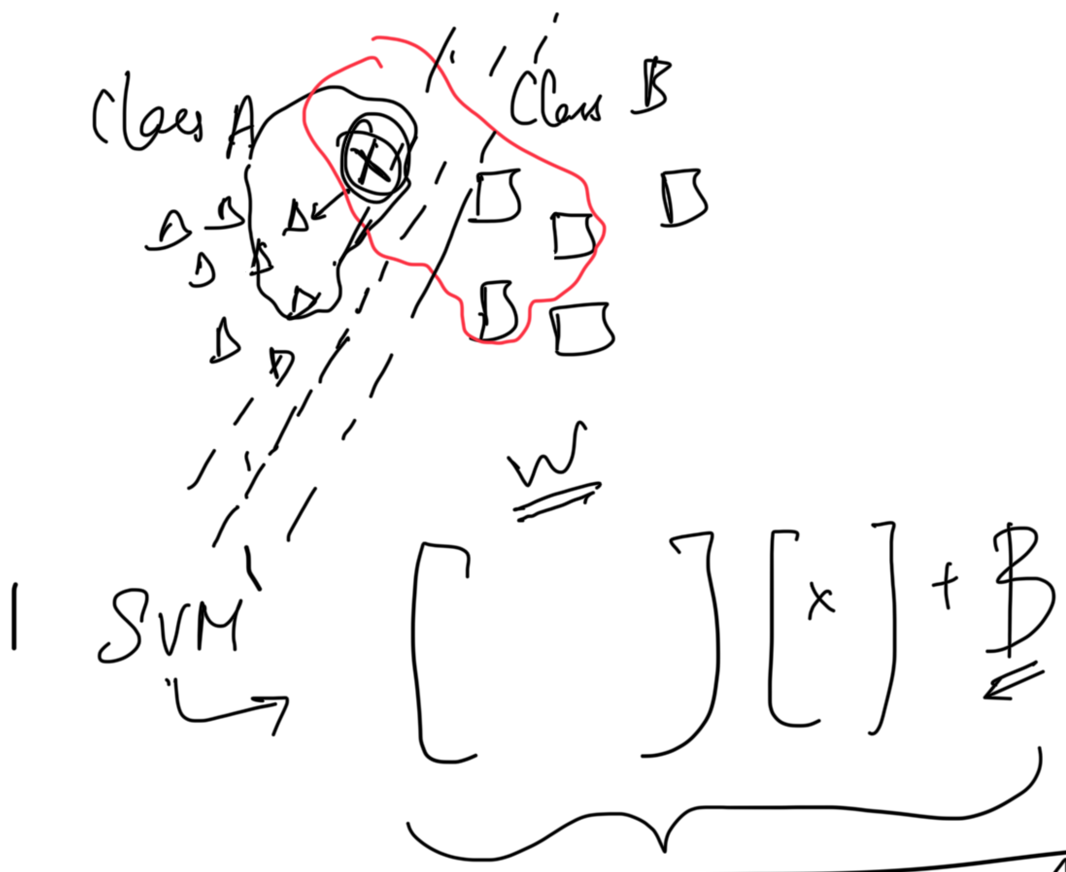
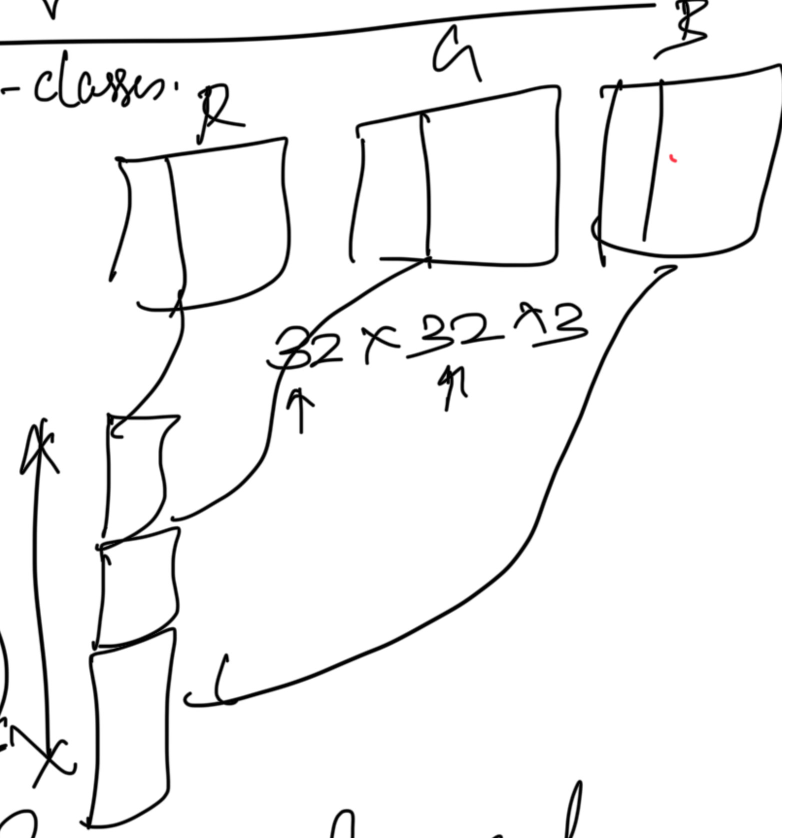
Multiclass SVC



$f : \mathbb{R}^D \to \mathbb{R}^K \Rightarrow$ K-classes.

$W x_i + b = 0$



$W X_i + b = S$

$$\begin{bmatrix} w_{11} & \dots & w_{1n} \\ \vdots & & \\ w_{k1} & \dots & w_{kn} \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_D \end{bmatrix} + \begin{bmatrix} b_1 \\ \vdots \\ b_n \end{bmatrix}$$

$\begin{bmatrix} S_1 \\ S_2 \\ \vdots \\ S_k \end{bmatrix}$ $S_1 \Rightarrow$ Car, $S_2 \Rightarrow$ horse, ⇒ … k class } Scores for each class / Not necessary to add

$+\Delta$

$S_i \geq \Delta$

$s_j = f(x_i, W)_j$

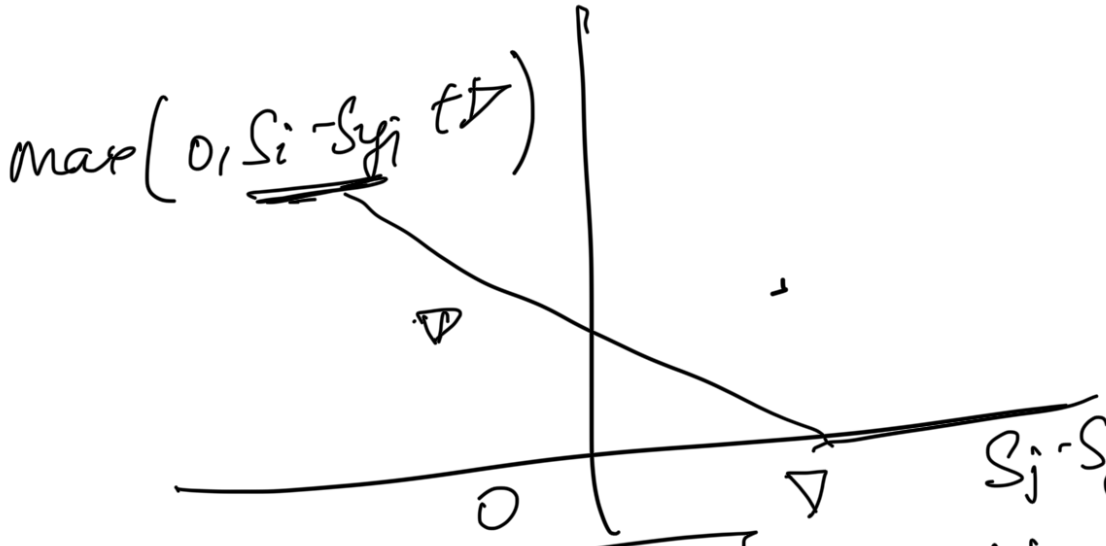
$L_i = \sum_{j \neq y_i} \max(0, s_j - s_{y_i})$

$\Delta = 10$

$S = [10, 20, 30, \ldots, 20, 25]$

$s_{y_i} = 30 + 10$

$\max[0, (10 - 30) + \max(0, 20 - 30) + \max(\ldots)]$



$L = \max(0, 1 - y_i \cdot y_{pred})$ → Total Multi class value

$L = \frac{1}{N} \sum_i \sum_{j \neq y_i} (\max(0, f(x_i, W) - acf))$ → Total loss

$L = \frac{1}{N} \sum_i L_i + \lambda \sum_k \sum_l W^2$

for 1 image → 10 scores

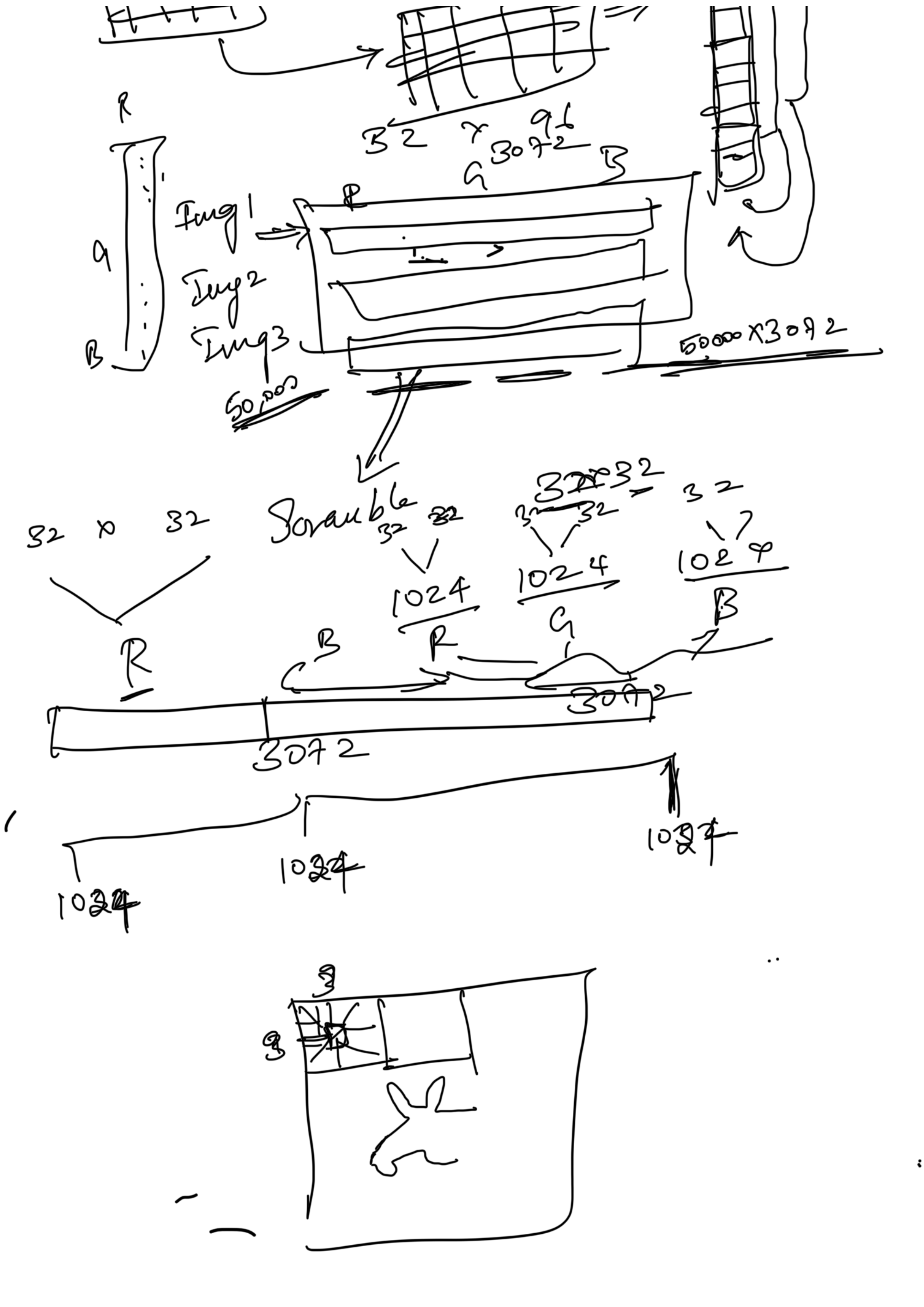
Pred → [0.002 0.008 - - - - - 0.01]

Actual → [0 0 0 . . . 1 0 0]

Σ one image 10 class [max(0, pred − act) + Δ] + max(0, pred − act) + Δ . . . [ ]$_{10}$

OVR Δ vs Rest

32×32×3



32 x 96
3072
R
G
B
Img1
Img2
Img3
50,000
50000 X 3072
Scramble
32 x 32
32x32
1024
1024
1024
3072
3072
1024
1024
1024