

Image Segmentation and Maskrcnn

Assignment Questions



Image Segmentation and Maskrcnn

1. What is image segmentation, and why is it important?
2. Explain the difference between image classification, object detection, and image segmentation.
3. What is Mask R-CNN, and how is it different from traditional object detection models?
4. What role does the "RoIAlign" layer play in Mask R-CNN?
5. What are semantic, instance, and panoptic segmentation?
6. Describe the role of bounding boxes and masks in image segmentation models.
7. What is the purpose of data annotation in image segmentation?
8. How does Detectron2 simplify model training for object detection and segmentation tasks?
9. Why is transfer learning valuable in training segmentation models?
10. How does Mask R-CNN improve upon the Faster R-CNN model architecture?
11. What is meant by "from bounding box to polygon masks" in image segmentation?
12. How does data augmentation benefit image segmentation model training?
13. Describe the architecture of Mask R-CNN, focusing on the backbone, region proposal network (RPN), and segmentation mask head.
14. Explain the process of registering a custom dataset in Detectron2 for model training.
15. What challenges arise in scene understanding for image segmentation, and how can Mask R-CNN address them?
16. How is the "IoU (Intersection over Union)" metric used in evaluating segmentation models?
17. Discuss the use of transfer learning in Mask R-CNN for improving segmentation on custom datasets.
18. What is the purpose of evaluation curves, such as precision-recall curves, in segmentation model assessment?
19. How do Mask R-CNN models handle occlusions or overlapping objects in segmentation?
20. Explain the impact of batch size and learning rate on Mask R-CNN model training.
21. Describe the challenges of training segmentation models on custom datasets, particularly in the context of Detectron2.
22. How does Mask R-CNN's segmentation head output differ from a traditional object detector's output?

Practical

1. Perform basic color-based segmentation to separate the blue color in an image.
2. Use edge detection with Canny to highlight object edges in an image loaded.
3. Load a pretrained Mask R-CNN model from PyTorch and use it for object detection and segmentation on an image.
4. Generate bounding boxes for each object detected by Mask R-CNN in an image.
5. Convert an image to grayscale and apply Otsu's thresholding method for segmentation.
6. Perform contour detection in an image to detect distinct objects or shapes.
7. Apply Mask R-CNN to detect objects and their segmentation masks in a custom image and display them.
8. Apply k-means clustering for segmenting regions in an image.