Machine Learning per la Fisica Applicata e la Fisica delle Alte Energie

Lezione 22: Considerazioni generali

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20 dicembre 2022

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X. Further reading and project ideas

We've only just touched the surface of the subject here and there are a much wider range of application than we have considered

Don't forget to checkout the tensorflow and kaggle tutorials

https://www.tensorflow.org/tutorials

https://www.kaggle.com/learn

Also included there are a wide variety of datasets (physics or otherwise) that you can use to find inspiration

X. Further reading and project ideas

- understanding the techniques in the course: ability to choose the right tool for the problem at hand
- technical skills: demonstrate some ability to extend code from the given examples
- presentation skills: clearly explain ideas in 15 mins demonstration

NB: no requirememnt to be original research

There are also plenty of extensions of the simple example we have considered here

Neural Networks for scattering amplitudes

- NN for hadron collider amplitudes. What happens when we go from e^+e^- to pp?
- Can we improve the loss function to enhance collinear regions?
- Are we using the right input parameters? 4-momenta vs kinematic invariants

Classifiers

- Particle identification with Boosted Decision Trees (new techniques to learn here of course…)
- Explore underfitting and overfitting (c.f. https://www.tensorflow.org/tutorials/keras/overfit_and_underfit)
- CNNs for galactic images (plenty of data availbale e.g. https://astronn.readthedocs.io/en/latest/#)