

DisCo: Robust Networks and automated ABCD background estimation

Friday 23 October 2020 15:50 (20 minutes)

With the wide use of deep learning in HEP analyses, answering questions beyond the classification performance becomes increasingly important. One crucial aspect is ensuring the robustness of classifier outputs against other observables - typically an invariant mass. Superior performance in decorrelation was so far achieved by adversarial training. We show that a simple additive term in the loss function based on a differentiable measure for independence termed distance correlation (DisCo) can achieve state-of-the-art performance while being much simpler to train. A key experimental application that relies on independent observables is the ABCD method for background estimation. We show that DisCo can be used to automatically construct a pair of powerful and independent classifiers that significantly improve performance in terms of ABCD closure, background rejection, and signal contamination.

Based on 2001.05310 and 2007.14400

Authors: KASIECZKA, Gregor (Hamburg University (DE)); NACHMAN, Ben (Lawrence Berkeley National Lab. (US)); SCHWARTZ, Matthew; SHIH, David (Rutgers University)

Presenter: SHIH, David (Rutgers University)

Session Classification: Workshop

Track Classification: 2 ML for analysis : Application of Machine Learning to analysis, event classification and fundamental parameters inference