
CaloChallenge

- Please don't delete things that other people add
- Please make sure your name is next to the question, like this [Graeme]

Introduction

- Example question [Ben]

CaloChallenge

- After slide 8, shared the following links:
 - <https://zenodo.org/record/6368338>
 - Pion validation dataset hopefully ready in next few weeks
 - <https://zenodo.org/record/6366271>
 - <https://zenodo.org/record/6366324>
 - Larger showers: split into multiple files
 - <https://github.com/CaloChallenge/homepage/blob/main/code/HighLevelFeatures.ipynb>
- Evaluation:
 - Sampling (generating showers) can be done in batches
 - Slide 12:
<https://github.com/CaloChallenge/homepage/blob/main/code/Evaluation-visualization.ipynb>
 - Histograms not currently shown in notebook, but written to files
 - This notebook compares the 2 datasets (training and validation), so e.g. separation power values are small by design
 - Some still to be added (e.g. classifier) in next weeks
- Leaderboard or interface for public evaluation? [Alexander]
 - Just local evaluation foreseen currently [Claudius]
 - For ML4Jets competition, send model & evaluate using a separate dataset not provided to participants [Claudius]
 - Would a leaderboard be good for motivation? [Claudius]
- Classifiers: how will they be made available? Framework, weights, etc. or just a black box? [Alexander]
 - Intention to include classifier training in the evaluation for each participant, to ensure that it looks at all inputs, correlations, etc. [Claudius]

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- Only condition is energy? [Fedor]
 - Yes [Claudius]
 - W/ varying geometry, response will depend on particle angle of incidence, etc.; why not considered? [Fedor]
 - Geometry always centered at 0 with respect to incident particle, perpendicular to particle direction [Claudius]
 - For ATLAS dataset, there is an angle: particle points to zero, but geometry around $\eta = 0.2$; but all particles have same angle [Michele]
 - ATLAS fast sim has a different GAN for each η slice, not conditioned on η [Claudius]
 - Simplification for challenge, or realistic for experiments? [Fedor]
 - Dataset 1 taken directly from ATLAS, other datasets generated separately but tried to be realistic
 - Quality metrics: focused here on distributions integrated over whole dataset, but for real fast sim, need correct per-event production. Are any per-event characteristics considered in evaluation? [Fedor]
 - What kind of event-by-event features? [Claudius]
 - E.g. shower width, depends on energy; easy to produce showers with correct width, but harder to produce correct stochastic behavior of widths; look at distributions separately by energy [Fedor]
 - Can do this easily for dataset 1, which has discrete energies. Could add fixed energies for datasets 2 and 3 to facilitate this [Claudius]
 - Data presented in voxelized form that is not necessarily related to calorimeter geometry [David]
 - Are voxels larger granularity than detector itself? [Fedor]
 - Depends: in core of shower, similar granularities; farther away, voxels become larger (coarser) [Michele]
 - Shower width is more macroscopic feature, should still reproduce well regardless of voxel size [Michele]
 - Can correct for offset in particle angle/direction; this is what is done in ATLAS [Michele]
 - Matching voxels to detector cells is done in ATLAS, but is beyond scope of this challenge: implementation is detector-specific [Michele]
 - Datasets 2,3 are independent from detector granularity [Anna]
 - ML world sometimes calls this “surrogate modeling”: goal is not to model microscopic physics à la Geant (though doing that fast would be great), but rather to model entire population. W/ proper conditioning (here just energy), really would act as surrogate without needing to understand underlying physics [David]

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- Goal of voxelization is to make the model detector-independent so it can be extended to other regions [Michele]
 - Dataset 2,3 voxelization is done based on the particle, i.e. dynamic for each event [Anna]
 - High-level features: energy per voxel, which is known to be hard to reproduce b/c requires low-energy fidelity. Histogram w/ one entry per voxel (can have some minimum energy threshold) [Kevin]
 - Not included yet, but can be considered [Claudius]
 - Need log x scale to view it properly [Kevin]
 - Also shower longitudinal distribution: i.e. quantities that are parametrized in GFLASH [Kevin]
 - Would be nice to show feature histograms in notebooks [Kevin]
 - Want to add this [Claudius]
 - Evaluation: send model files or hdf5 files? [Kevin]
 - Thinking about latter, but might be good to get full model somehow to run speed test on same hardware [Claudius]
 - Might need a container or conda environment to get right versions of ML frameworks etc. [Kevin, Claudius]
 - Can GPU be used for inference? Should specify exact hardware/architecture for speed test [Fedor]
 - Using Titan architecture for local tests, should be specified for challenge [David]