Contribution ID: **169** Type: **Oral**

A method for inferring signal strength modifiers by conditional invertible neural networks

Tuesday, 25 October 2022 16:40 (20 minutes)

The continuous growth in model complexity in high-energy physics (HEP) collider experiments demands increasingly time-consuming model fits. We show first results on the application of conditional invertible networks (cINNs) to this challenge. Specifically, we construct and train a cINN to learn the mapping from signal strength modifiers to observables and its inverse. The resulting network infers the posterior distribution of the signal strength modifiers rapidly and for low computational cost. We present performance indicators of such a setup including the treatment of systematic uncertainties and highlight the features of cINNs estimating a signal strength for HEP-data on simulations.

Significance

Evaluating trained cINNs is ultrafast and gives remarkable precision in reproducing arbitrary probability distributions from Gaussian distributions. Thus cINNs can be used for inference (ref. below). As a new approach to inference in HEP we construct a cINN, include systematic uncertainties, and present benchmark results using a typical simulated Higgs-plus-backgrounds physics case.

References

Inference of cosmic-ray source properties by conditional invertible neural networks, EPJC 82 (2022) 171

Experiment context, if any

Simulations of CMS Experiment

Primary authors: ERDMANN, Martin (Rheinisch Westfaelische Tech. Hoch. (DE)); FARKAS, Mate Zoltan (Rheinisch Westfaelische Tech. Hoch. (DE)); EICH, Niclas Steve (Rheinisch Westfaelische Tech. Hoch. (DE)); DIEKMANN, Svenja (Rheinisch Westfaelische Tech. Hoch. (DE))

Presenter: FARKAS, Mate Zoltan (Rheinisch Westfaelische Tech. Hoch. (DE))

Session Classification: Track 2: Data Analysis - Algorithms and Tools

Track Classification: Track 2: Data Analysis - Algorithms and Tools