KMI School 2020 Wrap-Up Session Challenge A: Particle Image Classifier

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Working on Challenge A

In the first attempt, using CNN+BN structure: Conv2D->BN->LeakyRelu->....>DownSampling to 12x12

Test set accuracy mean 0.9565284653465347 std 0.024345942194906114







• Using 90% of training sample to train the CNN, and the rest 10% as validation sample to run inference and softmax score checks.

• Recording training every 2500 iterations, in total 70000.

• The difference in classification performance is not due to insufficient training.

Working on Challenge A



- Muon and proton have higher energy (> 100 pix) and better concentrated, meanwhile electron and photon have lower and broader energy distribution.
- Compared to muon, proton data has larger stddev, indication of "hot pixels"?
- The track length seems to be close among the 4 categories, with electron and photon being slightly more varied. But there is no check of clustering or continuity in the track length plot->no sensitivity to a single "clean" trajectory or "shower-like" tracks.

175

150





Working on Challenge A

- Adding residual connection by ResNet seems to improve the performance in e/gamma PID (the same in Challenge-A-ExampleTrain.ipynb)
- But why? Instead of a uniform stride 1 in a basic CNN, ResNet adds extra information from stride 2 scanning. So this helps to enhance the coherent features and suppress the outliers?

CNN+BatchNorm







ResNet

Something we like about the School:

- Thanks to all the speakers, for giving inspiring and enjoyable talks this week! And thanks to LOC for organizing this amazing event!
- advanced details for the experienced.
- The hands-on tutorials are wonderful!

Something we'd like to see more:

scale of lectures would help.

• It's great to have the materials being prepared in such a way that contains both basics for beginners and

• Having small project groups helps to build up connections and improves the learning curve for everyone.

• As beginners, sometimes we find it a little bit hard to catch up with the lectures. Probably extending the time