ATRAPP Meeting

Thesis Planning

Jeremy Couthures

Official ITk plots

1) **Move the Hashing code to core:**

    1) Move the code to core (local) ✓

    2) Make the code compile ✓

    3) Ensure same results than before ✓

    4) Pull request

2) **Link ACTS+Hashing version in Athena (TWiki)**

3) **Edit seeding tool (in Athena) with Hashing**

4) **Reproduce official plots (with Florencia):**

    Athena:

      1) Default

      2) ACTS

      3) ACTS SSS only

      4) ACTS PPP only

5) **Reproduce the plots with Hashing (Eff + CPU)**

Next

1) Get the data from GNN people (SP and truth) (Alexis) (**Dumped files**) (**Dumping code**)

2) Train NN (using **acorn**? It can already read the dumped files)

Planning (Part 1)

1. Data:

- 1: Redo the official ITk plots inside Athena (03/04/2024)
- Plan A: Use only the space points and the associated truth particles from GNN people (05/04/2024)
- Plan B: Use Acorn (A Charged Object Reconstruction Network) (gitlab) with Athena samples (12/04/2024)

2. Architecture:

- Plan A: Define the architecture for the model and be able to train it (12/04/2024)

3. Training: (Try to get as much details as possible: learning curve, hyper parameters, ...)

- Plan A: Have a model with "good performances" (to be defined) (26/04/2024)

Planning (Part 2)

4. Model analysis:

– Plan A: Identification of relevant neurons through the analysis of their activation:

  • variation of the values of the activations on the data → no variation = not a variable (= constant) (correspond to the dependency of the neuron with respect to the input values) (Neural activation pattern) (10/05/2024)

  • Permutation Importance on the activations of the neurons to evaluate the impact on the prediction (score) (31/05/2024)

– Plan AB: Direct analysis of the neurons:

  • Network Dissection method (correlation between the values of the neurons and physics variables)

  • Symbolic regression with pySR on the output neurons (and relevant neurons if found) and the relation with physics variables

– Plan ABC: Global analysis of the model:

  • Identification of the data-flow inside the model

  • Search for symmetries inside the network

5. Result analysis:

– What worked, what did not? (list)

– Issues, potential solutions

– Relevance of the results (Are they useful?) (do they bring something?) (can they be used?)