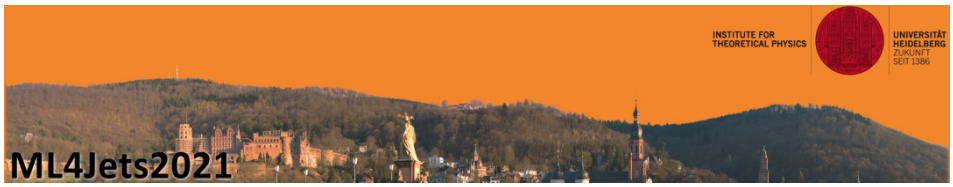

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Thoughts on the expressive power and inductive bias of DeepSets and Tree-Based models

Thursday, July 8, 2021 4:20 PM (20 minutes)

Nearly five years ago we introduced tree-based recursive NN models for jet physics, which intuitively reflected the sequence of 1-to-2 splittings found in a parton shower. Subsequently, tree-based models like JUNIPR were developed as (probabilistic) generative models that could be used for classification and reweighing. One result that somewhat undermined the narrative of the connection between the inductive bias of the architectures and the underlying physics for this class of tree-based models was that they continued to perform well even if the jet algorithm that was used did not reflect the underlying physics of the parton shower (eg. anti-kT, a simple pT ordering, or a 2d-printer). Later, even simpler models based on DeepSets were introduced that focused on permutation invariance and performed without reference to the underlying showering picture at all. In this talk I'd like to revisit these two forms of inductive bias for models for jets from a new perspective. In particular, I will discuss the expressive power of these network architectures, their connection to the jet clustering algorithm, and make some predictions for experiments that will be conducted over the coming months.

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