

**ASSIGNMENT**

Student Name : Nasir Mehmood| Nokhaiz Student ID : CSC-21F-097 | CSC-21F-099

Semester : 6-C Session : Spring 2024

Course : Digtital Imag Processing Teacher : Sir. Anwar Ali Sathio

|  |  |  |
| --- | --- | --- |
| **Feature** | **Faster R-CNN** | **YOLO (You Only Look Once)** |
| **Architecture** | Two-stage detector | Single-stage detector |
| **Speed** | Slower, due to its two-stage approach | Faster, processes the entire image in one go |
| **Accuracy** | Higher accuracy in localization and detection | Good accuracy, but generally lower than Faster R-CNN |
| **Detection Process** | 1. Region Proposal Network (RPN) generates region proposals<br> 2. CNN classifies proposals and refines bounding boxes | Single CNN predicts bounding boxes and class probabilities simultaneously |
| **Computational Complexity** | More complex, higher computational cost | Less complex, lower computational cost |
| **Suitability** | Suitable for applications where accuracy is critical | Suitable for real-time applications due to its speed |
| **Training Time** | Longer training time | Shorter training time |
| **Handling Small Objects** | Better at detecting small objects | Struggles more with small object detection |
| **Application Scenarios** | Use cases like object detection in images where high precision is required, e.g., medical imaging | Use cases like real-time object detection in videos, autonomous driving |
| **Anchors/Region Proposals** | Generates region proposals using RPN | Uses predefined anchors for bounding box prediction |
| **Backbone Network** | Commonly uses ResNet, VGG, etc. | Commonly uses Darknet, can be modified to use others |
| **Flexibility** | More flexible in terms of network design and feature extraction | More rigid but optimized for end-to-end training and inference |
| **Region Proposal Generation** | Separate stage for region proposals using selective search or RPN | Directly predicts bounding boxes without separate region proposal stage |
| **Post-Processing** | Requires Non-Maximum Suppression (NMS) for final predictions | Also requires NMS but integrates it more efficiently due to single pass prediction |