人工智能hw09

> Name:张展翔
>
> Student Number：PB20111669

1.

设超平面为$w^Tx+b=0$

故需要求$min 1/2||w||^2$使$y_i(w^Tx_i+b)\geq 1$

由$\alpha_1+\alpha_2+\alpha_3-\alpha_4-\alpha_5=0$得

$max 2(\alpha_1+\alpha_2+\alpha_3)-1/2(4\alpha_1^2+2\alpha_2^2+\alpha_3^2+4\alpha_1\alpha_2+2\alpha_2\alpha_3)$

上式各个偏导为0无解，故$\alpha_1\alpha_2\alpha_3$中至少一个为0、

$\alpha_1=0$时，$\alpha_2=0,\alpha_3=2,f(\alpha)=2$

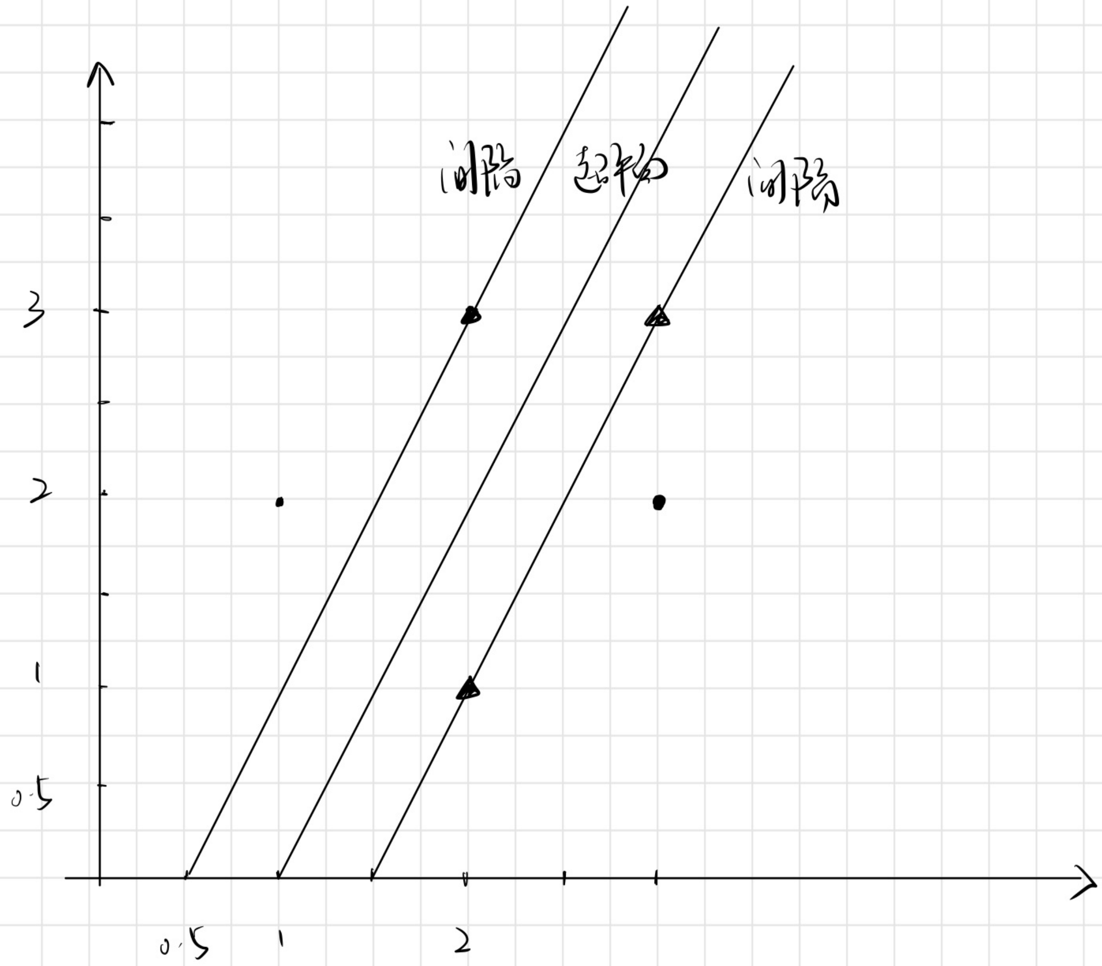
$\alpha_2=0$时，$\alpha_1=0.5,\alpha_3=2,f(\alpha)=2.5$

$\alpha_3=0$时，$\alpha_2=0,\alpha_3=1,f(\alpha)=1$

故$\alpha_1=0.5,\alpha_2=0,\alpha_3=2,\alpha_4=0,\alpha_5=2.5$

$w=(-1,2)^T,b=-2$

决策函数$f(x)=sign(-x_1+2x_2-2)$



间隔
超平面
间隔
3
2
1
0.5
0.5
1
2

$$\frac{\partial}{\partial w_j} L_{CE}(w,b)$$

$$= -\frac{\partial}{\partial w_j}[y\log\sigma(w\cdot x+b)+(1-y)\log(1-\sigma(w\cdot x+b))]$$

$$= -\frac{\partial}{\partial w_j}[y\log\sigma(z)+(1-y)\log(1-\sigma(z))]$$

$$= -\sum_{i=1}^{N} y_i\frac{1}{\sigma(z)}\sigma(z)(1-\sigma(z))x_i+(1-y_i)\frac{-1}{1-\sigma(z)}\sigma(z)(1-\sigma(z))x_i$$

$$= -\sum_{i=1}^{N} y_i(1-\sigma(z))x_i-(1-y_i)\sigma(z)x_i$$

$$z = w\cdot x+b$$