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# Flexible conditional normalizing flow distributions over manifolds: the jammy-flows toolkit

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Recently, conditional normalizing flows have shown promise to directly approximate the posterior distribution via amortized stochastic variational inference from raw simulation data without resorting to likelihood modelling.

In this contribution, I will discuss an open-source GitHub package, "jammy_flows", a pytorch-based project which comes with many state of the art normalizing flows out of the box and is taylor-made for this physics use case. It includes normalizing flows for different manifolds like Euclidean space, intervals, the probability simplex or spheres - the latter one being in particular important for directional distribution modelling. Joint probability distributions over multiple manifolds can be easily created via an auto-regressive structure that is taken care of internally without extra work by the user. The calculation of information geometric quantities like entropy, KL-divergence based asymmetry measures and convenience functions for coverage checks are also available. Finally, I will showcase an application of conditional NFs for neutrino event reconstruction in the IceCube detector.

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