Computer Vision Project

Object Recognition

Performance comparison between Fast RCNN and YOLOv5 in terms of mAP

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ISI Kolkata , 2022

Outline

1. Fast RCNN
2. YOLOv5
3. Mean Average Precision

Data Collection and Annotations

- “**Fruit Images for Object Detection” dataset downloaded from Kaggle**

  https://www.kaggle.com/datasets/mbkinaci/fruit-images-for-object-detection

- **Data annotation: Make Sense (https://www.makesense.ai/)**

About Dataset

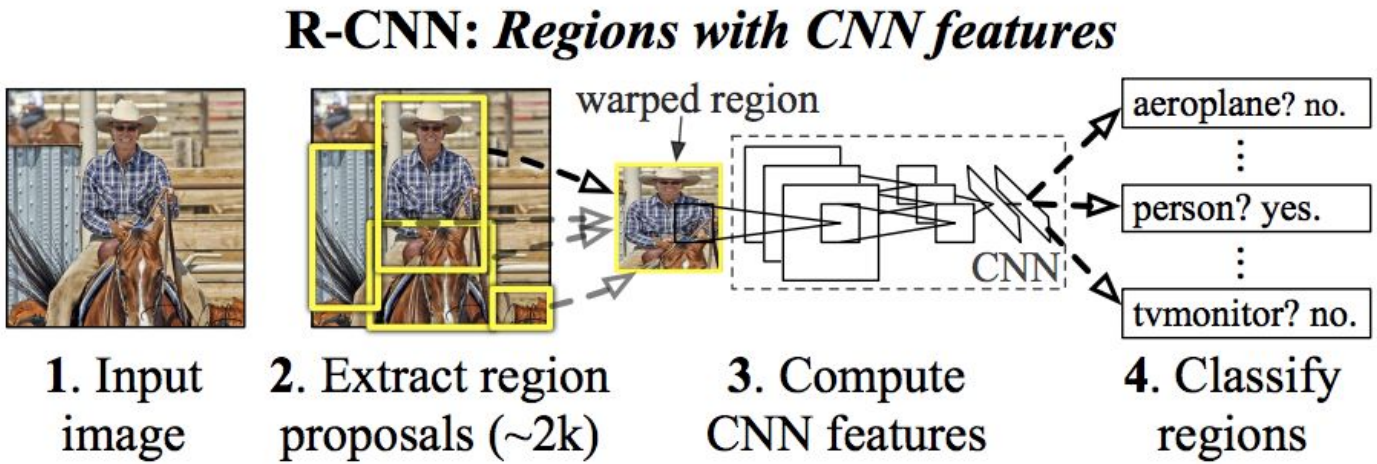
- **Context**:
  - A different dataset for object detection. 240 images in train folder. 60 images in test folder.

- **Content**:

  3 different class:

  - Apple
  - Banana
  - Orange

Fast RCNN



Source: https://towardsdatascience.com/r-cnn-fast-r-cnn-faster-r-cnn-yolo-object-detection-algorithms-36d53571365e

Fast RCNN

Selective Search

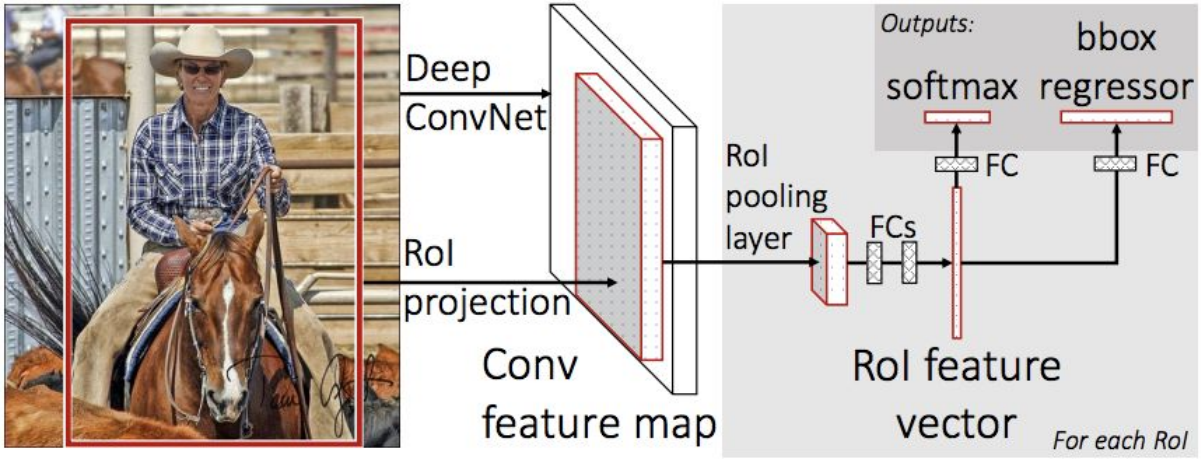
- Generate initial sub-segmentation and many candidate regions.
- Use greedy algorithm to recursively combine similar regions into larger ones.
- Use the generated regions to produce the final candidate region proposals.

Problems with R-CNN

- It still takes a huge amount of time to train the network.
- It cannot be implemented real time as it takes around 47 seconds for each test image.
- The selective search algorithm is a fixed algorithm. Therefore, no learning is happening at that stage.

Source: https://towardsdatascience.com/r-cnn-fast-r-cnn-faster-r-cnn-yolo-object-detection-algorithms-36d53571365e

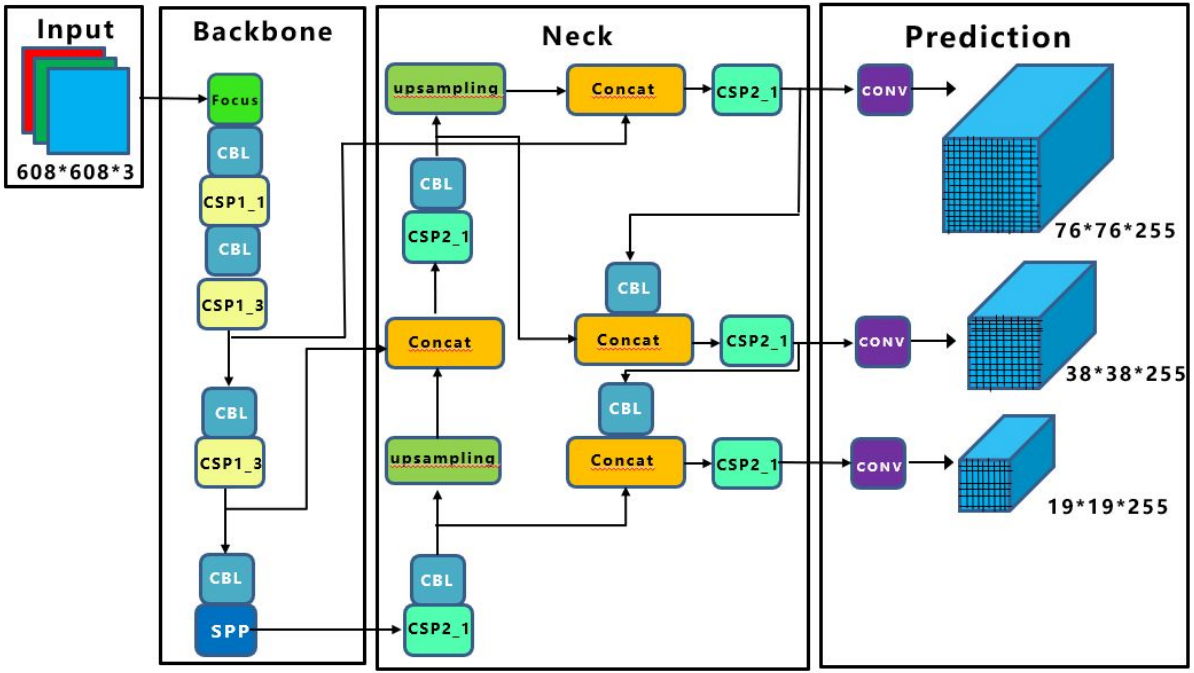
Fast RCNN



The reason “Fast R-CNN” is faster than R-CNN is because instead of feeding the region proposals to the CNN, we feed the input image to the CNN to generate a convolutional feature map

Source: https://towardsdatascience.com/r-cnn-fast-r-cnn-faster-r-cnn-yolo-object-detection-algorithms-36d53571365e

YOLOv5



Source:https://dl.acm.org/doi/fullHtml/10.1145/3512388.3512395

Mean Average Precision

- mAP is a popular evaluation metric used for object detection (i.e localisation and classification).
  - Localization determines the location of an instance.
  - classification tells you what it is.
- The general definition for the Average Precision (AP) is finding the area under the precision-recall curve.
- mAP is the average of all APs.

Source:https://towardsdatascience.com/map-mean-average-precision-might-confuse-you-5956f1bfa9e2

Mean Average Precision

Metric	Fast RCNN	YOLOv5
mAP	0.57	0.60
Time	25.92 min (30 Epoch)	2.32 min (200 Epoch)

GitHub Link

https://github.com/pradipdas9040/Computer-Vision/tree/main/Object%20Detection


thank
you