

Maharaja Agrasen Model School

Class 10

Question Bank - Computer Vision

Subjective Questions

1. Explain the concept of Computer Vision and its significance in Artificial Intelligence.

Answer:

Computer Vision is a branch of AI that enables machines to interpret and understand visual information from images and videos. It automates tasks like object detection, classification, and segmentation, which are vital in fields like healthcare, autonomous vehicles, security, and retail.

2. Describe the role of pixels and resolution in digital images.

Answer:

Pixels are the smallest units of a digital image, and resolution refers to the total number of pixels, typically given as width x height (e.g., 1280x1024). Higher resolution means more pixels, resulting in greater detail and clarity in the image.

3. Compare and contrast grayscale images and RGB images.

Answer:

Grayscale images consist of shades of gray, with a single color channel, while RGB images use three channels (Red, Green, Blue) to represent millions of colors. Grayscale images show only variations in light intensity, whereas RGB images display a full range of colors.

4. What are the different tasks performed in Computer Vision for single and multiple objects?

Answer:

For single objects:

- **Classification:** Labeling the entire image.
- **Classification + Localization:** Identifying and locating the object.

For multiple objects:

- **Object Detection:** Finding and locating multiple objects.
- **Instance Segmentation:** Categorizing and labeling each object and its pixels.

5. How does Computer Vision contribute to the development of self-driving cars?

Answer:

Computer Vision allows self-driving cars to perceive their environment by detecting and identifying objects like vehicles, pedestrians, and road signs. This information is used to make real-time decisions for navigation and safety.

6. Discuss the importance of pixel value in digital images and how it is determined.

Answer:

Pixel value determines the color or brightness of a pixel, impacting image quality. In grayscale images, values range from 0 (black) to 255 (white), while in RGB images, each channel (Red, Green, Blue) has a value that contributes to the final color.

7. Describe how Computer Vision is applied in the field of security and surveillance.

Answer: Computer Vision in security and surveillance involves the use of cameras and algorithms to monitor areas, detect unusual activities, and recognize faces for security purposes. It enhances the ability to detect and respond to threats in real-time, making it crucial in modern security systems.

8. Explain the difference between Object Detection and Image Classification in Computer Vision.

Answer: Image Classification involves assigning a label to an entire image, indicating the primary object or scene. Object Detection, on the other hand, involves identifying and locating multiple objects within an image, often using bounding boxes to mark their positions.

9. Discuss the significance of OpenCV in Computer Vision and give an example of its use.

Answer: OpenCV is an open-source computer vision library that provides tools for processing images and videos. It's significant because it simplifies the development of real-time vision applications. For example, it can be used to develop facial recognition systems by detecting and identifying faces in real-time video streams.

10. How does Computer Vision contribute to advancements in healthcare?

Answer: Computer Vision contributes to healthcare by enabling the analysis of medical images, such as X-rays, MRIs, and CT scans. It helps in diagnosing conditions, planning surgeries, and monitoring patient progress, leading to more accurate and efficient medical care.

11. In what ways does the use of Computer Vision in autonomous vehicles improve safety?

Answer: Computer Vision in autonomous vehicles improves safety by allowing the car to detect obstacles, recognize traffic signs, and monitor the surrounding environment. This capability helps the vehicle make informed decisions in real-time, reducing the likelihood of accidents and enhancing overall road safety.

12. Describe how Computer Vision is applied in the field of agriculture.

Answer: Computer Vision is used in agriculture to monitor crop health, detect weeds, and assess soil conditions. By analyzing images captured by drones or cameras, farmers can make informed decisions on irrigation, fertilization, and pest control, leading to increased crop yield and sustainability.

13. Explain the difference between Image Classification and Object Detection in Computer Vision.

Answer: Image Classification assigns a label to an entire image, identifying the main subject or scene. Object Detection goes further by identifying and locating multiple objects within an image, often using bounding boxes to highlight each object.

14. How does Computer Vision contribute to the development of augmented reality (AR) applications?

Answer: Computer Vision enables AR applications by recognizing and tracking real-world objects and environments. It allows digital content to be overlaid accurately on the physical world, providing interactive experiences such as virtual try-ons, gaming, and navigation.

15. Discuss the significance of Object Detection in security surveillance systems.

Answer: Object Detection is crucial in security surveillance as it allows systems to automatically identify and track potential threats, such as intruders or unattended objects. It enhances the efficiency of monitoring large areas and provides real-time alerts, improving overall security.

16. In what ways is Computer Vision used to improve customer experience in online shopping?

Answer: Computer Vision is used in online shopping to enhance product search through image recognition, enable virtual try-on features, and recommend products based on visual similarity. This technology makes the shopping experience more personalized and user-friendly.