$_report/final_report.texbeea05fanhourago@liangyyliangyyfinaldraft3contributors@liangyy@tonyabracadabra@needonatu$
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Input:
Output:

$x \in R^p V \in R^{k\times p} k < p$

$x \in R^p f : R^p \to R \hat{y} = w_0 + w^T x + \sum_{i=1}^{p} \sum_{j=i+1}^{p} v_i^T v_j x_i x_j$

$\hat{y} = w_0 + w^T x + x^T W x v_i R^k V V = (v_1, v_2, ..., v_p) \sum_{i=1}^{p} \sum_{j=i+1}^{p} v_i^T v_j x_i x_j = x^T V V^T x - x^T diag(VV^T) x = x^T (VV^T - diag(V$

$_0, w, W) = \sum_{i=1}^{n} (y^i - \hat{y}^i)^2$

$, where \hat{y} = w_0 + w^T x + x^T W x (cFMs)$

$\hat{y} = w_0 + w^T x + x^T U^T V x (gFMs) \|vec(W)\|_1 0, w, W) = f(w_0, w, W) + \lambda_1 \|W\|_{tr} + \lambda_3 \|w\|_2^2$

$L(w_0, w, W) = f(w_0, w, W) + \lambda_1 \|W\|_{tr} + \lambda_2 \|vec(W)\|_1 + \lambda_3 \|w\|_2^2$

$W l_1$

$\pi_i = \langle W, x_i x_i^T \rangle$

$w W f_1(w) \nabla f_1(w) = -X'(y - diag(XZX') - Xw) + \alpha w w^+ = w - t \nabla f_1(w) w g(W) + h(W) g(W) = \sum_{i=1}^{n} 1/2(y_i - w^T x_i - x_i^T$

$W = U \Sigma V^T \Sigma_{\beta t}$

$g(W)$

$0 < \beta < 1$

$t = \beta t$

W

$W Z W W - Z = 0 \|W\|_{tr} \|Z\|_{tr} 0, w, W, Z, u) = f(w_0, w, W) + \lambda_1 \|Z\|_{tr} + \lambda_2 \|vec(W)\|_1 + \lambda_3 \|w\|_2^2$

$+ \langle W - Z, u \rangle + m \|W - Z\|_F^2 u \in R^{p\times p} m$

@ $w_0, w, W_0^k, w^k, W^k = \arg\min_{w0,w,W} f(w_0, w, W) + \lambda_2 \|vec(W)\|_1 + \lambda_3 \|w\|_2^2$

$+ \frac{\rho}{2} \|W - Z^{k-1} + u^{k-1}\|_F^2$

@ $Z^k = \arg\min_Z \lambda_1 \|Z\|_{tr} + \frac{\rho}{2} \|W^k - Z + u^{k-1}\|_F^2$

@ $u^k = u^{k-1} + W^k - Z^k$

$w_0, w, W w_0, w W_0, w = \arg\min_{w0,w} f(w_0, w, W) + \lambda_3 \|w\|_2^2$

$W = \arg\min_W f(w_0, w, W) + \lambda_2 \|vec(W)\|_1 + \frac{\rho}{2} \|W - Z + u\|_F^2 w_0, w W W$

$w_0^0, w^0, W^0, Z^0, u^0, \rho w_0, w^k, W k = 1 > w_0^k, w^k, W^k Z^k = prox_{tr, \frac{\lambda_1}{\rho}} (W^k + u^{k-1}) u^k = W^k - Z^k$

$p 10, 30, 100, 500, 1000 W W = V^T V W = U^T V W W$

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$w_0, w, W W w_0, w W w_0, w_c urve.Thepercentagesofupdatesinthecoordinatedecentmethodsareshowninfig : argminw0wW$

$\|W - Z\|_F^2$

W

$kk U k$

W

w_0, w, W

$W W W k$

Proceedings of the 24th international conference on Machine learningJoint European Conference on Machine Learning and