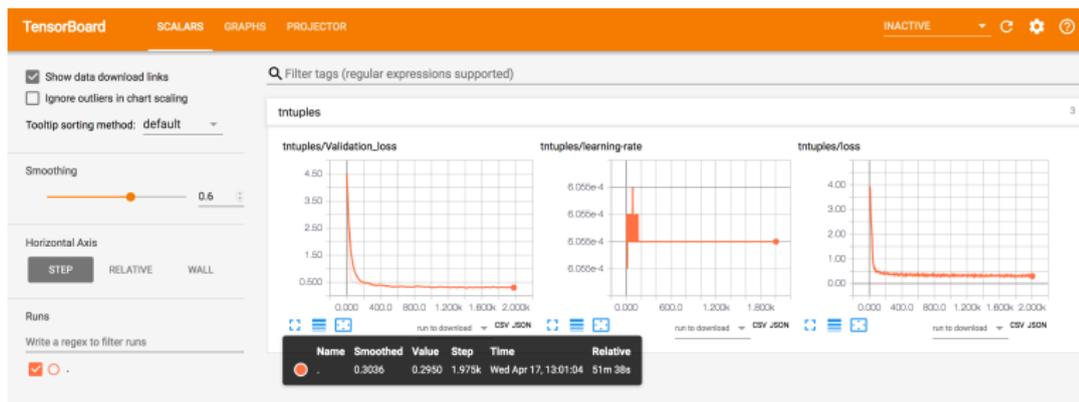


GPU enabled Particle Reconstruction using Graph Neural Networks

April 17, 2019

DAY 3: PROGRESS

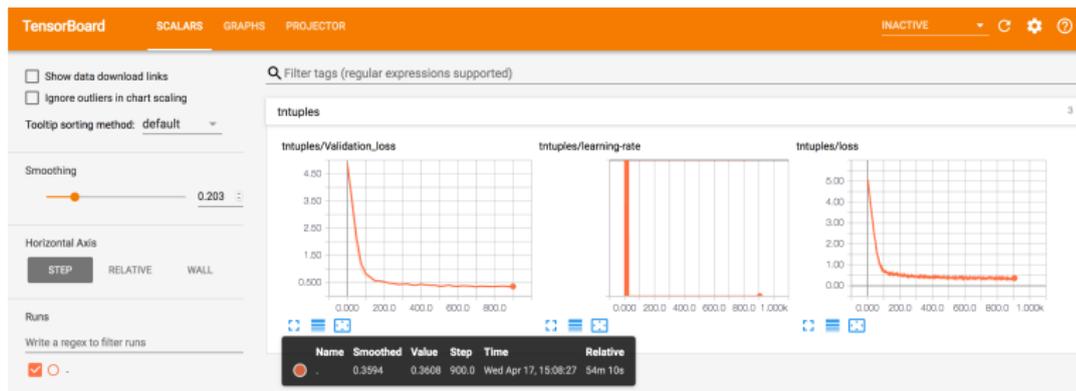
► Initial training results



- This shows the training loss going down to 0.29 (not great but it's a start; 2000 iterations) for the GNN model with Batch Size 64, Learning Rate 0.0004

DAY 3: PROGRESS

► Initial training results



- This shows the training loss going down to 0.35 (900 iterations) for the model with Batch Size 128, Learning Rate 0.0002

DAY 3: INSIGHTS

- ▶ Principled exploration into hyperparameter tuning: there are different ways of doing this although they require significant time and effort. These range from brute-force or grid search to Bayesian optimization.
- ▶ We need to evaluate what properties we can introduce to make it more interpretable. For example, the idea of tracks as centroids in the rechart space is one.
- ▶ Faster training for the models would be nicer. Could be interesting to compare GTX 1080Ti performance versus the V100s for this use-case.

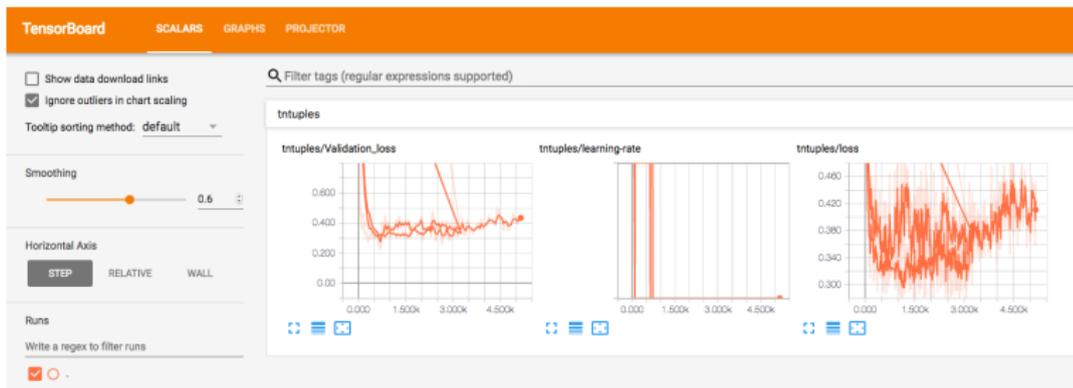
DAY 3: FUTURE WORK

- ▶ Project the tracks and seeds to a common space and improve the clustering by using the tracks as centroids for the clusters. This is a more intuitive way of looking at the problem.
- ▶ MOAR DATA! Since data is generated from simulations, it would be interesting to see how the same model performs (and at what point it overfits) with increasing data.

SLIDES ALREADY PRESENTED

DAY 2: PROGRESS

► Initial training results



- (this is a sample image from one of the trainings because the one I actually wanted to show crashed before I could take save it)

DAY 2: PROGRESS

- ▶ What does the image mean?
- ▶ Represents the loss for the GNN training on Tracking Data
- ▶ Exponential decay causes the variation in learning rate
- ▶ The lighter lines above/below represent the change of the minima/maxima with time.

PROBLEMS FACED IN CURRENT APPROACH

- ▶ Training GraphNets is computationally expensive
- ▶ Graph based data structures which are optimized for GPUs

DAY 1 : PROGRESS

- ▶ Discussion with the NVIDIA team to explain our project and issues regarding training/code optimization
- ▶ Initial training results

