

## EXPECTATION MAXIMIZATION

## Why

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## Definition

Let Z and X be non-empty finite sets. We want to model a distribution  $p^{\theta}: Z \times X \to \mathbf{R}$ . 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

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

## Binary Gaussian Mixture Example

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<sup>&</sup>lt;sup>1</sup>Future editions will rework this sheet.

<sup>&</sup>lt;sup>2</sup>Future editions will expand.

