

Object Detection (Concepts)

Computer Vision

1500

Exercise 1 : Calculate IOU for Object Detection

Given two bounding boxes, calculate the Intersection Over Union (IOU).

Bounding Box 1 (Predicted):

- Top-left corner: $(x1, y1) = (2, 2)$
- Bottom-right corner: $(x2, y2) = (6, 6)$

Bounding Box 2 (Ground Truth):

- Top-left corner: $(x1, y1) = (4, 4)$
- Bottom-right corner: $(x2, y2) = (8, 8)$

Exercise 2 : Calculate Precision and Recall in Object Detection

- Given the following predictions and ground truths, determine the True Positives, False Positives, and False Negatives based on an IOU threshold of 0.5.
- Calculate Precision and Recall.

Predictions:

Prediction 1: Top-left (1, 1), Bottom-right (4, 4)

Prediction 2: Top-left (2, 2), Bottom-right (5, 5)

Prediction 3: Top-left (7, 7), Bottom-right (9, 9)

Ground Truths:

Ground Truth 1: Top-left (1, 1), Bottom-right (3, 3)

Ground Truth 2: Top-left (2, 2), Bottom-right (6, 6)

Ground Truth 3: Top-left (8, 8), Bottom-right (10, 10)

Exercise 3: Calculate Mean Average Precision (mAP) in Object Detection

Mean Average Precision (mAP) is a metric used to evaluate the performance of object detection models. It involves calculating the average precision (AP) for each class and then taking the mean of these values.

Tasks:

- Given a set of predictions and ground truths for two classes (Class 1 and Class 2), calculate the Average Precision (AP) for each class.
- Calculate the Mean Average Precision (mAP).

Data:

Class 1 Predictions and Ground Truths

Predictions:

- Prediction 1: Confidence 0.9, Top-left (1, 1), Bottom-right (4, 4)
- Prediction 2: Confidence 0.8, Top-left (2, 2), Bottom-right (5, 5)
- Prediction 3: Confidence 0.7, Top-left (3, 3), Bottom-right (6, 6)

Ground Truths:

- Ground Truth 1: Top-left (1, 1), Bottom-right (3, 3)
- Ground Truth 2: Top-left (2, 2), Bottom-right (5, 5)

Class 2 Predictions and Ground Truths

Predictions:

- Prediction 1: Confidence 0.85, Top-left (5, 5), Bottom-right (7, 7)
- Prediction 2: Confidence 0.75, Top-left (6, 6), Bottom-right (8, 8)

Ground Truths:

- Ground Truth 1: Top-left (5, 5), Bottom-right (7, 7)