

# SUMMARY

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## Faster R-CNN: Towards Real-Time Object Detection with Region Proposal Networks

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# 1 SUMMARY

## 1.1 Overview

This paper improves upon the Fast R-CNN model, making it faster and more accurate. The key drawback of the R-CNN and Fast R-CNN was the use of selective search for region proposals. The Faster R-CNN architecture improves upon it by replacing the selective search algorithm with a Convolution-based Region Proposal Network.

## 1.2 Fast R-CNN architecture and Training

Initially, the full input image is fed into convolution layers which output feature vectors for the Region Proposal Network. The Region Proposal Network then produces  $k$  anchor boxes and  $k$  class outputs. The class outputs are the probability there is an object in the anchor box. The  $k$  anchor boxes are to identify objects of different scales.

For training, the Region Proposal Network is first trained to propose regions, and the Fast R-CNN with this region proposal network is trained. The Detector network is then used to fine-tune the region proposal network. Finally, the Fast R-CNN model is fine-tuned.

## 1.3 Results

The Faster R-CNN model outperforms previous architectures in terms of speed, and accuracy. It is much faster while training and relatively faster in practical scenarios.

## 1.4 Pros and Cons

The Faster R-CNN utilizes Convolutions for region proposals, discarding the slow selective search algorithms used before.

Its major drawback compared to modern architectures like YOLO is that it still requires separate region proposal networks, which makes it slower