

Question 1: Explain the difference between the 0-1 loss function and perceptron loss function in classification.

Question 2: Explain Huber loss and the function of the δ parameter.

Question 3: Object detection is a “multi-task” learning problem. Identify and explain the two tasks in object detection.

Answer Question 1: The 0-1 loss function in classification describes a function that produces a loss of 0 when the predicted value has the same sign as the real label and a loss of 1 when the predicted value does not have the same sign as the real label. The perceptron loss function is similar in that it is piecewise, and that the loss is 0 when the real and predicted values have the same sign. However this function produces a loss equal to the absolute distance between the predicted and real label when the signs are different.

Answer Question 2: The Huber loss is a loss function for regression that incorporates square loss and absolute loss. The δ parameter serves as a boundary for the function (dependent on the real value minus the predicted value) to use either square loss or absolute loss. When the difference between the real and predicted values is within the $\pm \delta$ window, square loss is used, otherwise absolute loss is used

Answer Question 3: The two tasks in object detection are object classification and object localization. Object localization is a regression task responsible for defining the location of the target object in the image with a bounding box. Object classification is the task responsible for defining the class of the object within the bounding box.