

Python-based Frameworks for KM3NeT

Wednesday 20 March 2019 09:30 (45 minutes)

This talk focuses on three frameworks developed by the KM3NeT collaboration: KM3Pipe, aanet and OrcaNet. KM3Pipe is a Python-based pipeline framework which is used to modularise different kinds of processes and workflows like data analysis, detector monitoring and ML training in the KM3NeT neutrino telescope experiment. Although it contains many implementations of project specific data formats and API, in its core it provides a generic and lightweight pipeline mechanism which also includes logging and basic profiling. One of its key features is the HDF5 file support which is tightly integrated with a handful of classes.

KM3NeT's offline data format is based on ROOT. The C++ data structures of the aanet framework have been designed with Python in mind from the start. Via the PyROOT binding, seamless interplay between C++ and Python code is possible, using the former for high-performance computation and the latter for high-level data analysis. Facilities also exist to use the C++ data structures with numpy with minimal overhead.

OrcaNet is a deep learning framework based on Keras in order to simplify the training process of multiple neural networks for astroparticle physics. It incorporates automated logging, plotting and validating during the training as well as saving and continuing the training process.

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Session Classification: Wednesday