Семинар 5

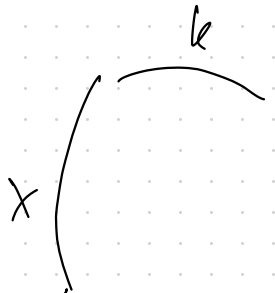
2024 курс: Генеративные модели

Семинарист: Кондратенко Владимир

1. $P(X|\theta) = \sum_{k=1}^{K} P(X|Z,\theta)\,P(Z) = \sum_{k=1}^{K} \pi_k \underbrace{N(X|\mu_k,\Sigma_k)}_{= N_k(X)}$

2. $P(X, Z|\theta) =$

dim 1..K



$P_{nk}(X,Z) = P(X_n, Z=k) = P(X_n|Z=k)\cdot P(Z=k)$

dim

$= \pi_k \cdot N_k(X)$

3. $P(Z|X,\theta) = \dfrac{P(X|Z)\cdot P(Z)}{P(X)} = \dfrac{\pi_k N_k(X)}{\sum_k \pi_k N_k(X)}$

$\theta = [\pi, \mu, \Sigma]$

E-шаг $q = p(z \mid x_n, \theta) = \frac{\pi_k \mathcal{N}_k(x)}{\sum_k \pi_k \mathcal{N}_k(x)} = \xi_{nk}$

(3)

M-шаг

$\arg\max_\theta \mathbb{E}_{q^*} \log(x_n, z \mid \theta) =$

$= \sum_k p_{q^*}(z=k) \cdot \log p(x_n, z=k \mid \theta) =$

$= \sum_k \xi_{nk} \cdot \log \mathcal{N}_k(x_n) \cdot \pi_k$

$\frac{\partial A}{\partial \pi_n} = 0$

$\frac{\partial A}{\partial \mu_n} = 0$

$\frac{\partial A}{\partial \Sigma_n} = 0$

индекс x | индекс элемента смеси