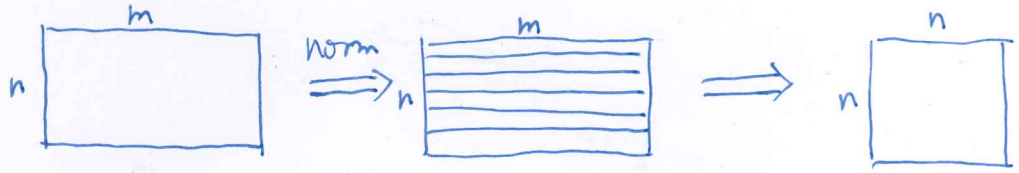
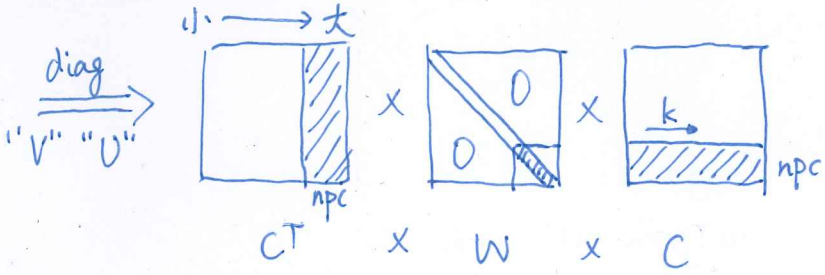
图片 A：



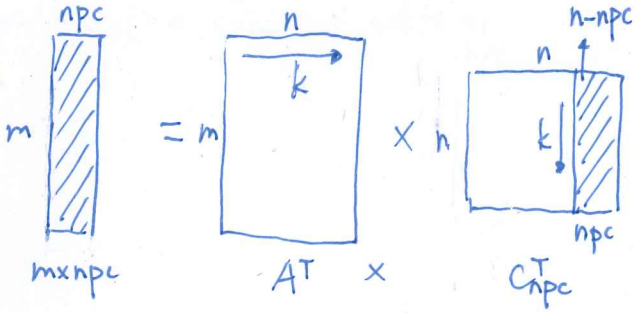
A：nxm　　$A = (A - Amean)/Avar$　　$C = Cov(A) = E\,AA^T - (EA)^2$

$= AA^T$ ：nxn



$C^T \times W \times C$

PCReduced：



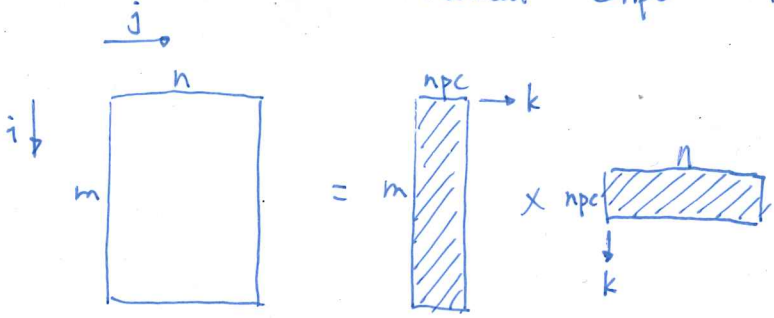
$PCReduced[i \times npc + j] = A[k \times m + i] \times C[(n - npc + j) \times n + k]$

Compress ratio：

原图：mxn

压缩：mxnpc + npcxn + 2xn = npcx(m+n)+2n

PCReduced　Cnpc　Amean Avar



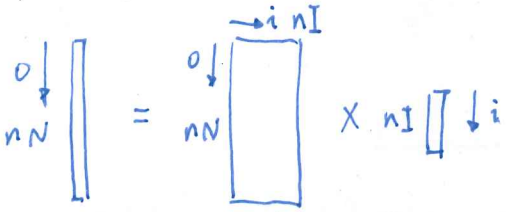
Z　=　PCReduced x C_{npc}

[ixn+j]　[ixnpc+k]　[(n-npc+k)xn+j]

$Z = Z \times Avar + Amean$

NN

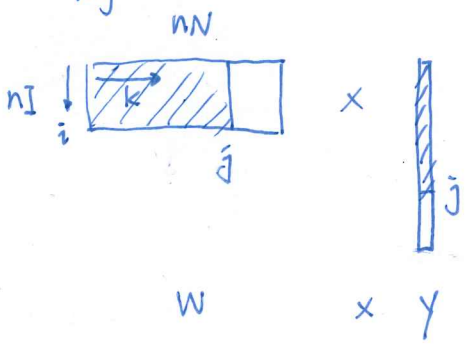
$y = w^T x$



prop.

y[0] += W^T[i x nN + 0] x X[i]

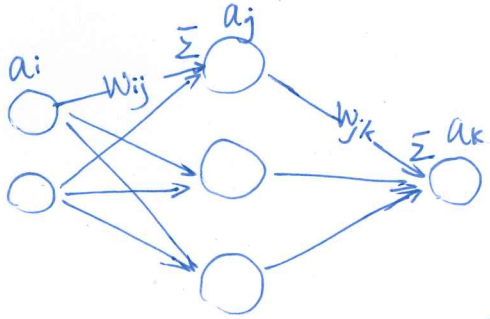
$2\sum_{k<j} y_k^i w_k^i =$



oja

o from nN-1 to 0.

in order to keep k<j unchanged.



$\frac{\partial Error}{\partial w_{jk}} = \delta_k \cdot a_j \qquad \delta_k = (a_k - t_k) \cdot g_k'(z_k)$

$\frac{\partial Error}{\partial b_k} = \delta_k$

同理: $\frac{\partial Error}{\partial w_{ij}} = \delta_j \cdot a_i \qquad \delta_j = (\sum_{k \in E} \delta_k \cdot w_{jk}) \cdot g_j'(z_j)$

$\frac{\partial Error}{\partial b_j} = \delta_j$

$dw = w \times \underbrace{\delta}_{nN}$

$db = \delta$

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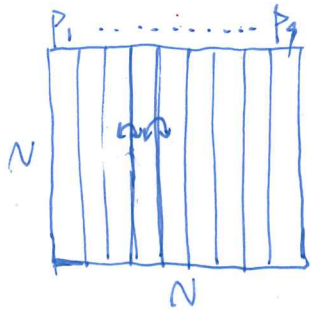
communication.



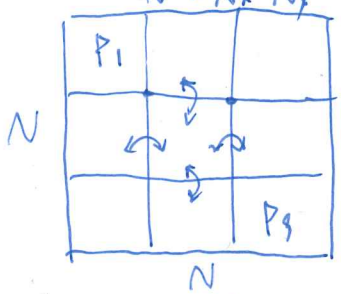
N x N.

2N for each process.

不变

$P = P_x \cdot P_y$

$N^2 = N_x \cdot N_y$



$2 \times \left(\frac{N_x}{P_x} + \frac{N_y}{P_x}\right) \sim \frac{4N}{\sqrt{P}}$

P↑ communication↓

computation

both of two $\frac{N^2}{P}$ ↓