**REGULAR QUESTIONS – 1**

**Object Detection Questions**

1. What is the role of Non-Maximum Suppression (NMS) in object detection?

2. Explain the difference between mean Average Precision (mAP) and precision-recall curves in object detection evaluation.

3. How do single-shot detectors (e.g., SSD) handle multi-scale object detection?

4. What are the challenges of detecting overlapping objects, and how can they be addressed?

5. Describe the impact of anchor box size on object detection performance.

**Object Detection Questions**

**1.** NMS is used to remove redundant bounding boxes by selecting the box with the highest confidence score and suppressing others with a high Intersection over Union (IoU) threshold. It ensures that only the most relevant bounding box remains for each detected object.

**2.**  **Precision-Recall Curve:** It plots precision against recall at different confidence thresholds, showing how well a model balances precision and recall.

 **mAP (mean Average Precision):** It is the average precision over multiple IoU thresholds or categories, summarizing the overall detection performance of the model. A higher mAP indicates better object detection accuracy.

**3.** SSD uses multiple feature maps at different resolutions to detect objects of varying sizes. Lower-resolution feature maps detect large objects, while higher-resolution feature maps capture small objects. This allows SSD to effectively detect objects across different scales.

**4.**  **Challenges:**

* Multiple detections for the same object.
* Objects occluding each other, reducing visibility.
* High IoU between different objects causing misclassification.

 **Solutions:**

* Use **Non-Maximum Suppression (NMS)** to eliminate redundant detections.
* Apply **IoU threshold tuning** to balance recall and precision.
* Implement **instance segmentation** (e.g., Mask R-CNN) to differentiate overlapping objects.

**5.**

* + **Anchor boxes help detect objects of different shapes and sizes. If anchor sizes are poorly chosen:**
    - **Too small: Larger objects might not fit, leading to poor detection.**
    - **Too large: Small objects might be missed.**
  + **Proper anchor box selection improves detection accuracy and recall, ensuring better alignment with object scales in the dataset.**