1. What do REGION PROPOSALS entail?

2. What do you mean by NON-MAXIMUM SUPPRESSION? (NMS)

3. What exactly is mAP?

4. What is a frames per second (FPS)?

5. What is an IOU (INTERSECTION OVER UNION)?

6. Describe the PRECISION-RECALL CURVE (PR CURVE)

7. What is the term "selective search"?

8. Describe the R-CNN model's four components.

9. What exactly is the Localization Module?

10. What are the R-CNN DISADVANTAGES?

Answer:

1. Region proposals refer to the process of identifying potential regions of interest in an image for further processing or analysis. In object detection tasks, region proposals are typically generated using algorithms such as Selective Search or Region Proposal Networks (RPNs) that identify regions likely to contain objects based on features such as color, texture, or contrast.
2. Non-Maximum Suppression (NMS) is a technique used in object detection and localization to reduce the number of overlapping bounding boxes generated by object detectors. NMS involves setting a threshold for the IoU (Intersection over Union) between bounding boxes and then selecting the box with the highest confidence score, suppressing any other boxes that have a significant overlap with it.
3. mAP (mean Average Precision) is a metric used to evaluate the accuracy of object detection and localization models. It is calculated as the average precision over all classes and is a measure of how well a model can detect and locate objects in an image.
4. Frames per second (FPS) is a measure of how many frames a system can process in one second. In computer vision, FPS is often used to describe the speed of object detection or tracking algorithms.
5. Intersection over Union (IoU) is a measure of the overlap between two bounding boxes used in object detection and localization. It is calculated as the ratio of the intersection area of two bounding boxes to their union area.
6. The Precision-Recall (PR) Curve is a plot of the precision and recall values for different classification thresholds in binary classification problems. Precision is the ratio of true positives to the total number of predicted positives, while recall is the ratio of true positives to the total number of actual positives. The PR curve provides a trade-off between precision and recall, allowing one to select the best threshold for a given application.
7. Selective Search is an algorithm used to generate region proposals for object detection and localization tasks. The algorithm works by grouping pixels together into larger superpixels based on their color and texture, and then iteratively merging these superpixels into larger regions that are likely to contain objects.
8. The R-CNN model (Region-based Convolutional Neural Network) consists of four main components: (1) a Region Proposal Network (RPN) that generates candidate object regions, (2) a shared convolutional network that extracts features from the input image and the proposed regions, (3) a region-specific fully connected network that classifies each proposed region and refines the bounding box coordinates, and (4) a post-processing step that applies Non-Maximum Suppression (NMS) to eliminate duplicate detections.
9. The Localization Module in the R-CNN model is responsible for estimating the precise location and size of an object within a proposed region. This is achieved by regressing the predicted bounding box coordinates from the region-specific fully connected network against the ground-truth bounding box coordinates.
10. Some of the disadvantages of the R-CNN model include its slow training and inference times, its dependence on external region proposal algorithms, and its high memory requirements due to the large number of candidate regions that need to be processed. Additionally, the model can struggle to detect small or occluded objects and may produce inaccurate detections in cluttered or complex scenes.