EE7403 2021-2022 - S2

5. (a) $y_j^k = \sum_{i=1}^{9} w_{ij} z_i^k + b_j$

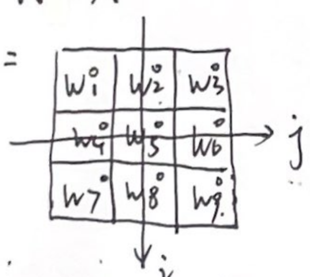
(b) $W = \begin{bmatrix} w_{11} & w_{21} & \cdots & w_{61} \\ w_{12} & w_{22} & \cdots & w_{62} \\ \vdots & \vdots & \ddots & \vdots \\ w_{19} & w_{29} & \cdots & w_{69} \\ b_1 & b_2 & \cdots & b_6 \end{bmatrix}$ $\quad y^k = W^T z^k$

(c) $z^k \rightarrow$ one pixel in X at (i, j)

$x_{ij} \longrightarrow z^{(i-1)\cdot 100 + j}$.

let $Z^k = W^o * X$

for $W^o =$



$Z^k = [z^1 \ z^2 \ \cdots \ z^{10000}]$.

according to (a) and (b).

$y_j^k = \sum_{i=1}^{9} w_{ij} z_i^k + b_j$ $\quad W^k = [w_{11}^k \ w_{12}^k \ \cdots \ w_{19}^k \ b_1^k]^T$

$y_j^k = (W^k)^T z^k$

where y_j^k is a pixel in Y_j at (i, j)

$j = \mathrm{mod}(k, 100)$ $\quad i = (k-j)/100$

y_j^k corresponds to z^k, then to x_{ij}.

We can calculate as $Y_j = (W^k)^T z^k = (W^k)^T (W^o * X)$

(d) channel = 100

one W corresponds to one pixel in one channel.

hence. there are $100 \times 100 \times 100 = 10^6$ W;

and 6×9 w_{ij} in one W, hence $6 \times 9 \times 10^6 = 5.4 \times 10^7$ w_{ij};

and 6 b_j in one W, hence 6×10^6 b_j.