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?
$\mathcal{X} \subset R^N \mathcal{Y} \subset R^M nX \in R^{n \times N}, Y \in R^{n \times M} X, Y0??T, U$

$X = TP^T + EY = UQ^T + F$
(1)
$T, Un \times$
$ppN \times$
$pPM \times$
$pQn \times$
$NEn \times$
MF
$?w, c[cov(Xw, Yc)]^2$

$[cov(u,t)]^2 = [cov(Xw, Yc)]^2 = \max_{\|r\|=\|s\|=1} [cov(Xr, Ys)]^2$
(2)
??u

$w = X^T u/(u^T u)c = Y^T t/(t^T t)$
$\|w\| \to 1 \qquad \|c\| \to 1$
$t = Xw \qquad u = Yc$
(3)
???

$p = X^T t/(t^T t)X = X - tp^T Y = Y - tt^T Y/(t^T t) = Y - tc^T$
(4)
$Cy_i \in$
$\{1, 2, ..., C\}, i =$
$1, 2, ..., ny_i Cy_i \to$
p^{y_i}

$p_k^{y_i} = \{1if k = y_i 0else$

??

$$Y = \begin{bmatrix} p^{y_1} \\ p^{y_2} \\ \\ p^{y_n} \end{bmatrix} = \begin{bmatrix} 1_{n_1} 0_{n_2} \cdots 0_{n_C} \\ 0_{n_1} 1_{n_2} \cdots 0_{n_C} \\ \\ 0_{n_1} 0_{n_2} \cdots 1_{n_C} \end{bmatrix}$$
(5)
$n_1, n_2, ..., n_C n =$
$\sum_{i=1}^{C} n_i$??
$_E uclidean.png$
?

$CCA : \max_{\|r\|=\|s\|=1} [corr(Xr, Ys)]^2 PLS : \max_{\|r\|=\|s\|=1} [cov(Xr, Ys)]^2$
(6)
???

$$\max_{\|r\|=\|s\|=1} \frac{cov(Xr, Ys)}{([1-\gamma_X]var(Xr) + \gamma_X)([1-\gamma_Y]var(Ys) + \gamma_Y)}$$
(7)
$0 \leq$
$\gamma_X, \gamma_Y \leq$
1

$([1-\gamma_X]X^T X + \gamma_X I)^{-1} X^T Y([1-\gamma_Y]Y^T Y + \gamma_Y I)^{-1} Y^T Xw = \lambda w$
(8)
??
??????

$$\max_{\|r\|=\|s\|=1} [cov(Xr, Ys)]^2 = \max_{\|r\|=\|s\|=1} \left\{ \sum_{i=1}^{n} (x_i^T r - \bar{x}^T r)(y_i^T s - \bar{y}^T s) \right\}^2 = \max_{\|r\|=\|s\|=1} \left\{ \sum_{i=1}^{n} [r^T (x_i - \bar{x})][s^T (y_i - \bar{y})] \right\}^2$$
(9)
??$r^T(x_i -$
$\bar{x})s^T(y_i -$
$\bar{y}), i =$
$1, 2, ..., n$
$x \in$
$R^n nS_k nkxS_k$??$d(\cdot, \cdot)$