CSD TEAM-16

YOLO Real Time Object Detection

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Abstract :

YOLO (You Only Look Once) is one of the best approaches to object detection. Real-time detection plays a significant role in various domains such as video surveillance, computer vision, autonomous driving, and the operation of robots. The YOLO algorithm has emerged as a well-liked and structured solution for real-time object detection due to its ability to detect items in one operation through a neural network. This research article seeks to provide an extensive understanding of the defined YOLO algorithm, its architecture, and its impact on real-time object detection. The detection process is identified as a regression problem where frame object detection leads to spatially separated bounding boxes. Tasks such as recognition, detection, and localization, along with widespread applicability in real-world scenarios, make object detection a crucial subdivision of computer vision.
The YOLO algorithm detects objects in real-time using Convolutional Neural Networks (CNNs). This paper serves as a comprehensive guide to understanding the detection of objects in real-time using the YOLO algorithm. By examining the architecture, variations, and implementation details, readers can gain a deeper understanding of YOLO's capabilities.

Input:

- **Real-time video or image data**: The live video or images captured by a camera are fed into the system for object detection.
- **Various objects in the scene**: Objects within the video or images that need to be detected (e.g., cars, pedestrians, animals, etc.).
- **Pre-trained YOLO model weights**: The YOLO algorithm uses pre-trained model weights to perform object detection efficiently.

Process:

1. **Convolutional Neural Networks (CNNs)**:
    - YOLO processes each frame of the live camera feed using CNNs to detect features and classify objects in real time.
2. **Real-time Detection**:
    - YOLO performs object detection in a single pass through the neural network, making it suitable for live video streams.
3. **Bounding Box Regression**:
    - YOLO predicts bounding boxes around objects in each frame and assigns class labels to these objects, effectively localizing them in the scene.

Output:

- **Bounding Boxes**:
    - Boxes are drawn around the detected objects in the live feed, highlighting their positions in the frame.

- **Class Labels**:
  - Each detected object is assigned a class label, such as "car", "person", or "dog".
- **Confidence Scores**:
  - A confidence score is provided for each detection, indicating the likelihood that the object in the bounding box is correctly identified.