

Particle-based Variational Inference for Continuous Systems

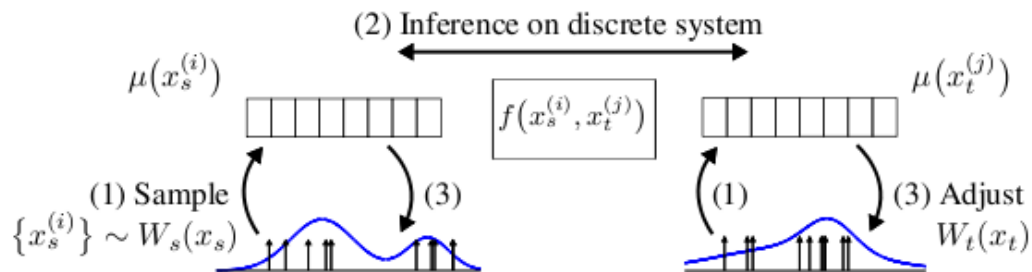
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Can we apply variational message-passing algorithms to continuous graphical models?

Yes! Use importance-reweighted discrete algorithms.

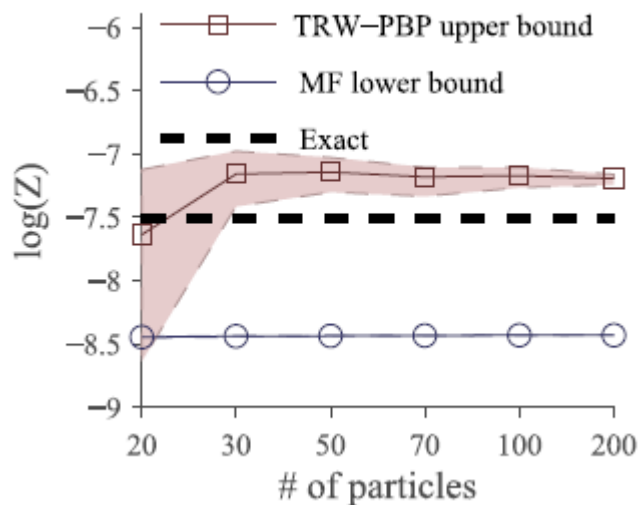
Methods within this framework can provide:

- Guarantees of convergence.
- More accurate marginal estimation.
- Upper and lower bounds on the partition function.



- (1) Draw weighted particles from each variable's domain.
- (2) Run importance-reweighted message passing over the particle discretization.
- (3) Use the new messages to adjust the sampling distributions.
- (4) Repeat.

Bounds on the partition function:



Sensor localization example:

