1. What do REGION PROPOSALS entail?

**Region proposals refer to a technique used in object detection and image segmentation. It involves generating a set of candidate bounding boxes or regions in an image that potentially contain objects of interest. These regions are proposed based on certain criteria, such as the likelihood of containing objects or salient image regions. Region proposal methods help reduce the computational burden in object detection tasks by focusing computation on a limited number of regions, rather than examining the entire image.**

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

**Non-Maximum Suppression is a post-processing step in object detection algorithms. After generating multiple overlapping bounding box predictions for objects, NMS is used to select the most confident and non-overlapping predictions. It works by iteratively selecting the bounding box with the highest confidence score and suppressing (removing) overlapping bounding boxes that have a high Intersection over Union (IoU) with the selected one. NMS helps eliminate redundant and duplicate predictions, resulting in a cleaner and more accurate set of object detections.**

1. What exactly is mAP?

**mAP is a commonly used evaluation metric in object detection and image retrieval tasks. It measures the average precision across multiple classes or categories of objects. Precision and recall values are calculated for each class, and the average precision (AP) is computed for each class separately. The mAP is the mean of these AP values across all classes. It provides a comprehensive measure of the model's performance in detecting objects of various categories.**

1. What is a frames per second (FPS)?

**FPS is a metric used to measure the speed or performance of video processing or rendering systems. It represents the number of frames (individual images) displayed or processed per second in a video or real-time system. In the context of computer vision, higher FPS indicates that the system can process images or video frames more quickly, which is crucial for real-time applications like object detection, tracking, and video analysis.**

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

**Intersection over Union is a metric used to evaluate the overlap between two bounding boxes or regions. It is calculated by dividing the area of overlap between two bounding boxes by the area of their union. IoU is often used in object detection to determine how well a predicted bounding box aligns with a ground truth bounding box. High IoU values indicate better alignment and accuracy in object localization.**

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

**The Precision-Recall curve is a graphical representation of a model's performance in binary classification tasks, particularly when dealing with imbalanced datasets. It plots precision (positive predictive value) on the y-axis and recall (true positive rate) on the x-axis as the decision threshold for classification is varied. The PR curve helps visualize the trade-off between precision and recall at different threshold settings. A higher area under the PR curve (AUC-PR) indicates better overall performance.**

1. What is the term &quot;selective search&quot;?

**Selective Search is a region proposal method used in object detection. It generates a diverse set of candidate regions in an image based on a combination of low-level image features, such as color, texture, and intensity. Selective Search aims to produce a varied set of region proposals that cover objects at different scales and positions within the image. These proposals can then be fed into an object detection algorithm to identify and classify objects.**

1. Describe the R-CNN model&#39;s four components.

**The R-CNN (Region-based Convolutional Neural Network) model consists of four main components:**

**Selective Search: This component generates region proposals that potentially contain objects of interest.**

**CNN Feature Extractor: It extracts features from each region proposal using a convolutional neural network (CNN).**

**SVM Classifiers: SVMs (Support Vector Machines) are trained for each object class to classify the extracted features from the region proposals.**

**Bounding Box Regressors: These regressors are used to refine the bounding box coordinates of the region proposals.**

1. What exactly is the Localization Module?

**The localization module in object detection models, such as R-CNN, is responsible for refining the location (bounding box coordinates) of the region proposals generated by the region proposal component. It takes the features extracted from the region proposal and refines the bounding box to more accurately align with the object's location in the image. This module helps improve the precision of object localization.**

1. What are the R-CNN DISADVANTAGES?

**Computationally Inefficient: R-CNN processes each region proposal independently, leading to redundant computations for shared features. This makes it computationally expensive and slow.**

**Fixed Number of Proposals: R-CNN relies on a fixed number of region proposals, which may result in missed objects or excessive false positives.**

**Training Complexity: Training R-CNN involves multiple stages, including training SVMs and bounding box regressors, making it cumbersome and slow.**

**Inflexible to Object Number: R-CNN is designed for fixed-size inputs and does not handle a variable number of objects in an image effectively.**

**Not End-to-End: R-CNN's multi-stage training process is not end-to-end, making it less suitable for end-to-end deep learning pipelines**