Gaussian application to derivation

$$p(\vec{y}) = \sum_{i=1}^{M} \alpha_i p_i(\vec{y}_j | \vec{\mu}_i, \mathbf{\Sigma}_i)$$
 $\vec{\theta} = \{\alpha_1, ..., \alpha_M, \vec{\mu}_1, ..., \vec{\mu}_M, \mathbf{\Sigma}_1, ..., \mathbf{\Sigma}\}$ 

 $a_{ij}^{p} = \frac{\alpha_{j}^{p} p(\vec{y}_{i}^{(p)} | \vec{\mu}_{j}^{(p)} \mathbf{\Sigma}_{j}^{(p)})}{\sum_{i=1}^{M} \alpha_{i}^{p} p(\vec{y}_{i}^{(p)} | \vec{\mu}_{i}^{(p)} \mathbf{\Sigma}_{i}^{(p)})}$ 

$$\vec{\mu}_{j}^{(p+1)} = \frac{\sum_{i=1}^{N} a_{ij}^{p} \vec{y}_{i}}{\sum_{i=1}^{N} a_{ij}^{(p)}}$$

$$\sum_{i=1}^{N} a_{ij}^{(p)} (\vec{y}_{i} - \vec{y}_{i}) (\vec{y}_{i} - \vec{y}_{i})^{T}$$

$$\mathbf{\Sigma}^{(p+1)} = \sum_{i=1}^{N} a_{ij}$$

$$\mathbf{r}^{(p+1)} = \sum_{i=1}^{N} a_{ij}$$

$$\mathbf{\Sigma}_{i}^{(p+1)} = \frac{\sum_{i=1}^{N} a_{ij}(\vec{y}i)}{n}$$

$$\Sigma_j^{(p+1)} = \frac{\sum_{i=1}^N a_{ij} (\vec{y}i - \vec{\mu}_j) (\vec{y}i - \vec{\mu}_j)^T}{\sum_{i=1}^N a_{ij}^{(p)}}$$

$$\sum_{i=1}^{N} a_{ij}^{(p)}$$

$$\alpha_{i}^{(p+1)} = |a_{i}|$$