

Variational Bayesian EM Algorithm For Modeling Mixtures Of

Unlike Variational Inference, EM assumes that the posterior distribution $P(Z | X, \theta)$ is computable. Unlike EM, variational inference does not estimate fixed model parameters but it is often used in a Bayesian setting where classical parameters are treated as latent variables. Now we can go back to the lower bound to explain the EM algorithm.

The Variational Bayesian EM algorithm EM for MAP estimation Goal: maximize $p(y; \theta)$ w.r.t. θ E Step: compute $q(z)$ $q(z) = p(z|y; \theta)$ M Step: $\theta^{(t+1)} = \arg\max_{\theta} \int q(z) \ln p(x; \theta) dx$ Variational Bayesian EM Goal: lower bound $p(y; \theta)$ VB-E Step: compute $q(z)$ VB-M Step: $\theta^{(t+1)} = \arg\max_{\theta} \int q(z) \ln p(x; \theta) dx$ Properties: Reduces to the EM algorithm if $q(z) = p(z|y; \theta)$

2.2. Variational EM algorithm. Variational inference is a deterministic Bayesian learning method, which formulates the problem of evaluating the posterior distribution as an optimization problem. By appropriately introducing the approximation scheme, the tractable solutions can be achieved.

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Models 16 Variational EM and K-Means Fast Quantification of Uncertainty and Robustness with Variational Bayes

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Variational algorithms for approximate Bayesian inference ...

The variational Bayesian based algorithm is applied to estimate the process noise statistics. We use a Gaussian mixture distribution to model the non-Gaussian noisy forward speed of AUV and MRS.

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In this case, we have the problem. If we cannot calculate or factorize the posterior, we cannot move on with the EM algorithm. This is where VI might come in. From EM to VI. In EM, we can learn posteriors of all variables except for the one that is learned as point estimate. So let's make it learn all variables in posteriors. For model V3, we ...

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