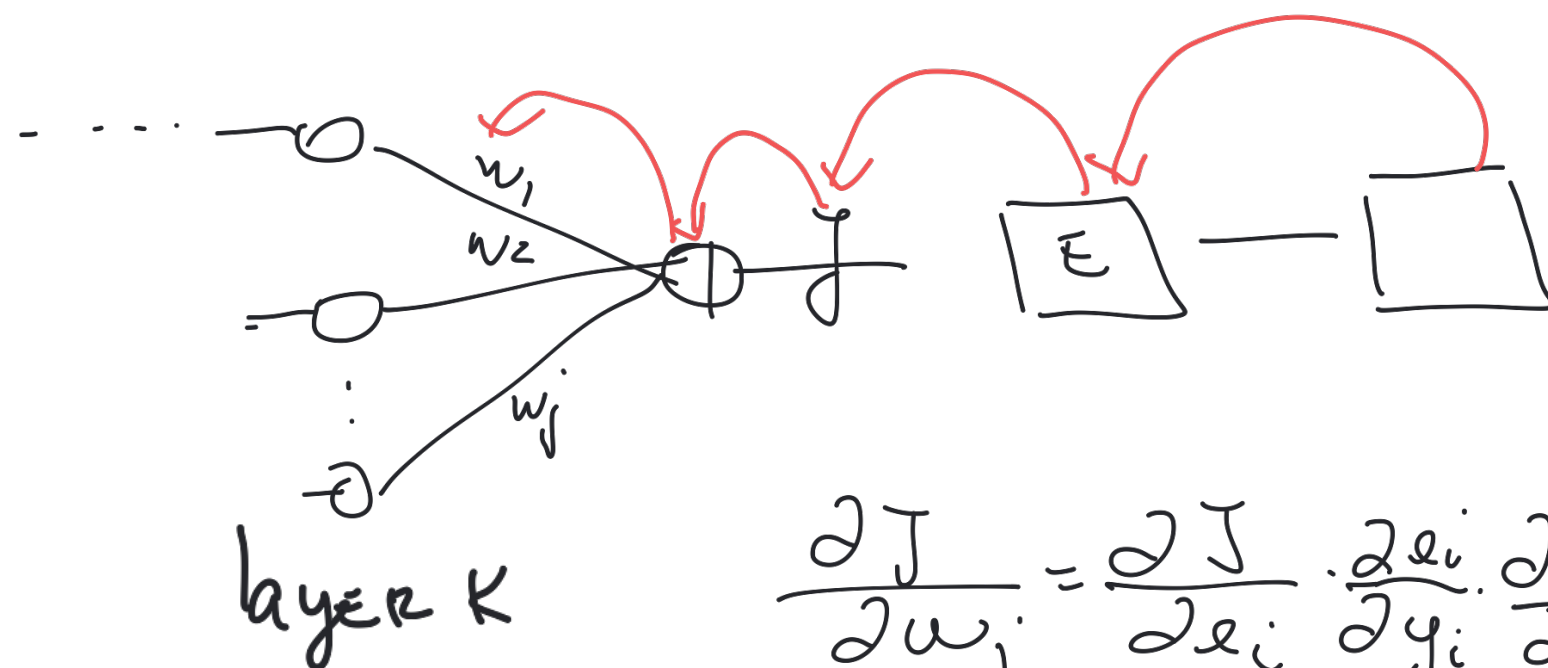


Problem 10

$$J = \underbrace{\frac{1}{2} \sum_{i=1}^N e_i^2}_{\text{data loss}} + \underbrace{\lambda \cdot \sum_j w_j^2}_{\text{regularization}}$$

$$w_j^{(t+1)} = w_j^{(t)} - \eta \cdot \frac{\partial J}{\partial w_j^{(t)}}$$



$$\frac{\partial J}{\partial w_j} = \frac{\partial J}{\partial e_i} \cdot \frac{\partial e_i}{\partial y_i} \cdot \frac{\partial y_i}{\partial v_i} \cdot \frac{\partial v_i}{\partial w_j}$$

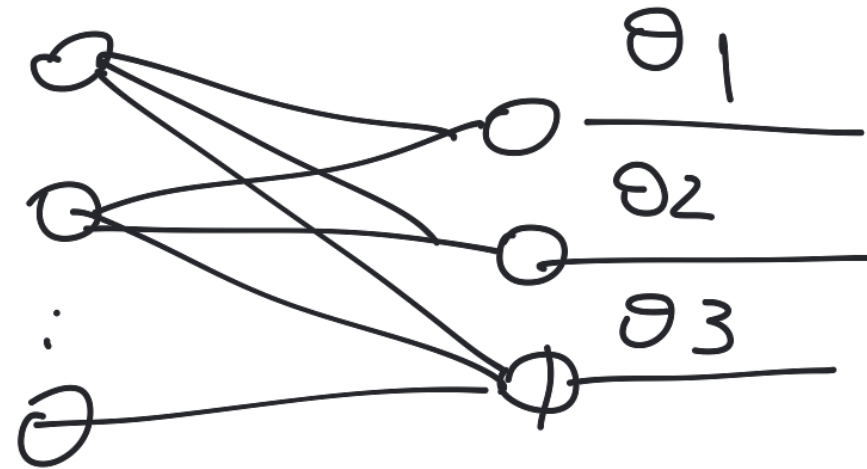
$$\frac{\partial J}{\partial w_j} = \frac{\partial}{\partial w_j} \left(\frac{1}{2} \sum_{i=1}^N e_i^2 \right) + \frac{\partial}{\partial w_j} \left(\lambda \sum_j w_j^2 \right)$$

$$= -e_i \cdot \phi'(v_i) \cdot y_k + 2 \cdot \lambda \cdot w_j$$

Problem 11

3-class with one-hot encoding

0
0
:
0

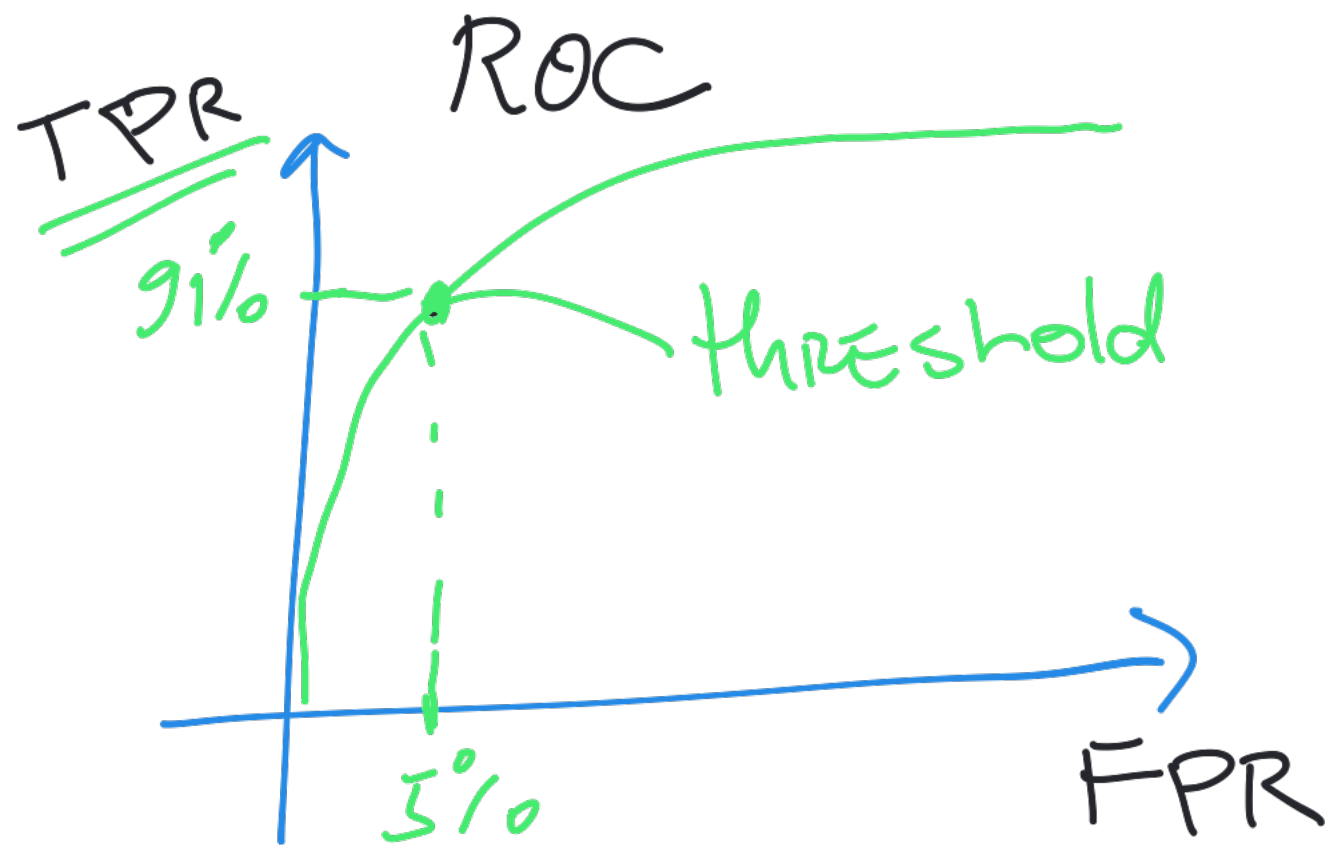


$$\frac{\theta_1}{\sum_{i=1}^3 \theta_i}$$

$$\frac{\theta_2}{\sum_{i=1}^3 \theta_i}$$

$$\frac{\theta_3}{\sum_{i=1}^3 \theta_i}$$

$$\begin{bmatrix} 0.4 \\ 0.3 \\ 0.3 \end{bmatrix} \rightarrow \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$$



Threshold at the output layer, we will have
TP, TN, FP, FN