

Title: Expectation propagation

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Expectation propagation (EP) is a technique in Bayesian machine learning .

EP finds approximations to a probability distribution . It uses an iterative approach that uses the factorization structure of the target distribution. It differs from other Bayesian approximation approaches such as variational Bayesian methods .

More specifically, suppose we wish to approximate an intractable probability distribution  $p(\mathbf{x})$  with a tractable distribution  $q(\mathbf{x})$  . Expectation propagation achieves this approximation by minimizing the Kullback–Leibler divergence  $KL(p||q)$  . Variational Bayesian methods minimize  $KL(q||p)$  instead.

If  $q(\mathbf{x})$  is a Gaussian  $N(\mathbf{x}|\mu, \Sigma)$  , then  $KL(p||q)$  is minimized with  $\mu$  and  $\Sigma$  being equal to the mean of  $p(\mathbf{x})$  and the covariance of  $p(\mathbf{x})$  , respectively; this is called moment matching .

Applications

Expectation propagation via moment matching plays a vital role in approximation for indicator functions that appear when deriving the message passing equations for TrueSkill .

References

Thomas Minka (August 2–5, 2001). "Expectation Propagation for Approximate Bayesian Inference". In Jack S. Breese, Daphne Koller (ed.). UAI '01: Proceedings of the 17th Conference in Uncertainty in Artificial Intelligence (PDF) . University of Washington, Seattle, Washington, USA. pp. 362– 369. {{ cite book }}: CS1 maint: location missing publisher ( link )

External links

Minka's EP papers

List of papers using EP

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