演習 5.24

ノートのタイトル 2014/08/09

(5.115) $\tilde{x}_i = a x_i + b$

(5.116) $\tilde{w}_{ji} = \frac{1}{a} w_{ji}$

(5.117) $\tilde{w}_{j0} = w_{j0} - \frac{b}{a} \sum w_{ji}$

(5.113) $z_j = h\left(\sum_i w_{ji} x_i + w_{j0}\right)$

(5.115), (5.116), (5.117) の変換の元で $\tilde{z}_j = z_j$ を示す

$$\tilde{z}_j = h\left(\sum_i \tilde{w}_{ji} \tilde{x}_i + \tilde{w}_{j0}\right)$$
$$= h\left(\sum_i \tilde{w}_{ji}(a x_i + b) + \tilde{w}_{j0}\right)$$
$$= h\left(\sum_i a \tilde{w}_{ji} x_i + \sum_i b \tilde{w}_{ji} + \tilde{w}_{j0}\right)$$
$$= h\left(\sum_i w_{ji} x_i + w_{j0}\right) = z_j$$

同様に $\tilde{y}_k = y_k$ を示す

(5.114) $y_k = \sum_j w_{kj} z_j + w_{k0}$

$$\tilde{y}_k = \sum_j w_{kj} \tilde{z}_j + w_{k0} \overset{(5.113)}{=} \sum_j w_{kj} z_j + w_{k0} = y_k$$

(5.119) $\tilde{w}_{kj} = c w_{kj}$

(5.120) $\tilde{w}_{k0} = c w_{k0} + d$

の変換の元で

(5.118) $\tilde{y}_k = c y_k + d$ となることを示す

$$\tilde{y}_k = \sum_j \tilde{w}_{kj} z_j + \tilde{w}_{k0} = \sum_j c w_{kj} z_j + c w_{k0} + d$$
$$= c\left(\sum_j w_{kj} z_j + w_{k0}\right) + d$$
$$= c y_k + d$$