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JETFLOW: Generating jets with Normalizing Flows using the jet mass as condition and constraint

Tuesday 25 October 2022 11:00 (30 minutes)

In this study, jets with up to 30 particles are modelled using Normalizing Flows with Rational Quadratic Spline coupling layers. The invariant mass of the jet is a powerful global feature to control whether the flow-generated data contains the same high-level correlations as the training data. The use of normalizing flows without conditioning shows that they lack the expressive power to do this. Using the mass as a condition for the coupling transformation enhances the model's performance on all tracked metrics. In addition, we demonstrate how to sample the original mass distribution with the use of the empirical cumulative distribution function and we

study the usefulness of including an additional mass constraint in the loss term. On the JetNet dataset, our model shows state-of-the-art performance combined with a general model and stable training.

Significance

Significance: The contribution demonstrates that Normalising Flows with Rational Quadratic Splines can model high-dimensional data efficiently (i.e. stable training and state-of-the-art performance) when global features (mass) are used for conditioning the transformation.

References

Reference: The study uses the public JetNet dataset: https://zenodo.org/record/4834876 and arXiv:2106.11535

Experiment context, if any

None

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