Lec 10 - Friday, 01 Nov

01 November 2013
12:18

$$\frac{1}{2}\|f\|^2 + C\sum \xi_i$$

$$f(x_i, y_i) \geq f(x_i, y) + D(y_i, y) - \xi_i$$

$$\forall\ 1 \leq i \leq n,\ \forall\ y \in Y$$

$$\boxed{f(x, y) = y^t W^t x} + \frac{\lambda}{2} y^t H y$$

ML

$$= w^t x_y$$

$$y^* = \text{ARGMAX}\ \boxed{y^t W^t x} = \sum y_c w_c^t x$$

$$y \in Y = \{e_1, e_2, \sim, e_L\}\ \text{MC}$$

$$\{0,1\}^L \qquad \text{ML}$$

$$D(y, y^*) = y^t P \qquad y^* = \sum_{ij} P_{ij} y_i y_j^*$$

$$\frac{1}{2}\sum_{e}^{t} w_e w_e \equiv$$

$$\frac{1}{2}\sum_{ij} w_{ij}^2 \equiv \frac{1}{2}\text{Trace}(w^t w)$$

$$\frac{1}{2}\sum_{e} w_e^t w_e + C\sum_i \xi_i$$

$$(y_i - y)^t w^t x \geq 1 - \delta_{y_i y} - \xi_i$$

L = # CLASSES

N = # PTS/CLASS

total # PTS $= NL$

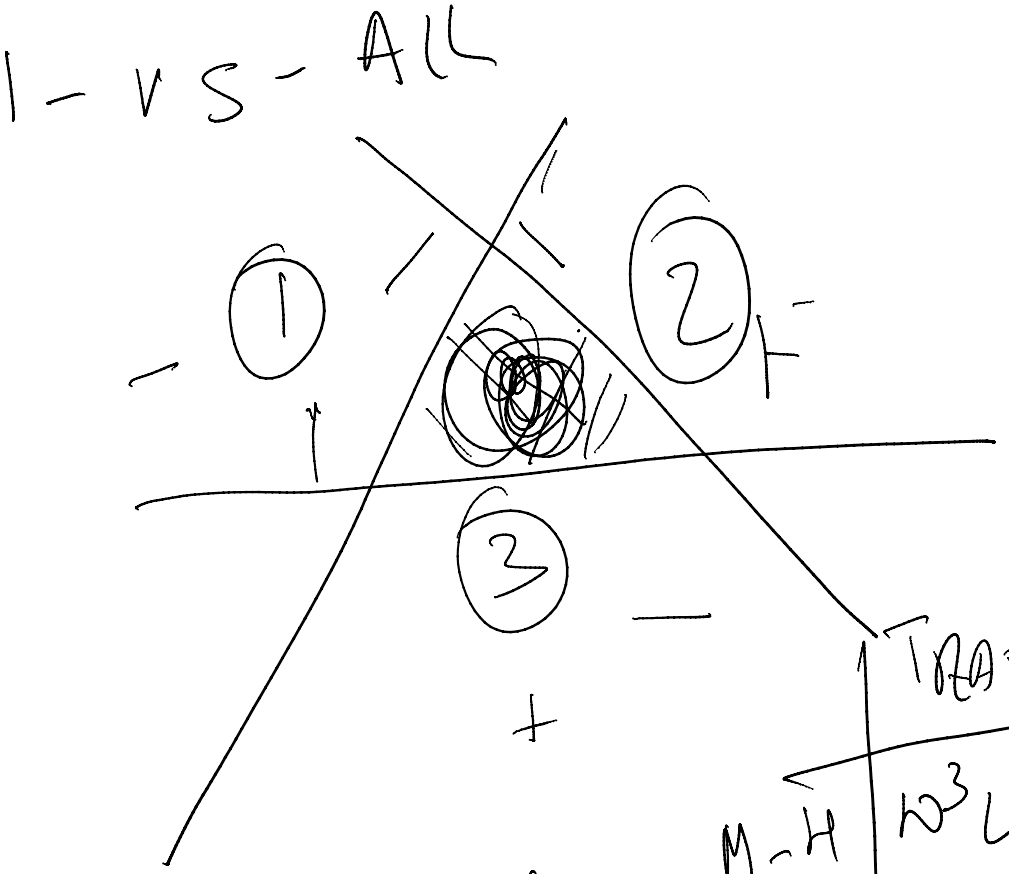
CONSTRAINTS $= NL^2$

$= NL^2$

DUAL SVMs $= (NL^2)^3 = N^3 L^6$

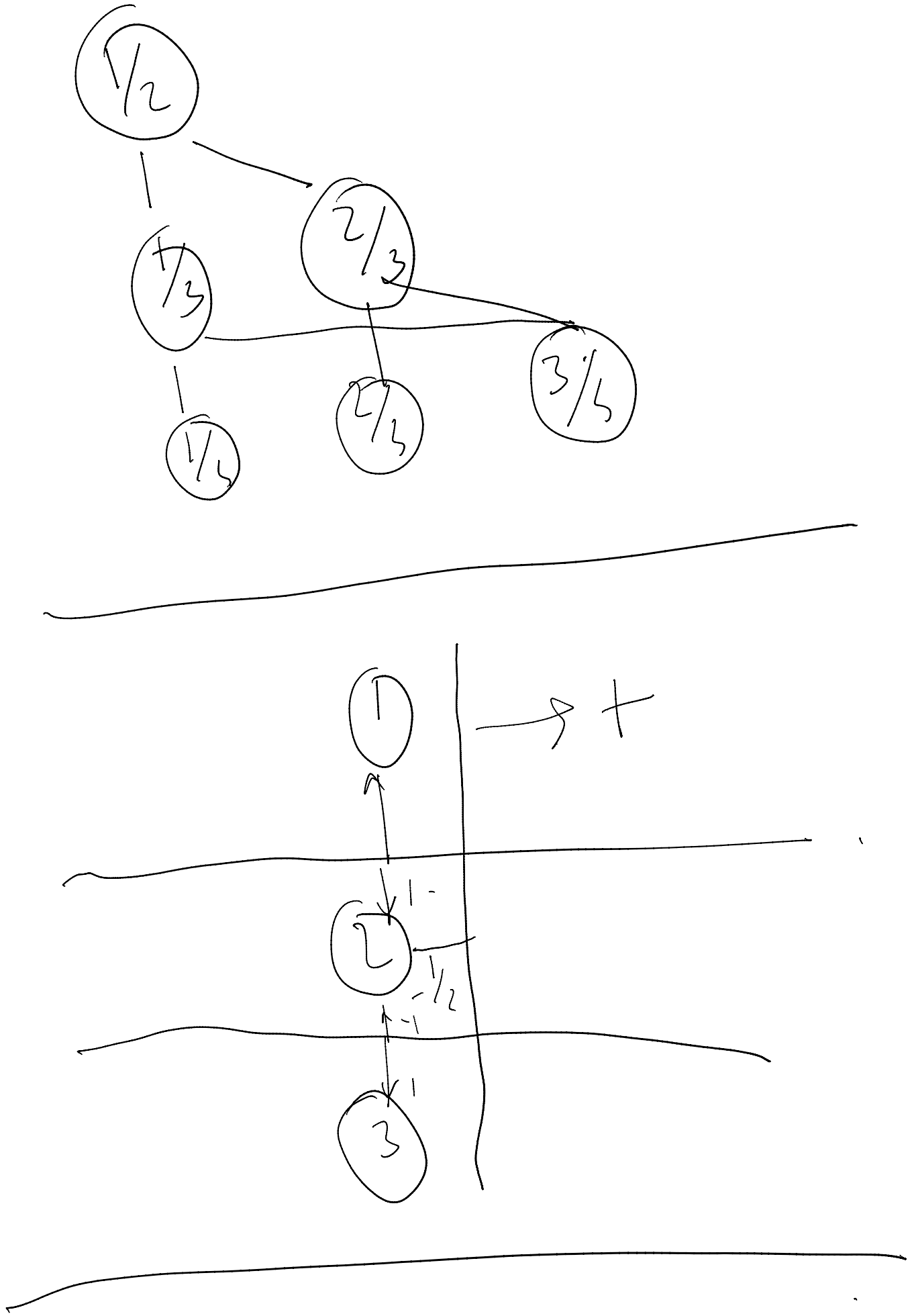
$$\sum \alpha_i - \frac{1}{2} \sum_i \alpha_i^t H \alpha_i$$

$$\beta \cdot \text{sum}\alpha^t \alpha = \sum \alpha_i$$



	Training	Test
M-H	$N^3 L^6$	NL^2
1-vs-All	$N^3 L^3$	NL^2
MAD 1-vs-1	$N^3 L^2$	NL^2
DAG 1-vs-1	$N^3 L^2$	NL

ARGMAX $\alpha_i^t K$ $\forall f(\Gamma, L)$


1/2
2/3
1/3
3/3
2/3
1/3
1
+
1
2
-1/2
-1
1
3

SMO

$$\text{MAX } D(\alpha) = 1^t\alpha - \tfrac{1}{2}\alpha^t H\alpha$$
$$0 \le \alpha \le C$$

$$\text{MAX}_{S} \; D(\alpha + s e_i) = D(\alpha) - \tfrac{1}{2}H_{ii}s^2 - (1 - \alpha^t h_i)s$$
$$0 \le \alpha_i + s \le C$$

$$y_i \sum_j \alpha_j y_j K(x_i, x_j) = \alpha^t h_i$$

$O(ND)$

$$D(\alpha + s e_i) = D(\alpha) - \tfrac{1}{2}H_{ii}s^2 - g_i(\alpha)s$$

$$g(\alpha) = 1 - H\alpha \quad O(N)$$

$$g(\alpha + s e_i) = g(\alpha) - s h_i \quad O(NS)$$

$$\sum \alpha_i y_i = 0$$

$$\omega = XY\alpha$$

$$\sum_j \alpha_j y_j k(x_\pm, x_j) + b = \pm 1$$
