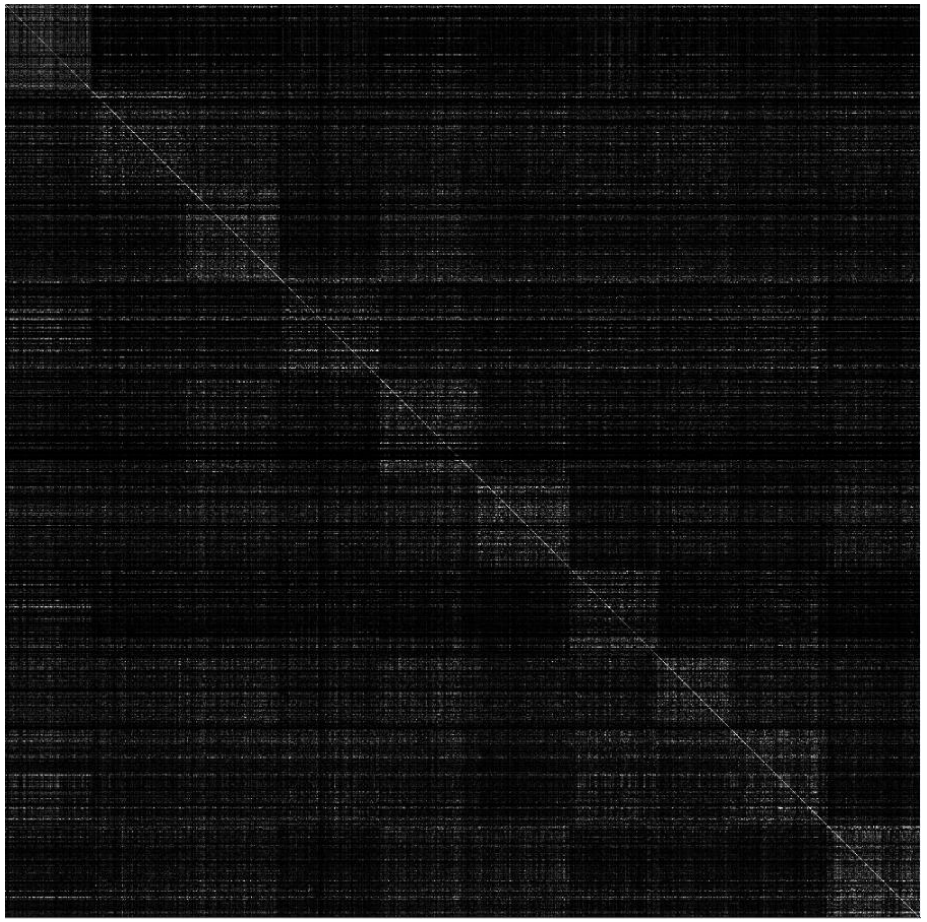
实验探究

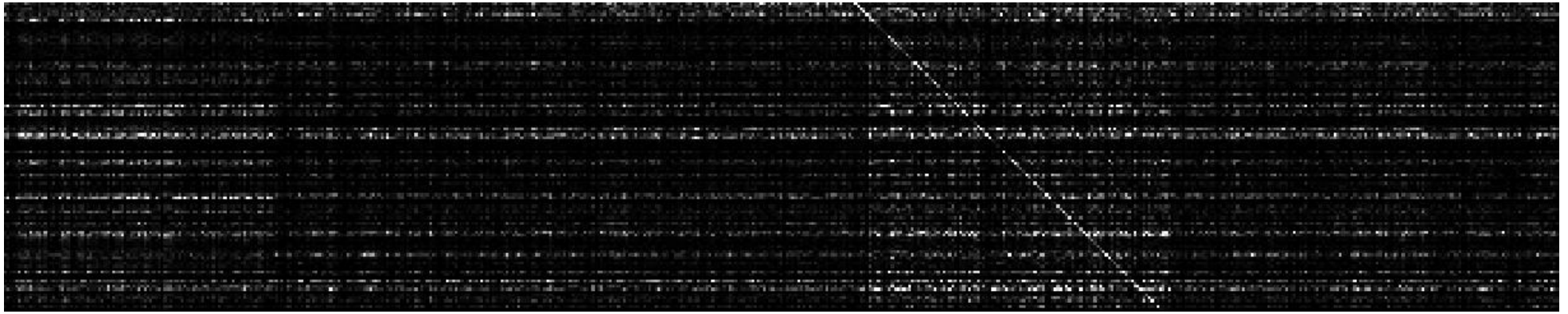


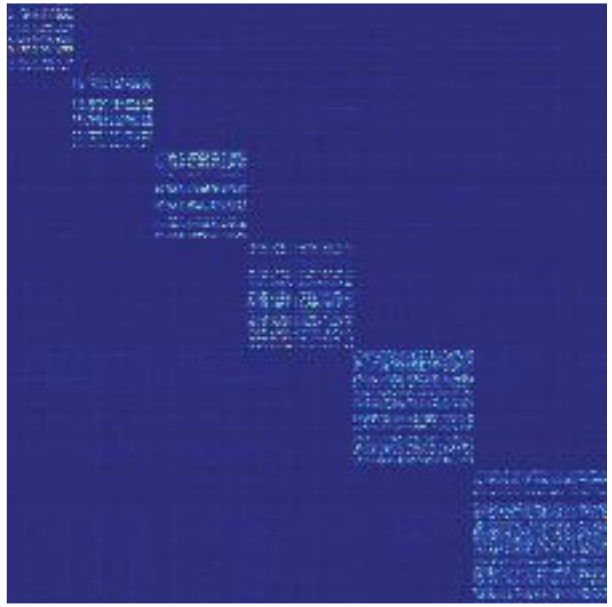
Input: The data matrix $\mathbf{X} \in \mathbb{R}^{d \times n}$.
Initialize $\mathbf{A} \in \mathbb{R}^{n \times n}$;
while *not converge* **do**

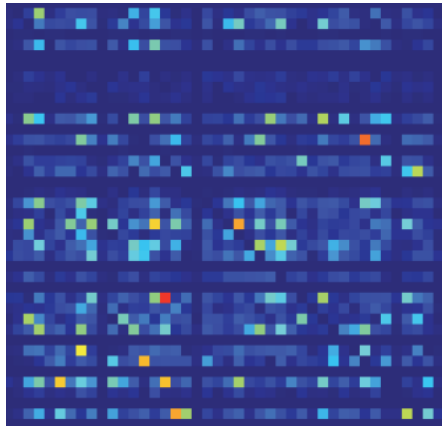
1. Calculate the diagonal matrix $\mathbf{U}$, where the i-th diagonal element of $\mathbf{U}$ is $u_{ii} = \frac{1}{2\|\mathbf{x}_i - \mathbf{X}\mathbf{a}_i\|_2}$.
Calculate the diagonal matrix $\mathbf{V}$, where the i-th diagonal element of $\mathbf{V}$ is $v_{ii} = \frac{1}{2\|\mathbf{a}^i\|_2}$. ;

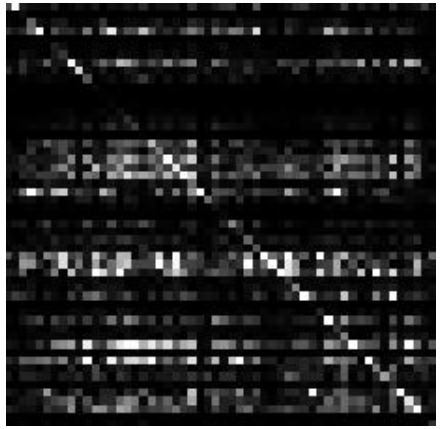
2. For each $i(1 \leq i \leq n)$, update $\mathbf{a}_i$ by $\mathbf{a}_i = u_{ii}(u_{ii}\mathbf{X}^T\mathbf{X} + \gamma\mathbf{V})^{-1}\mathbf{X}^T\mathbf{x}_i$;

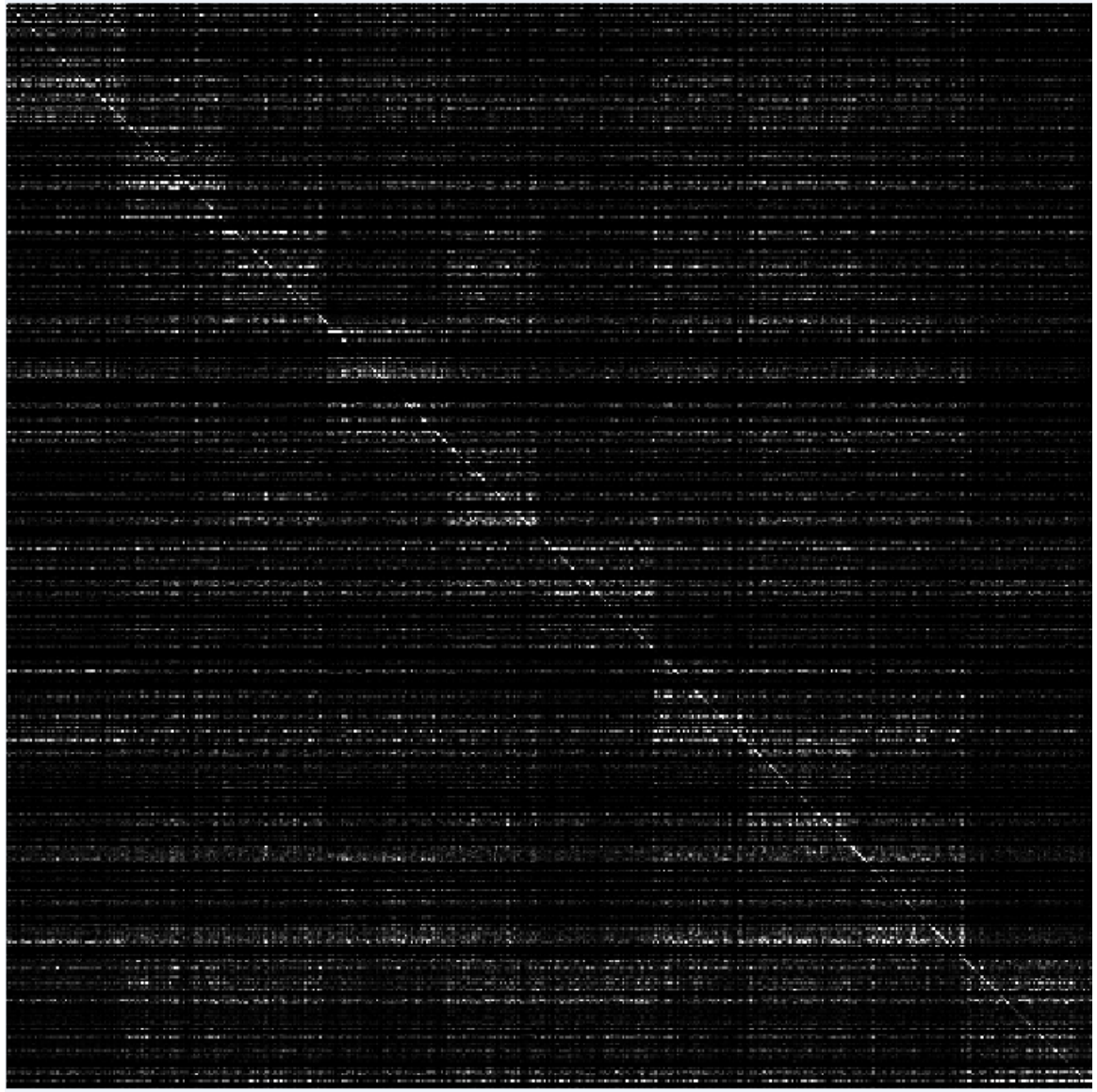
end
Output: The matrix $\mathbf{A} \in \mathbb{R}^{n \times n}$.









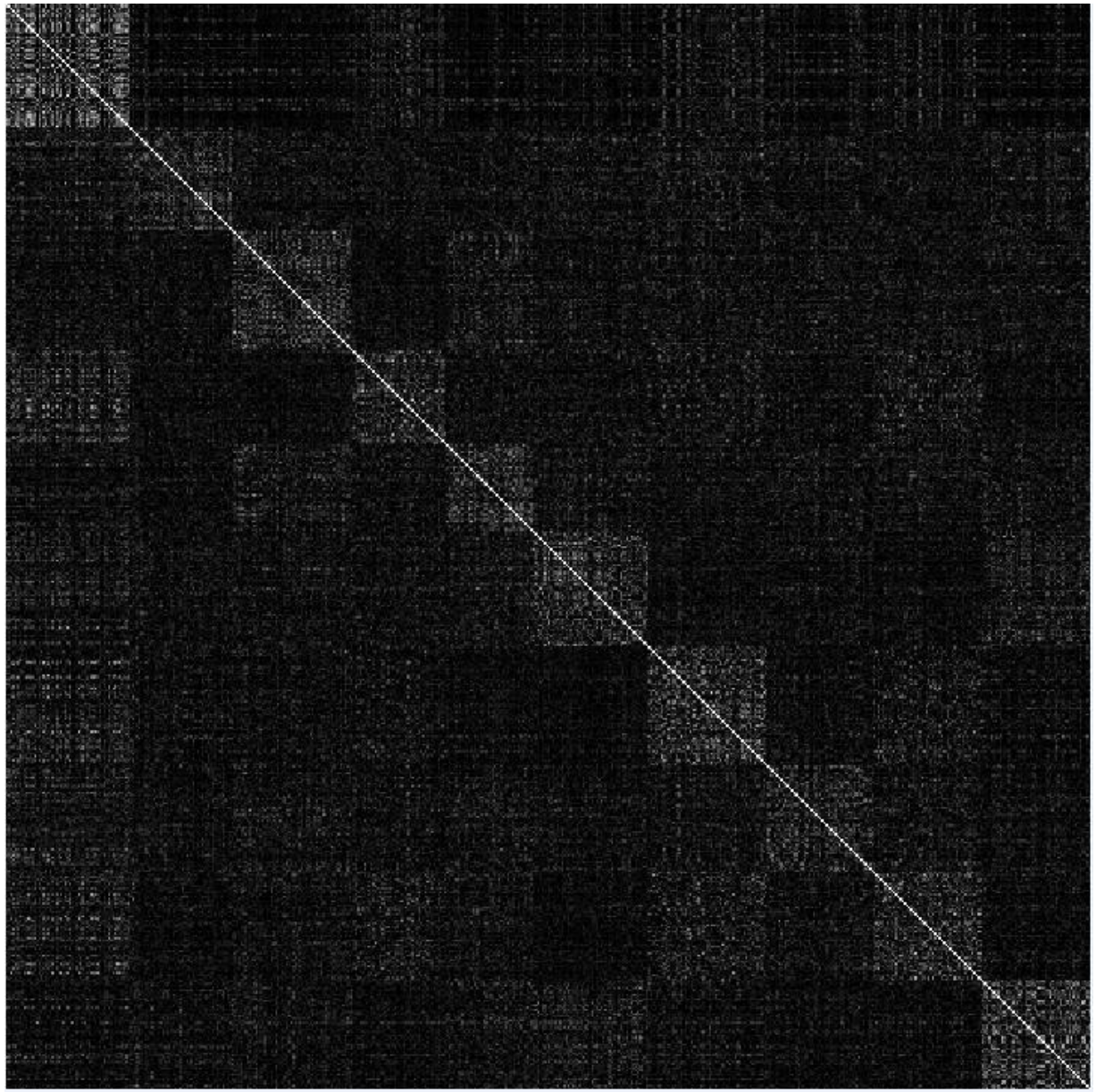


[20, 40, 60, 80, 100, 120]

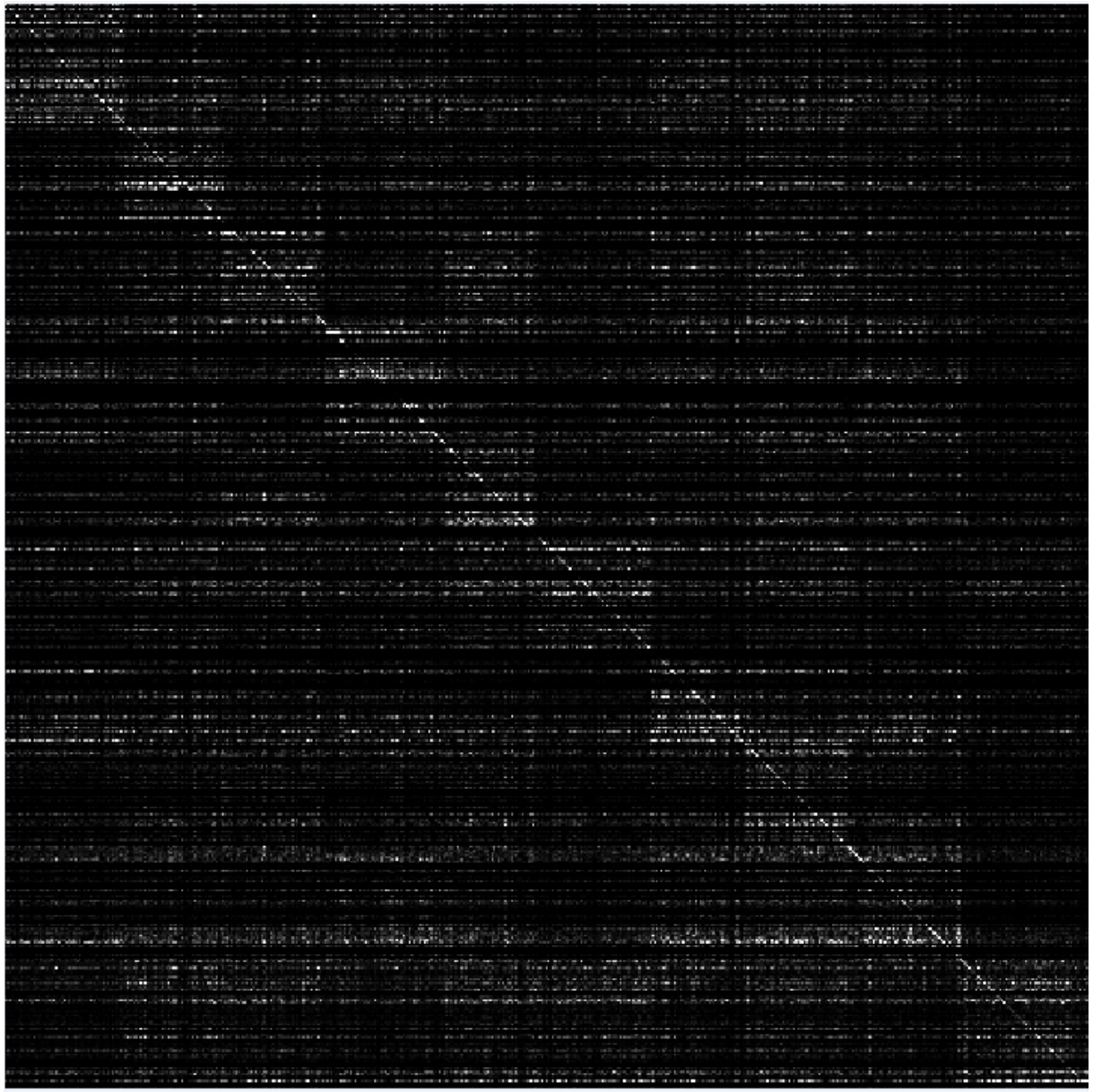
[0.28, 0.408, 0.59, 0.632, 0.652, 0.736]

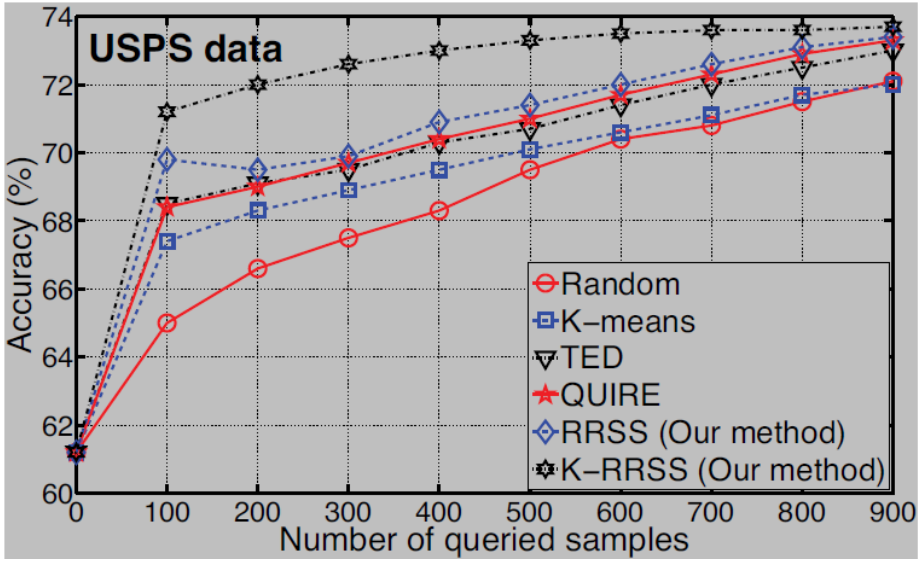
[0.24, 0.294, 0.444, 0.562, 0.674, 0.7]

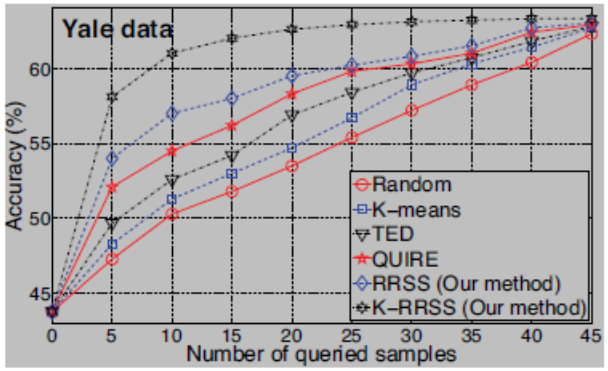
$$J = \min_{A,c} \ \|(X - XA)^T\|_{2,1} + \gamma \|\alpha I \circ AA^T - C\|_F^2 + \lambda \|c\|_1$$

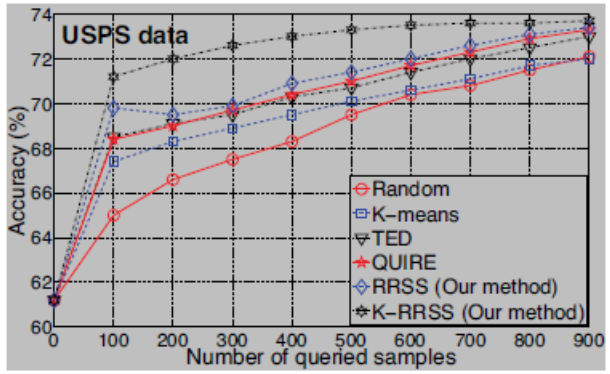


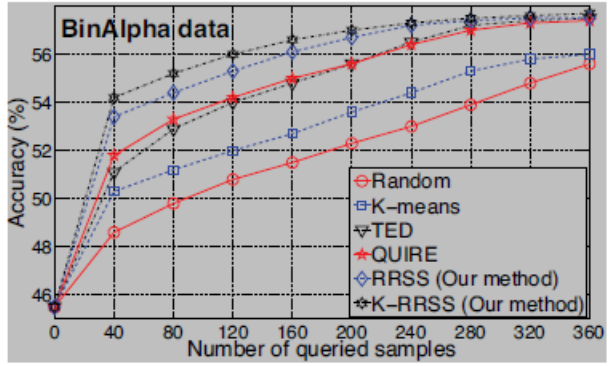
$$J = \min_{A} \ \|(X - XA)^T\|_{2,1} + \gamma \|A\|_{2,1}$$











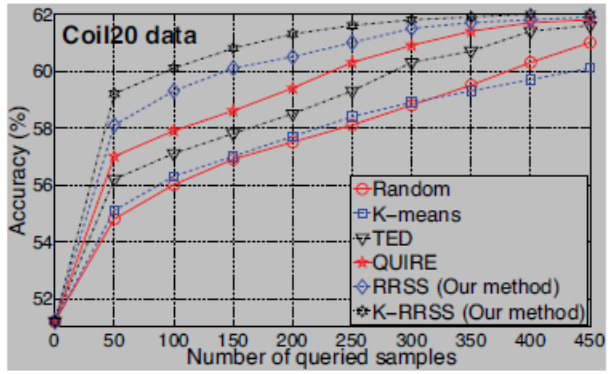


Figure 2: Classification accuracies using SVMs trained by varied amount of samples selected by the active learning methods.

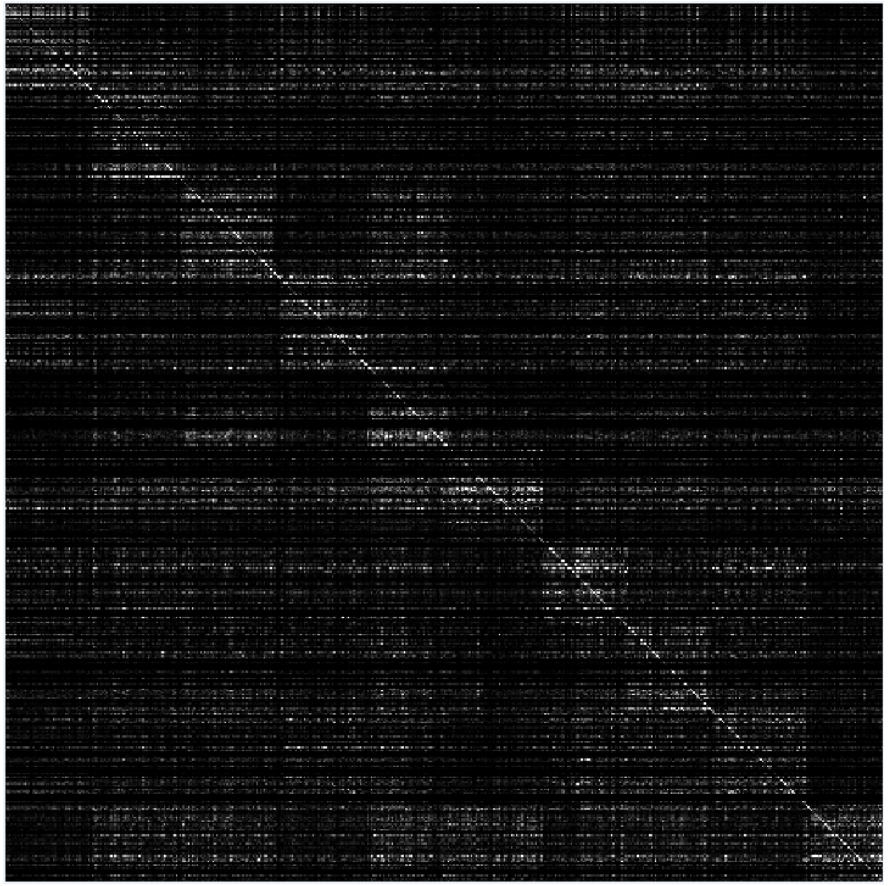
$$J = \min_{A,c} \left\|(X - XA)^T\right\|_{2,1} + \gamma\left\|AA^T - C\right\|_F^2 + \lambda\|A\|_{2,1} + \beta\|\mathbf{diag}(DA)\|$$

$$J = \min_{A,c} \left\|(X - XA)^T\right\|_{2,1} + \gamma \left\|\alpha I \circ AA^T - C\right\|_F^2 + \lambda \|c\|_1$$

$$\min_{c} \gamma \left\|\alpha I \circ AA^T - C\right\|_F^2 + \lambda \|c\|_1$$

$$J = \min_{A,c} \left\|(X - XA)^T\right\|_{2,1} + \gamma \left\|AA^T - C\right\|_F^2 + \lambda \|A\|_{2,1}$$

$$J = \min_{A,C} \|(X - XA)^T\|_{2,1} + \gamma \|AA^T - C\|_F^2 + \lambda \|A\|_{2,1}$$

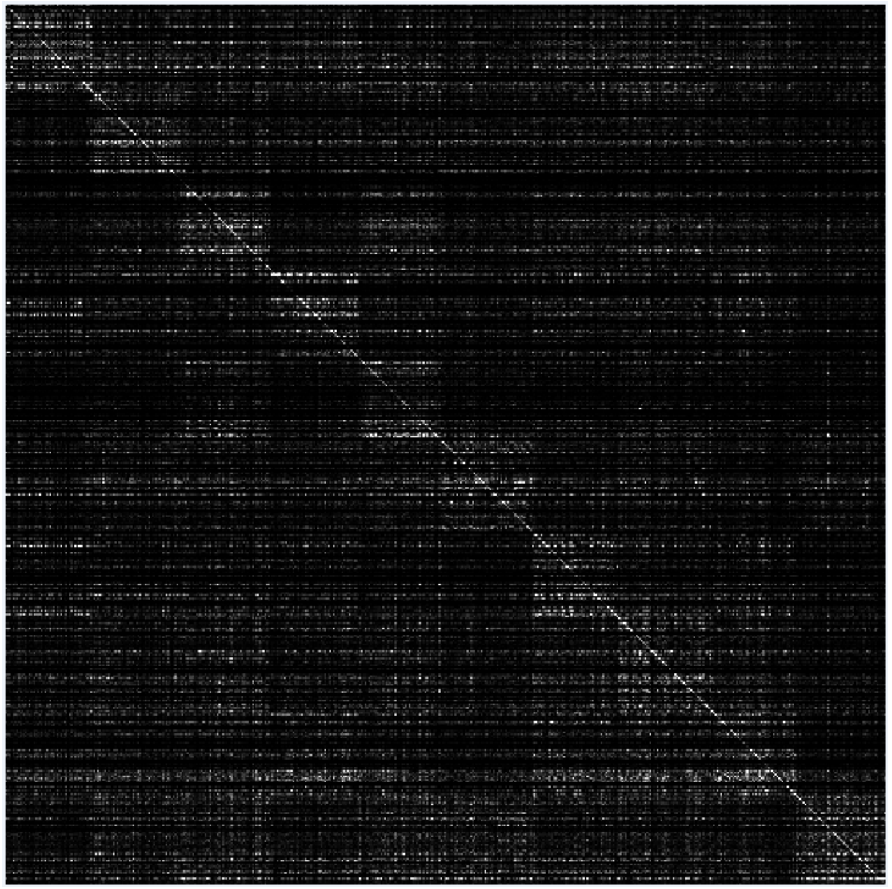


[20, 40, 60, 80, 100, 120]

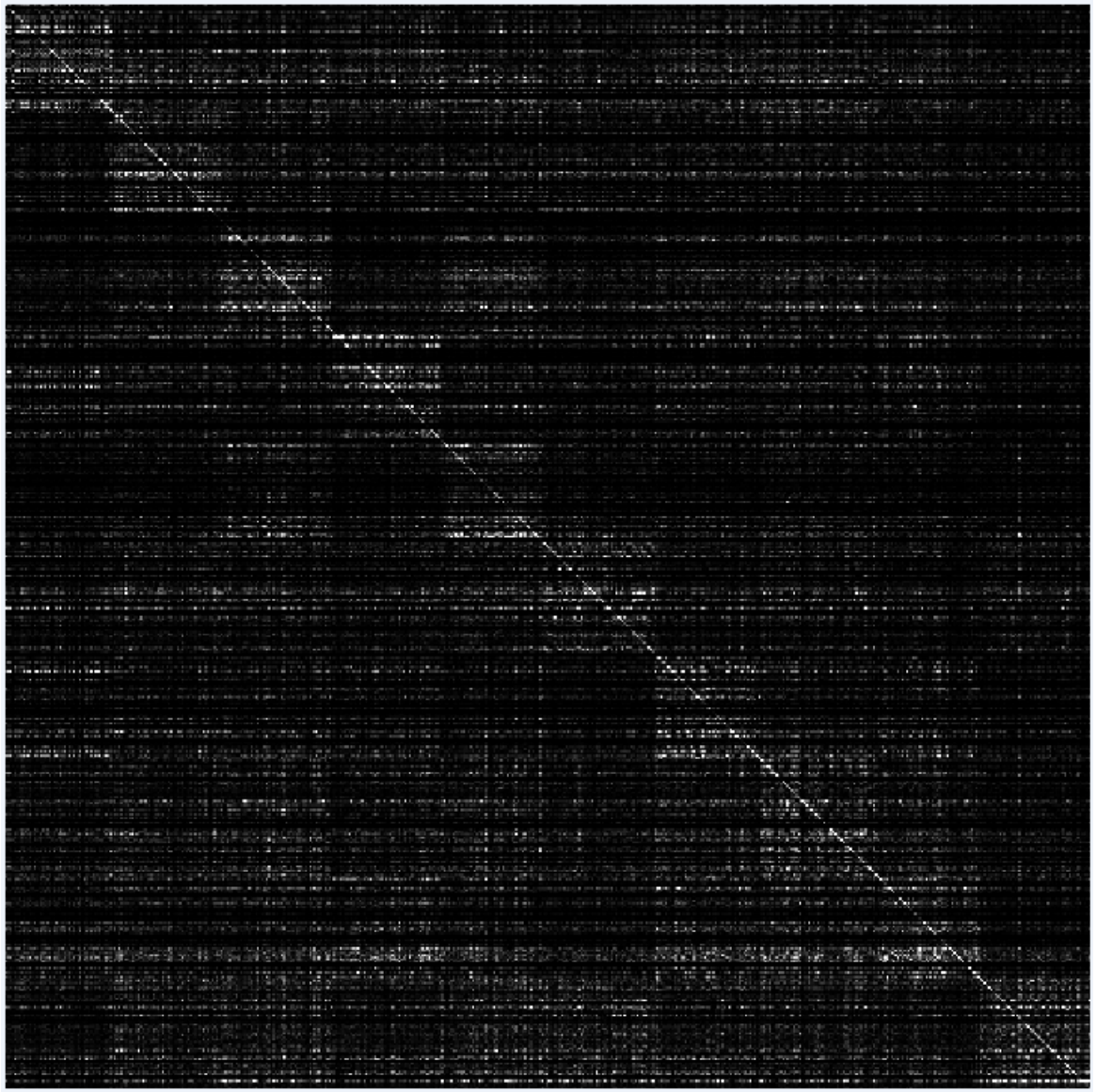
[0.236, 0.384, 0.502, 0.606, 0.71, 0.782]

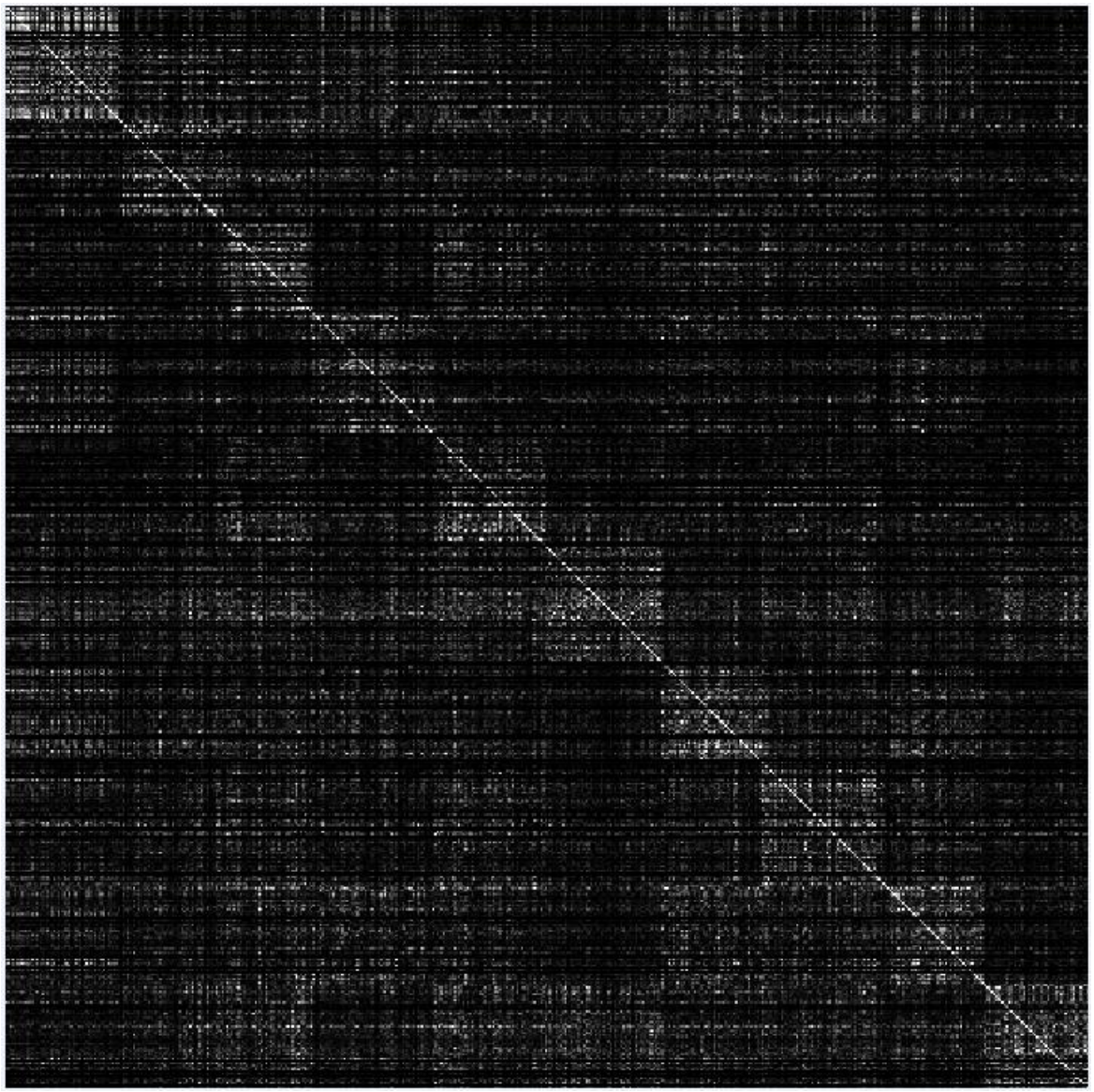
[0.26, 0.358, 0.464, 0.544, 0.688, 0.662]

$$J = \min_{A} \|(X - XA)^T\|_{2,1} + \gamma \|A\|_{2,1}$$



$\gamma = 0.5$ $J = \min_{A,c} \|(X - XA)^T\|_{2,1} + \gamma\|AA^T - C\|_F^2 + \lambda\|A\|_{2,1}$ $\gamma = 5$





$$\boldsymbol{J = \min_{A,c} \left\|(X - XA)^T\right\|_{2,1} + \gamma\left\|AA^T - C\right\|_F^2 + \lambda\|A\|_{2,1} + \beta\|\mathbf{diag}(DA)\|}$$

$M = AA^T$

$$u_{ii}X^TXa_i - u_{ii}X^Tx_i + \lambda Va_i + 4\gamma(M - C)a_i + \beta d_i = 0$$

$$a_i = [u_{ii}X^TX + \lambda V + 4\gamma(M - C)]^{-1}[u_{ii}X^Tx_i - \beta d_i]$$

$$\boldsymbol{J = \min_{A,c} \left\|(X - XA)^T\right\|_{2,1} + \gamma\left\|\alpha I \circ AA^T - C\right\|_F^2 + \lambda\|c\|_1 + \beta\|\mathbf{diag}(DA)\|}$$

$$\boldsymbol{\min_c \gamma\left\|\alpha I \circ AA^T - C\right\|_F^2 + \lambda\|c\|_1}$$

$M = AA^T$

$$u_{ii}X^TXa_i - u_{ii}X^Tx_i + 4\gamma(\alpha I \circ M - C)a_i + \beta d_i = 0$$

$$a_i = [u_{ii}X^TX + 4\gamma(\alpha I \circ M - C)]^{-1}[u_{ii}X^Tx_i - \beta d_i]$$

1，多次实验验证加入$\left\|\boldsymbol{AA^T}-\boldsymbol{C}\right\|_{\boldsymbol{F}}^{\boldsymbol{2}}$是否有效，验证作者实验方法有效性。

2，多次实验验证$\underset{\boldsymbol{A,c}}{\mathbf{min}}\ \left\|(\boldsymbol{X}-\boldsymbol{XA})^{\boldsymbol{T}}\right\|_{\boldsymbol{2,1}}+\boldsymbol{\gamma}\left\|\boldsymbol{AA^T}-\boldsymbol{C}\right\|_{\boldsymbol{F}}^{\boldsymbol{2}}+\boldsymbol{\lambda}\|\boldsymbol{A}\|_{\boldsymbol{2,1}}+\boldsymbol{\beta}\|\mathbf{diag}(\boldsymbol{DA})\|$或

$\underset{\boldsymbol{A,c}}{\mathbf{min}}\ \left\|(\boldsymbol{X}-\boldsymbol{XA})^{\boldsymbol{T}}\right\|_{\boldsymbol{2,1}}+\boldsymbol{\gamma}\left\|\boldsymbol{\alpha I}\circ\boldsymbol{AA^T}-\boldsymbol{C}\right\|_{\boldsymbol{F}}^{\boldsymbol{2}}+\boldsymbol{\lambda}\|\boldsymbol{c}\|_{\boldsymbol{1}}+\boldsymbol{\beta}\|\mathbf{diag}(\boldsymbol{DA})\|$的有效性。

3，是否每个批量查询重新调整参数