EXPERIMENT

$$\min_{f,\theta} \sum_{\{x_i,y_i\}\in L} \alpha_i (y_i - f(x_i))^2 + \lambda\left(\frac{1}{2}\alpha^2 - \alpha\right) + \sum_{x_j \in U} \theta_j * \beta_j (\hat{y_j} - f(x_j))^2 + \lambda\left(\frac{1}{2}\beta^2 - \beta\right) + \mu MMD(S, L \cup Q) + \gamma||f||^2$$

Repeat:

1. Calculate the weight of set L α_i

Repeat:

2. Solve QP for the unlabel data to get the \theta $\arg\min_{\theta} \sum_{x_j \in U} \theta_j * \beta_j (\hat{y_j} - f(x_j))^2 + \mu MMD(S, L \cup Q)$

3. Solve SPL for the unlabel data to get the and \beta $\arg\min_{\beta} \sum_{x_j \in U} \theta_j * \beta_j (\hat{y_j} - f(x_j))^2 + \lambda\left(\frac{1}{2}\beta^2 - \beta\right)$

4. Update model using ADMM $\arg\min_{f} \sum_{x_j \in L} \alpha_i (y_i - f(x_i))^2 + \gamma||f||^2 + \sum_{x_j \in U} \theta_j * \beta_j (\hat{y_j} - f(x_j))^2$

Until Converge

5. Pick the largest $\theta_j * \beta_j$ b instances to Query

6. Update model $\sum_{\{x_i,y_i\}\in L\cup Q} (y_i - f(x_i))^2 + \gamma||f||^2$

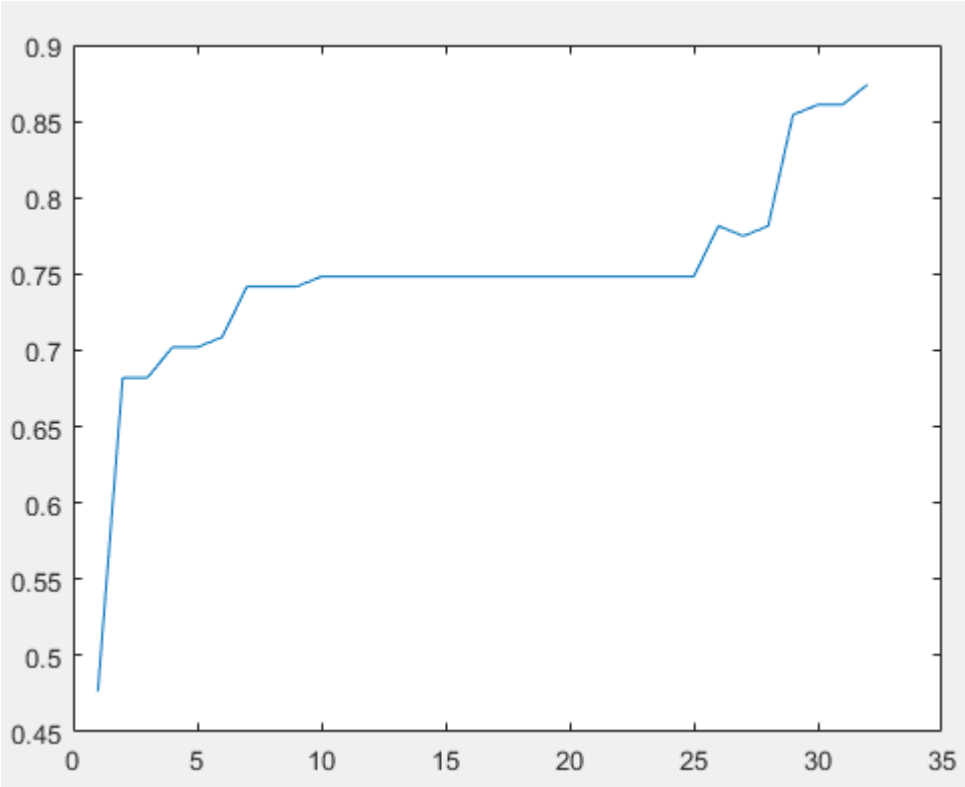
7. increase \lamda

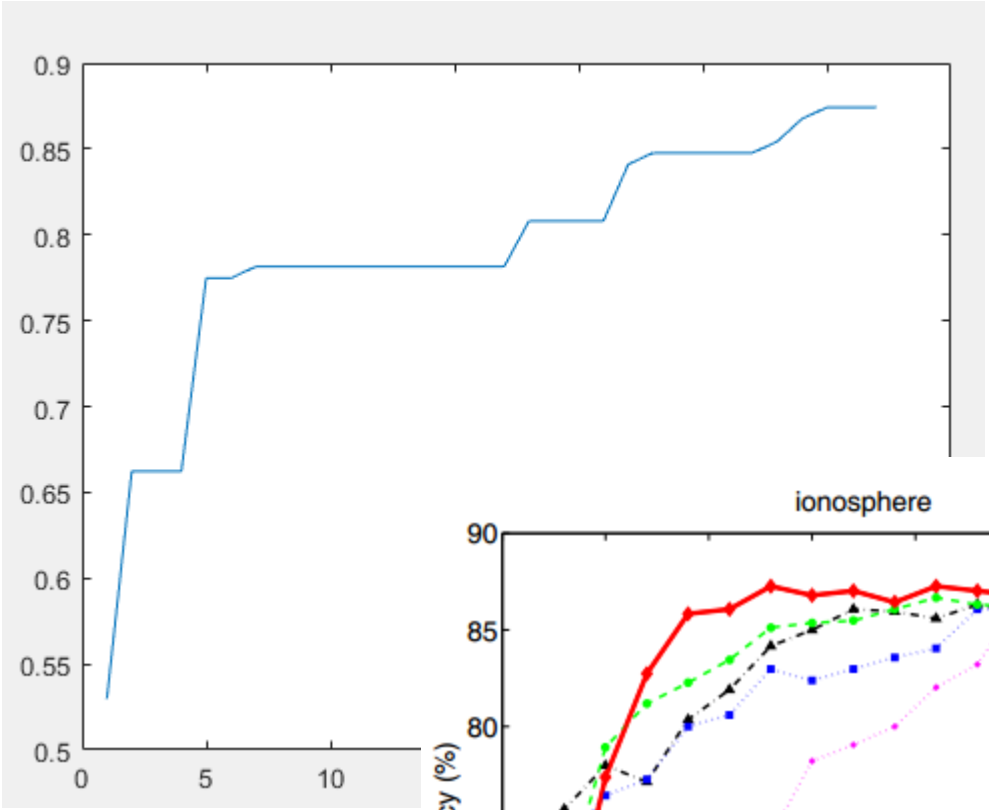
Until 80% samples are labeled

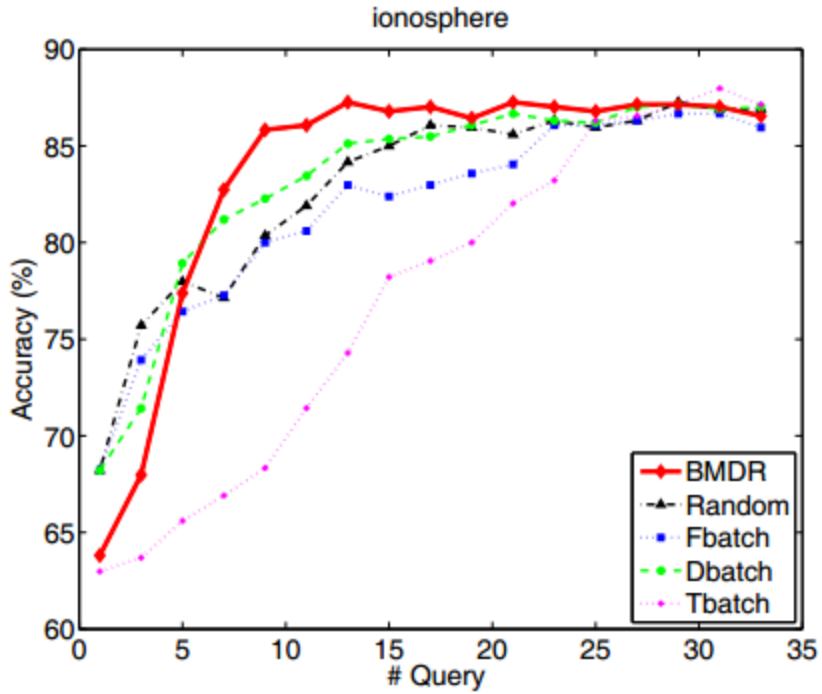
SPL

BMDR: batch mode active leaning with discriminative and representative

Precicion







lamda_initial = 0.3
lamda_pace = 0.15
lamda_max = 3.5

- Dataset: Ionosphere
- Kernel: Gaussian

ADMM 计算框架

一般问题

若优化问题可表示为

$$\min \quad f(x)+g(z) \qquad \text{s.t.} \quad Ax+Bz=c$$

$$L_\rho(x,z,y)=f(x)+g(z)+y^T(Ax+Bz-c)+(\rho/2)\|Ax+Bz-c\|_2^2$$

则该优化问题的 ADMM 迭代求解方法为

$$\begin{aligned}
x^{k+1} &:= \arg\min_x L_\rho(x,z^k,y^k)\\
z^{k+1} &:= \arg\min_z L_\rho(x^{k+1},z,y^k)\\
y^{k+1} &:= y^k+\rho(Ax^{k+1}+Bz^{k+1}-c)
\end{aligned}$$

Problem:

1. 矩阵A不可逆

W= $\sum_{\mathbf{x}_j \in L} \tau_j \phi(\mathbf{x}_j)$

使用线性核的时候在特定迭代轮数会发生

$$\boldsymbol{\tau}^{k+1} = A^{-1}\mathbf{r}^T,$$

$$\text{with } A = K_{LL}^2 + \frac{\rho}{2} K_{LQ} K_{QL} + \lambda K_{LL},$$

$$\text{and } \mathbf{r} = \mathbf{y}_L K_{LL} + \frac{1}{2}\boldsymbol{\gamma}^k K_{LQ}^T + \frac{\rho}{2}\mathbf{z}^k K_{LQ}^T;$$

2.Z的优化问题（运行时间）

$$arg\min_z \sum z_i^2 + 2\sum |z_i| + \sum z_i * \gamma_i + \frac{\rho}{2}\sum (z_i - \tau^T K_{LQ})^2 \qquad z \in Q$$

$$\mathbf{z}^{k+1} = \arg\min \frac{1}{2}||\mathbf{z} - \mathbf{v}||^2 + \eta|\mathbf{z}| = \text{sign}(\mathbf{v})(|\mathbf{v}| - \eta)_+$$

$$arg\min_z \sum \theta_i * \beta_i * z_i^2 + 2\sum \theta_i * \beta_i * |z_i| + \sum z_i * \gamma_i + \frac{\rho}{2}\sum (z_i - \tau^T K_{LQ})^2 \qquad z \in U$$

形式有点类似于变量带权的elastic net,用cvx优化这个式子得不到最优解，且速度比较慢（ADMM需要迭代100次）

sqlp stop: dual problem is suspected of being infeasible

---

number of iterations = 13

residual of dual infeasibility

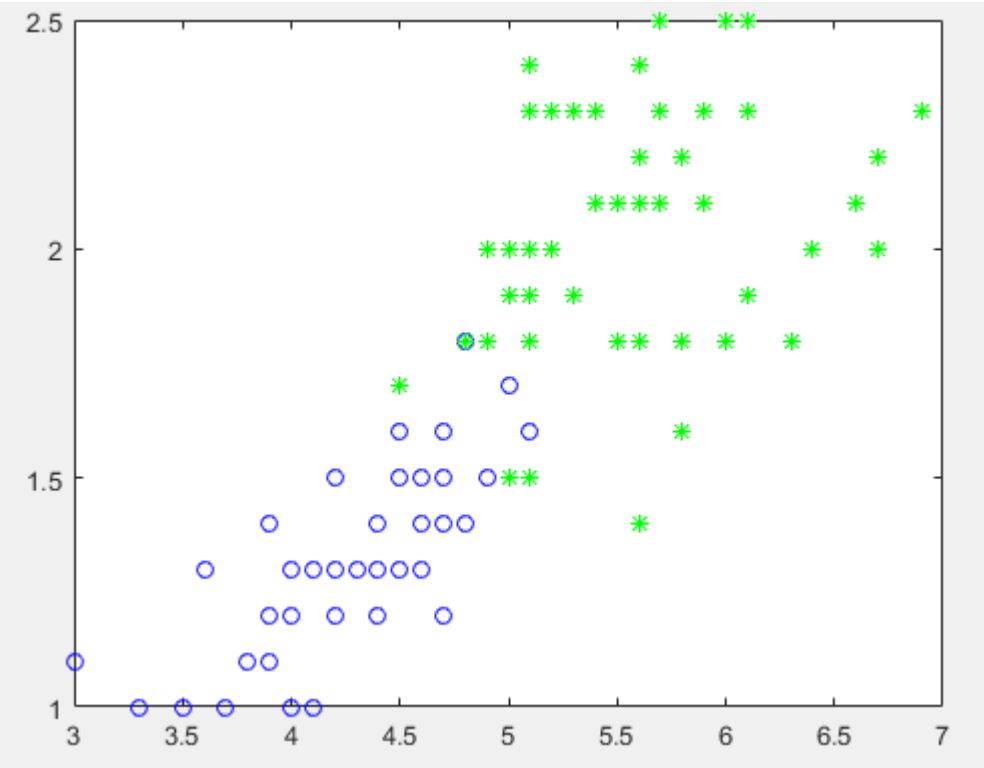
termination code = 2

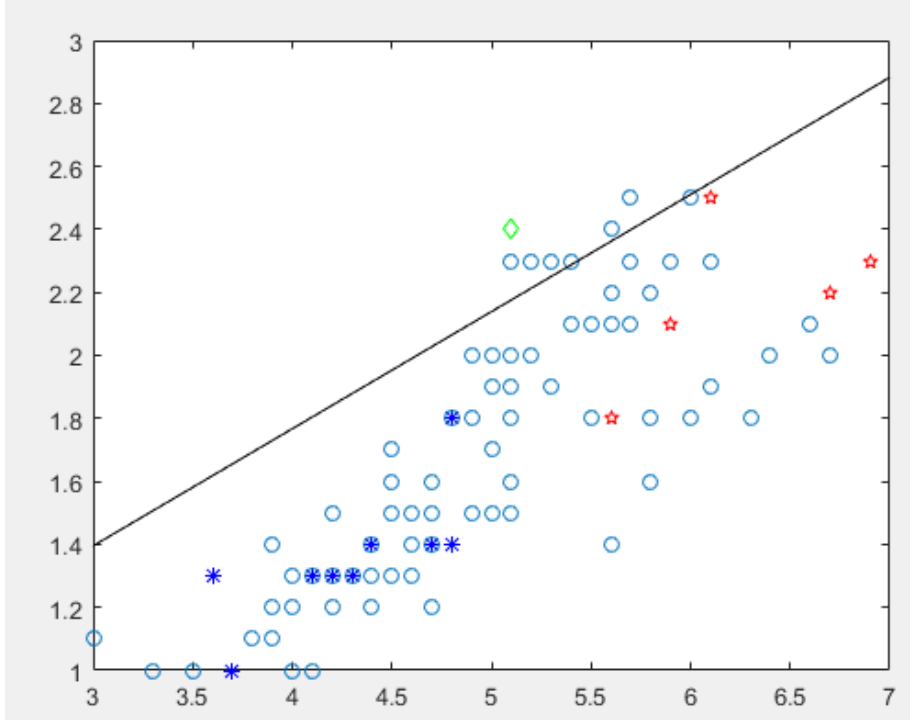
DIMACS: 2.3e-03 0.0e+00 3.8e+00 0.0e+00 -1.0e+00 1.3e-02

Status: Unbounded

Optimal value (cvx_optval): -Inf

Iris数据集画图看选择样本的不同

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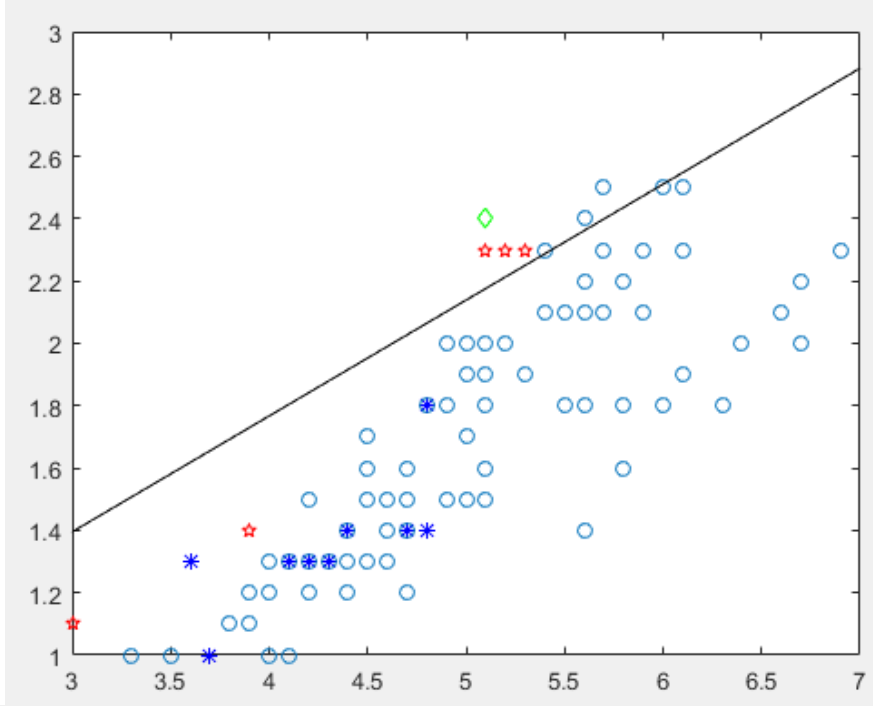
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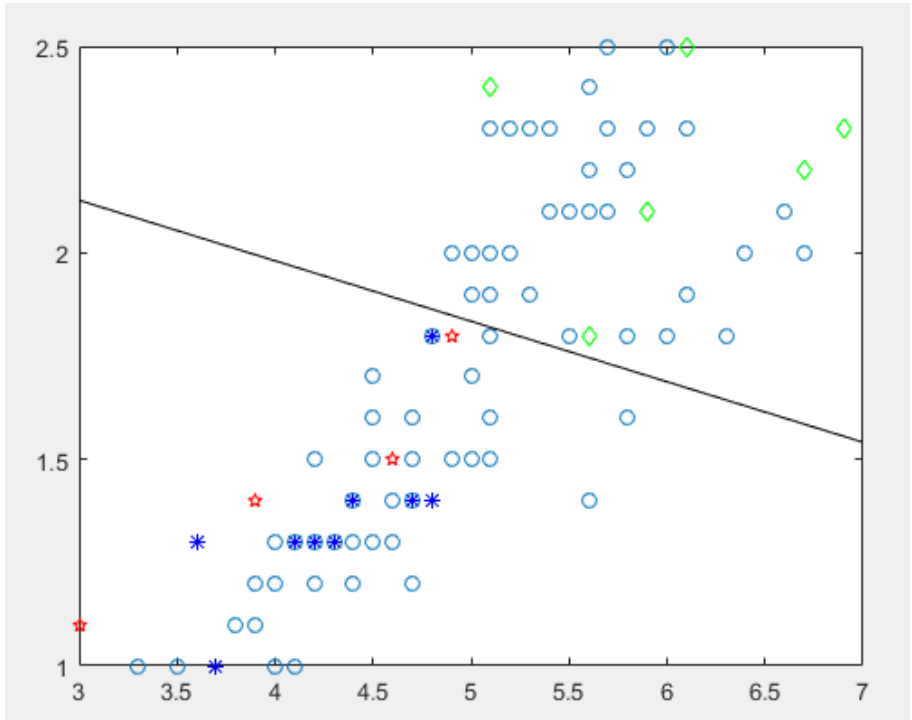
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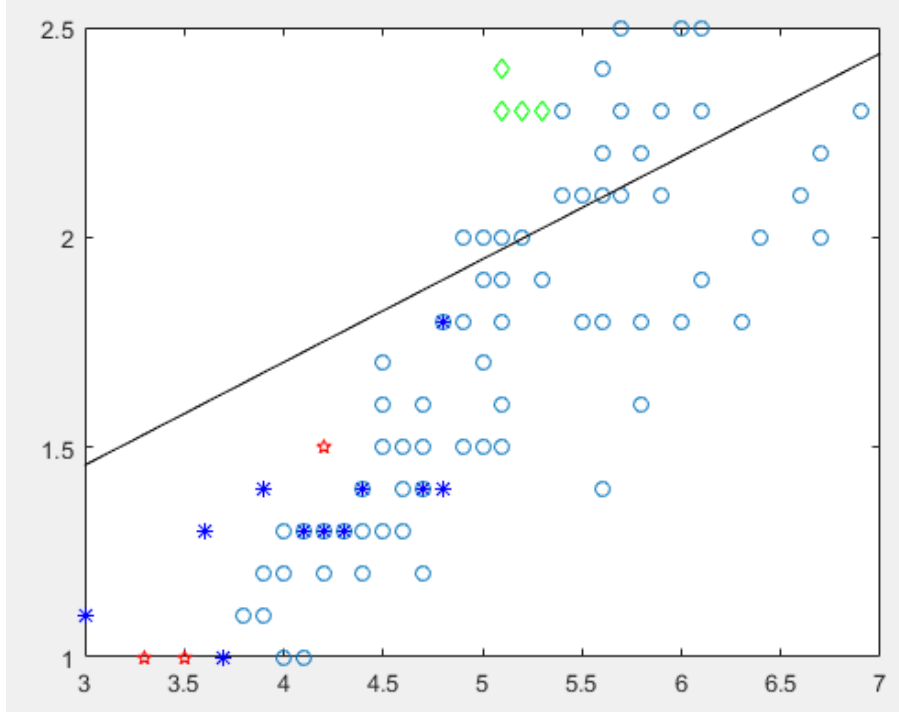
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