CV / VLM

Unit 2: Introduction to Object Detection (OD)

2.4.1

Handling Challenges

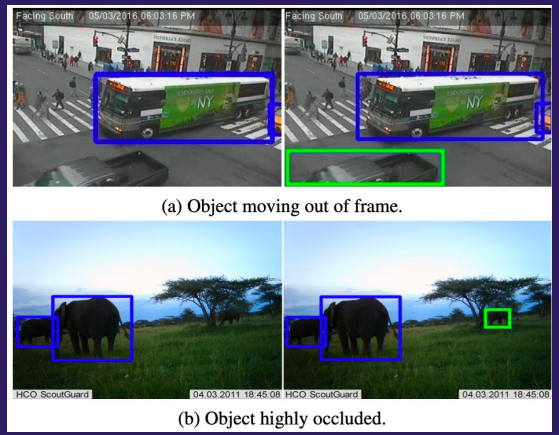
Real-world challenges in OD

TIL-AI
TODAY I LEARNED AI

Real-world Challenges in OD

1. Occlusion and Clutter:

- Objects in real-world scenarios are often partially hidden behind each other (occlusion) or crowded together (clutter).



(a) Object moving out of frame.

(b) Object highly occluded.

Adapted from https://arxiv.org/pdf/1912.03538.pdf

Real-world Challenges in OD (cont.)

2. Scale Variation:

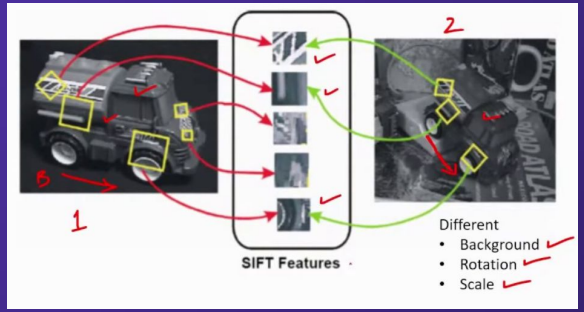
- The size of an object in an image can vary greatly depending on its distance from the camera
- Models need to be robust enough to detect objects across a wide range of scales

3. Viewpoint Variation:

- Objects can appear differently depending on the viewing angle
- Models need to be able to recognize objects regardless of their orientation or pose

4. Background Complexity:

- Complex backgrounds with textures or patterns can confuse models and lead to false detections



Scale Invariant Feature Transform | Computer Vision

Real-world Challenges in OD (cont.)

(a) A picture where colour balance is incorrect due to prevailing illumination conditions
(b) A reproduction where blue colour cast has been removed
(c) Another output where illuminant is estimated using grey world algorithm.

5. Illumination Changes:

- Lighting conditions can significantly impact the appearance of objects in an image
- Models need to perform well under various lighting conditions, from bright sunlight to low-light environments

6. Limited Training Data

- The accuracy and robustness of object detection models heavily rely on the quality and quantity of training data
- Rare or uncommon objects might not be well-represented in training datasets, leading to poor performance on those specific objects