Rejection Sampling Variational Inference

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Overview

- **Goal:** General variational inference for probabilistic models
- Reparameterization allows for low-variance gradient estimators
- But it is available for some distributions only
- We show how to extend reparameterization to other distributions

Main Idea

Every random variable that we can simulate on our computers is ultimately a transformation of elementary random variables

- In theory, this should allow for reparameterization of any distribution
- Challenge: rejection sampling steps
  - Discontinuities
  - We cannot push gradient inside integral

Main Idea

Every random variable that we can simulate on our computers is ultimately a transformation of elementary random variables

- In theory, this should allow for reparameterization of any distribution
- Challenge: rejection sampling steps
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  - We cannot push gradient inside integral
- Our approach: Marginalize out auxiliary variables
- Leverage ideas from reparameterization used in rejection sampling (60+ years of research)

Results

Model: Sparse gamma deep exponential family