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Title: Flexible Tails for Normalizing Flows

Abstract:

A normalizing flow represents a probability distribution as a parametric transformation of a simple base distribution. Many transformations have been proposed involving neural networks, which allow a wide range of probability distributions to be modelled. Applications include density estimation, data generation and approximate Bayesian inference (e.g. via variational inference).

We consider normalizing flows to represent heavy tailed distributions. Most previous work has used a heavy tailed base distribution. However this can result in extreme values being passed to neural networks, which produces poor performance. Instead we propose a normalizing flow layer which can convert Gaussian tails to heavy tails or vice versa. The transformation in this layer is inspired by results from extreme value theory. We illustrate our approach on density estimation problems, including financial data.