Algorithm 5 Object Detection Head

Require: Anchor boxes, ground truth labels and box coordinates, hyperparameters α and β

Ensure: Predicted class probabilities and box offsets

function EFFICIENTDETHEAD(*AnchorBoxes*, *Labels*, *BoxCoordinates*, α, β)

$N \leftarrow$ number of anchor boxes

$C \leftarrow$ number of classes

$y_{i,c} \leftarrow$ ground truth class label for the i-th anchor box and c-th class

$\hat{y}i, c \leftarrow$ predicted probability of the i-th anchor box belonging to the c-th class

$t \leftarrow$ ground truth box coordinates

$\hat{t} \leftarrow$ predicted box coordinates

$w_i \leftarrow i$-th weight of the network

$$Lcls \leftarrow -\frac{1}{N} \sum_{i=1}^{N} \sum_{c=1}^{C} y_{i,c} \log\left(\hat{y}i, c\right)$$

$$Lbox \leftarrow \frac{1}{N} \sum_{i=1}^{N} \sum_{j \in x,y,w,h} smoothL1\left(t_j - \hat{t}j\right)$$

$$Lreg \leftarrow \frac{1}{N} \sum i = 1^N \left|w_i\right| 2^2$$

$$L \leftarrow Lcls + \alpha L_{box} + \beta L_{reg}$$

return $\hat{y}_{i,c}$, $\hat{t}$

end function