

## 2. Gradient learning rule

$$H(p||q) \int p(y|x)p(x) \quad q(x|y)q(y) \cdot x \cdot y - z_q, \tag{1}$$

 $e e Z_q$ ,  $e^+$ ,  $e^-$ 

$$p(y \quad j|x) \quad \frac{\alpha_j q(x|\theta_j)}{q(x|\Theta_k)}, \quad q(x|\Theta_k) \quad \sum_{j=1}^k \alpha_j q(x|\theta_j), \tag{1}$$

 $e e q(x|\theta_j) = q(x|y = j) \quad a = \theta_j \quad a = a \quad f \quad a = e e \quad a = \Theta_k \quad \{\alpha_j, \theta_j\}_{j=1}^k.$ 

$$H(p||q) \quad J(\Theta_k) = \frac{1}{N} \sum_{t=1}^N \sum_{j=1}^k \frac{\alpha_j q(x_t|\theta_j)}{\sum_{i=1}^k \alpha_i q(x_t|\theta_i)} = \alpha_j q(x_t|\theta_j) . \tag{(-)}$$

 $H(p||q) \quad e \quad e \quad y \quad f \quad y \quad J(\Theta_k), \quad e \quad e \quad e \quad \Theta_k, f \quad fi \quad e \quad y \quad y \quad y \quad y \quad e \quad y \quad f \quad e \quad y \quad e \quad y \quad f \quad e \quad g(k) \quad y \quad e \quad e \quad e \quad e \quad y \quad e \quad g(x|\theta_j) \quad$ 

$$q(x|\theta_j) \quad q(x|m_j, \Sigma_j) \quad \frac{1}{(\pi)^{n/||\Sigma_j|^{1/||}}} e^{-(1/||y(x-m_j)||\Sigma_j^{-1}(x-m_j))}, \tag{()}$$

$$\Delta \beta_j \quad \eta \, \frac{\alpha_j}{N} \sum_{i=1}^k \sum_{t=1}^N h(i|x_t) U(i|x_t) (\delta_{ij} - \alpha_i), \tag{1}$$

$$\Delta m_j \quad \eta \, \frac{\alpha_j}{N} \sum_{t=1}^N h(j|x_t) U(j|x_t) \Sigma_j^{-1}(x_t - m_j), \tag{)}$$

$$\Delta \Sigma_{j} = \eta \frac{\alpha_{j}}{N} \sum_{t=1}^{N} h(j|x_{t}) U(j|x_{t}) \Sigma_{j}^{-1} (x_{t} - m_{j}) (x_{t} - m_{j})^{T} - I \Sigma_{j}^{-1}, \qquad ()$$

e e

$$U(i|x_t) \sum_{r=1}^{k} (\delta_{ri} - p(r|x_t)) \quad \alpha_r q(x_t|\theta_r) + 1 \qquad zj|x$$









se ce, e concensión sec, vilente sec, e c, 0.1.

 $= - \frac{1}{2} \left( \frac{1}{2} e_{1} + \frac{1}{2} e_{2} + \frac{1}{2} e_{2}$ e, e . e, e . e . e . , , e . e . e . f. e . . . . , i.e., i.y.  $p(j|x_t)$  , fine inclusion e.e., e.e.,  $\Theta_k$  , i.e., i.e., e.e., e $(f_{i}, e_{i}) = e_{i}, e_{i$ le e e le tre e le e e le rei.

## 4. Conclusions

ne tur na ve ve ve te te frank na vye na ve eve ve v  $(1, 1, \mathbf{c}, \mathbf{c}) = (1, 1, 2, \dots, 1, \mathbf{c}, \mathbf{c}) + (1, 2, 2, \dots, 2, \mathbf{c}) + (1, 2, \dots, 2, \mathbf{c}) + (1,$ 

## References

- 1 ...  $e_{i}$ ,  $e_{i}$ ,  $\dots$   $h_{i}$ ,  $h_{i}$ ,
- (1 1) (1 1)
- ·····,····
- $f_{1} = f_{1} + f_{2} + f_{2} + f_{2} + f_{3} + f_{3$