

## Expectation Maximization

## 1 Why

I am doing a homework on this.

## 2 Definition

Let Z and X be non-empty finite sets. We want to model a distribution  $p^{\theta}: Z \times X \to \mathbb{R}$ . We parameterize a family of distributions by a parameter  $\theta$ . We have a dataset  $(x^1, \ldots, x^n)$ . Given a parameter  $\theta^0$ , we want to solve

find 
$$\theta$$
 to maximize 
$$\sum_{k=1}^n \mathbf{E}_{p^{\theta^0}_{z|x}(z,x^k)} \left[\log p^{\theta}(z,x)\right]$$

## 2.1 Binary Gaussian Mixture Example

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