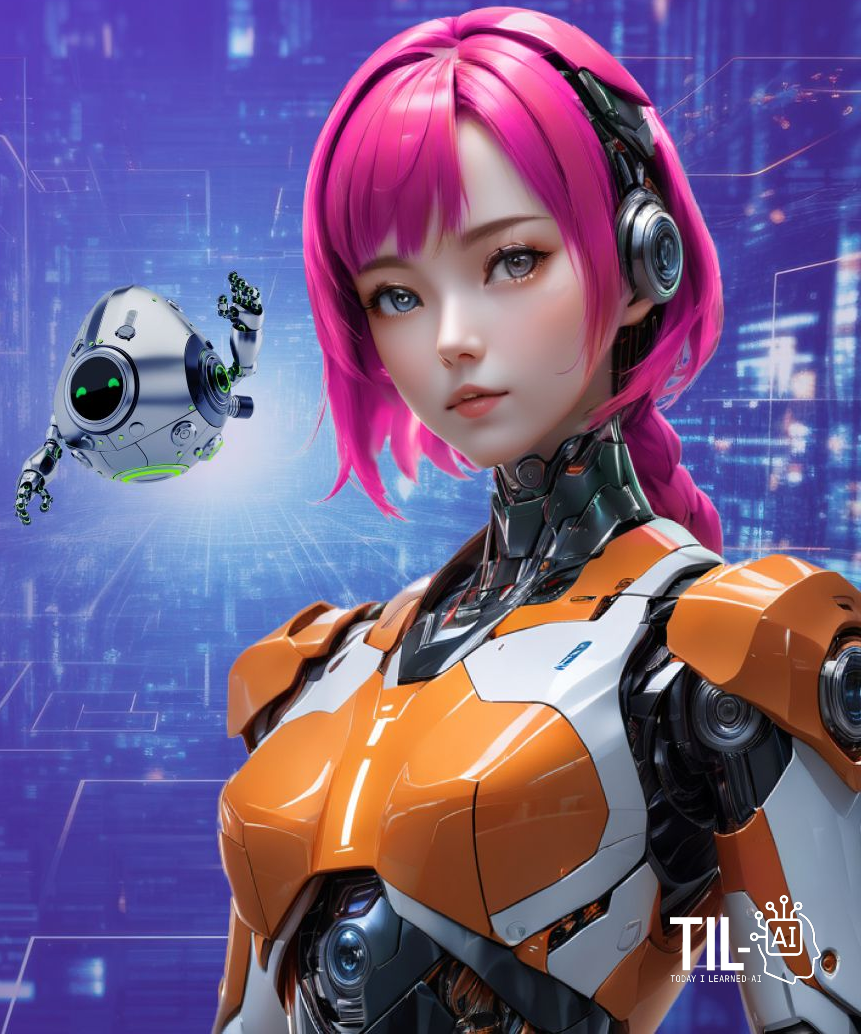
CV / VLM

Unit 2: Introduction to Object Detection (OD)



2.1.1

Overview of Object Detection

What is object detection?

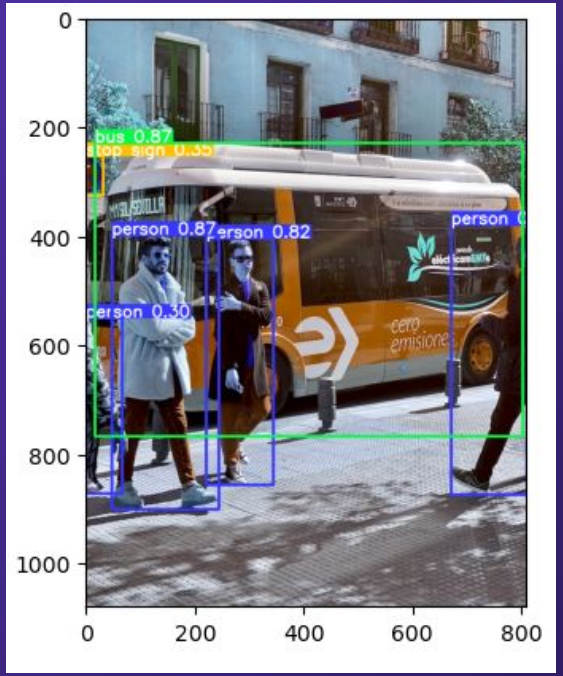
TIL-AI
TODAY I LEARNED AI

What is Object Detection?

Localizing and identifying objects within an image.

Tasks:

What	**Classification**: Assigning a class label to the object (e.g. bus, person, dog).
Where	**Localization**: Pinpointing the bounding box (rectangular frame) around the detected object.
Score	**Confidence Score**: Indicating the model's certainty in the detection and classification.

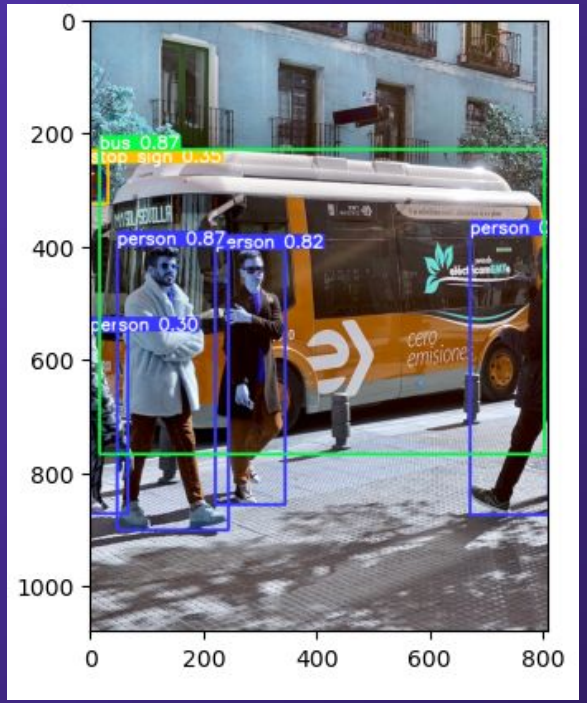


How Object Detection Works

1. **Feature Extraction:**
   The model extracts relevant features from the image, like edges, shapes, and colors, often using convolutional neural networks (CNNs).

2. **Bounding Box Prediction:**
   The bounding box model predicts bounding boxes for potential objects in the image.

3. **Classification and Confidence Score:**
   The CNN model classifies the objects within the bounding boxes and assigns a confidence score for each detection.



OD Algorithm Examples

There are many object detection algorithms available. We will discuss:

- Region-CNN (R-CNN)
- Single-Shot Detectors (SSD)
- You Only Look Once (YOLO)
- Vision Transformers (ViT)

Explored in Unit 6!

Applications of OD

Object detection has a wide range of applications, including:

- **Self-driving cars:** Detecting pedestrians, vehicles, and traffic signs.
- **Video surveillance:** Tracking objects and monitoring activity.
- **Medical image analysis:** Detecting tumors and other abnormalities.
- **Robot navigation:** Identifying obstacles and objects in the environment.