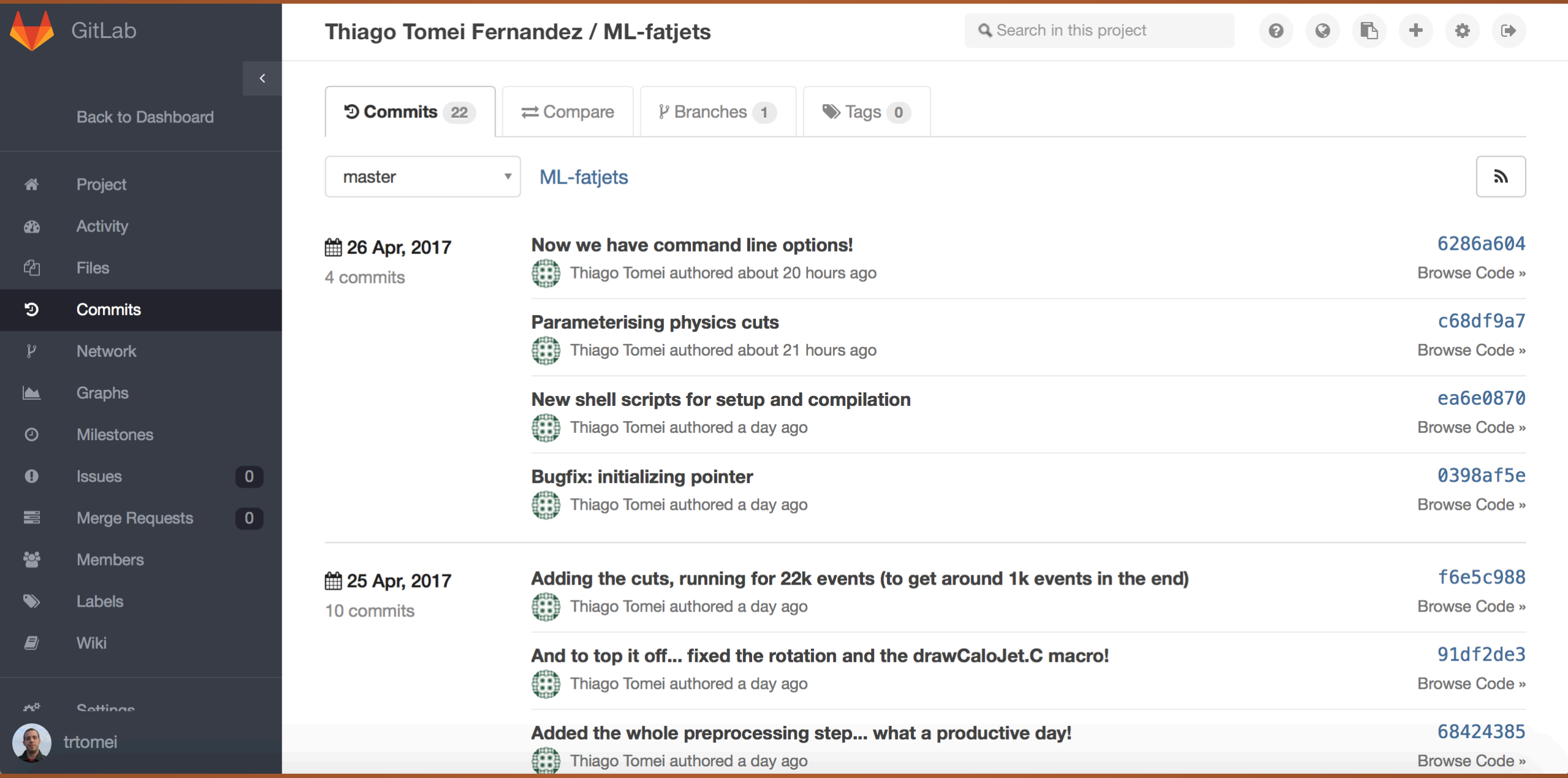
- Background and signal

Implement the Fisher Linear Discriminant (to follow the paper)

Implement the neural network

Three-way comparison

- FLD vs NN vs n-subjetiness


GitLab
Back to Dashboard
Project
Activity
Files
Commits
Network
Graphs
Milestones
Issues 0
Merge Requests 0
Members
Labels
Wiki
trtomei
Thiago Tomei Fernandez / ML-fatjets
Search in this project
Commits 22
Compare
Branches 1
Tags 0
master
ML-fatjets
26 Apr, 2017
4 commits
Now we have command line options!
Thiago Tomei authored about 20 hours ago
6286a604
Browse Code »
Parameterising physics cuts
Thiago Tomei authored about 21 hours ago
c68df9a7
Browse Code »
New shell scripts for setup and compilation
Thiago Tomei authored a day ago
ea6e0870
Browse Code »
Bugfix: initializing pointer
Thiago Tomei authored a day ago
0398af5e
Browse Code »
25 Apr, 2017
10 commits
Adding the cuts, running for 22k events (to get around 1k events in the end)
Thiago Tomei authored a day ago
f6e5c988
Browse Code »
And to top it off... fixed the rotation and the drawCaloJet.C macro!
Thiago Tomei authored a day ago
91df2de3
Browse Code »
Added the whole preprocessing step... what a productive day!
Thiago Tomei authored a day ago
68424385
Browse Code »