

In the notation

- first assignment step

- update the parameters

$$\Theta: \begin{cases} \mu_c \rightarrow \text{centers} \\ \sigma_c \rightarrow \text{var} \\ [\pi_c] = \frac{1}{N_c} \end{cases}$$

⚠ when updating the variances

to use  $\mu^{(k-1)}$   $\sigma_c^{(k)} = \frac{\sum r_c^i (x_i - \mu_c^{(k-1)})^2}{R_c^{(k-1)}}$

$$\mu_c^{(k)} = \frac{\sum r_c^i x_i}{R_c^{(k-1)}}$$

i) make only the update of  $\mu$

ii) the old on  $\mu$

iii) on  $\sigma$

For the algo, you have to choose

$\mu_c^{(k=0)} \rightarrow$  take it randomly uniform  $\in [-15, 15]$

$\sigma_c^{(k=0)} \rightarrow 0.5$

$\pi_c^{(k=0)} \rightarrow$  uniform  $\in [0, 1]$  and then normalize:  $\sum_c \pi_c = 1$   
 $\pi_c^{(k=0)} = \frac{1}{k}$

- Generate a dataset with  $k$  clusters

- Run the algorithm with  $k = 1 \rightarrow 8$

: you might have to do many runs for a given  $k$  & choose the highest value of  $L_k$



impose  $<$  minimum variances (e.g.  $10^{-5}$ )

