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.
$clusters[AwA]t - SNEAwA..$
??
??
?:
?

$$\min_{R,\mu_1,\ldots,\mu_k} \sum_{n,k} r_{nk}\mathbf{x_n} - \mu_k + \beta \sum_{n=1}^{N_s} 1(\mathbf{r_n} \neq \mathbf{y_n}),$$

(1)
$\mu_1,\ldots,\mu_k$
R
β
n_s
n_s
β
$D =_D X_s - DZ_s{}^2 + \gamma D^2,$

(2)
$Z_s \in$
$R^{a \times N_s}$
X_s
γ
D
$_d efinition : D =$
$X_s Z_s^T (Z_s Z_s^T +$
$\gamma I)^{-1}.(3)$
$\ell(\mu_k) =_{u=1,\ldots,n_u} \mu_k - DC_{s(u)}{}^2$

(4)
k
$\ell(\mu_k)$
γ
$_d efinition \beta$
$_c lustering.\gamma$
??
k
β
k
$k =$
$n_s +$
$2n_u$
β
$x_1 =$
1
$\dagger$
??
R
R
mu_k
μ_k
k

$$\mu_k = \frac{\sum_{n=1}^{N_s+N_u} 1(r_{nk}=1)\mathbf{x_n}}{\sum_{n=1}^{N_s+N_u} 1(r_{nk}=1)}.$$

(5)
R
$R_{(n)} = \mathbf{1_k x_n - \mu_k}, n = 1,\ldots,N_s + N_u$

(6)
μ_k

$$\mu_k^0 = \frac{\sum_{n=1}^{N_s+N_u} 1(Y_{s(n)}=\mathbf{1_k}) \cdot \mathbf{x_n}}{\sum_{n=1}^{N_s+N_u} 1(Y_{s(n)}=\mathbf{1_k})}, 1 \leq k \leq n_s$$

(7)
?
??
X_s, X_u, Y_s, Z_s, C_u
Y_u
$k \in$
$\{1,2,\ldots,n_s +$
$n_u\}$
$n \in$
$\{1,2,\ldots,N_s +$
$N_u\}$
μ_k
$k =$
$1,\ldots,n_s$
$_m u.\mu_k$
$k =$
$n_s +$
$1,\ldots,n_s +$
n_u
$a_n \leftarrow$
$_i x_n - \mu_{i2}$
$_i \mu_\mathbf{k} \leftarrow$
$\sum_n \mathbf{x_n} 1(a_n =$
$k)/\sum_n (1(a_n =$
$k)$
$D \leftarrow$