

National University of Computer and Emerging Sciences, Lahore Campus



Course: Fundamentals of Computer Vision
Program: BS(Data Science)
Duration: -
Due Date: 9-May-24
Section: B
Exam: Quiz 2 v2

Course Code: CS-4059
Semester: Spring 2024
Total Marks: 10
Weight
Page(s): 1
Roll No.

Instruction/Notes:

- Read the Questions carefully. Make sure you have understood the requirements and expectations of the Questions.
- Any form of cheating or plagiarism will result in an award of ZERO marks.
- Crying is allowed but do it silently and please be sure to use your own tissue.

Question [10 marks]

Consider a YOLO object detection model with the following parameters:

- Predicted bounding box coordinates (x, y, w, h): (3, 4, 5, 6)
- Ground truth bounding box coordinates (x', y', w', h'): (2, 3, 6, 7)
- Number of classes: 4
- Confidence score for object presence: 0.8

Given that the YOLO loss function components are defined as follows:

$$\text{Localization loss: } \lambda_{coord} \sum_{i=0}^{S^2} \sum_{j=0}^B \mathbb{1}_{ij}^{obj} [(x_i - \hat{x}_i)^2 + (y_i - \hat{y}_i)^2]$$

$$\text{Confidence loss: } \sum_{i=0}^{S^2} \sum_{j=0}^B \mathbb{1}_{ij}^{obj} (C_i - \hat{C}_i)^2$$

$$\text{Class loss: } \lambda_{class} \sum_{i=0}^{S^2} \sum_{j=0}^B \mathbb{1}_{ij}^{obj} \sum_{c=0}^C (p_i(c) - \hat{p}_i(c))^2$$

Assume ($\lambda_{coord} = 5$) and ($\lambda_{class} = 1$).

Calculate the total YOLO loss for the given parameters.