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HOW OBJECT DETECTION WORKS?

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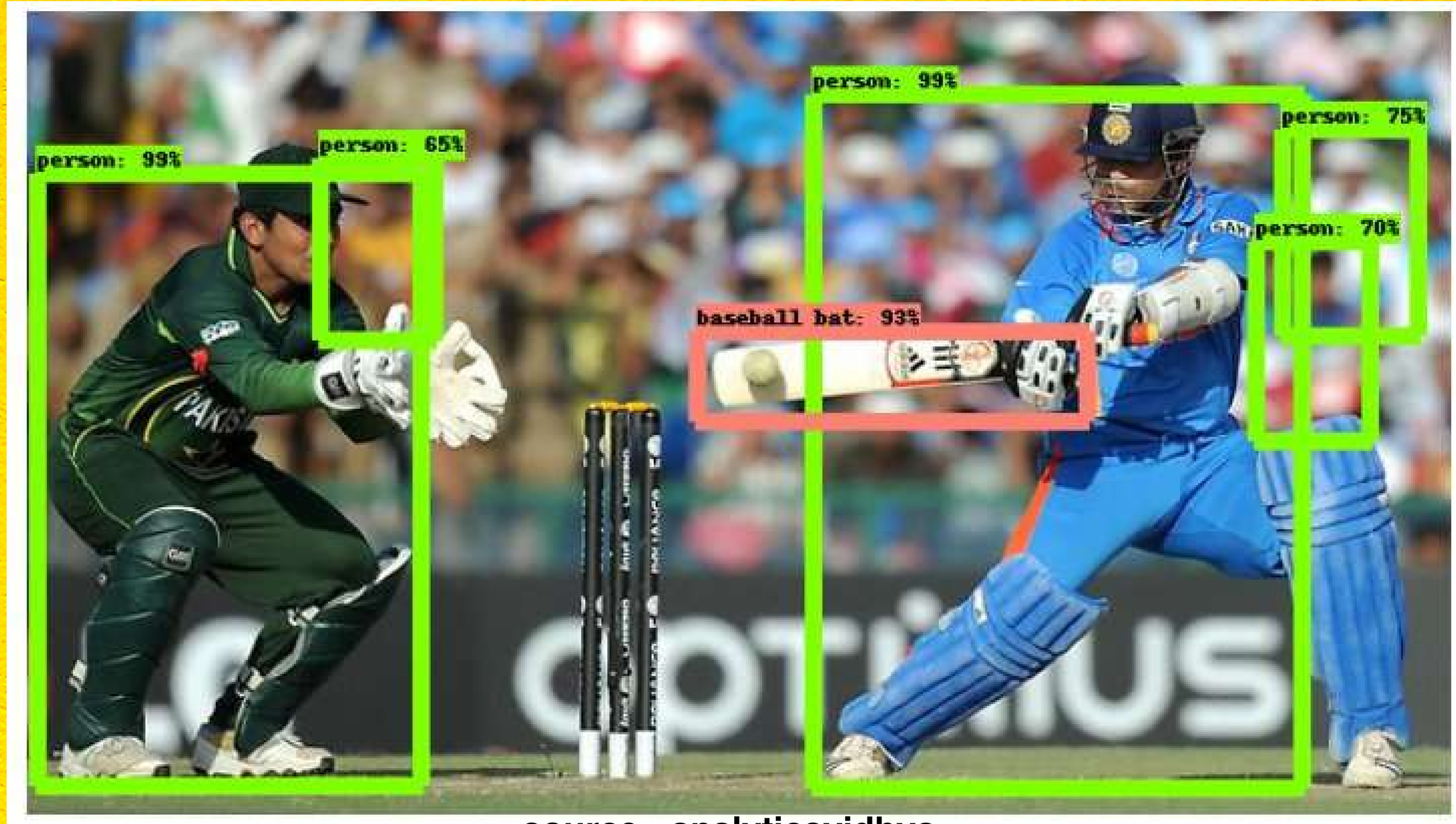

source - analyticsvidhya

WHAT IS OBJECT DETECTION??

- Classification+Localization
- Image classification involves predicting the class of one object in an image. Object localization refers to find the location of one or more objects in an image and it draws abounding box around them.
- Object detection combines these two tasks and localizes and classifies one or more objects in an image. As we can see in the above example

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Input

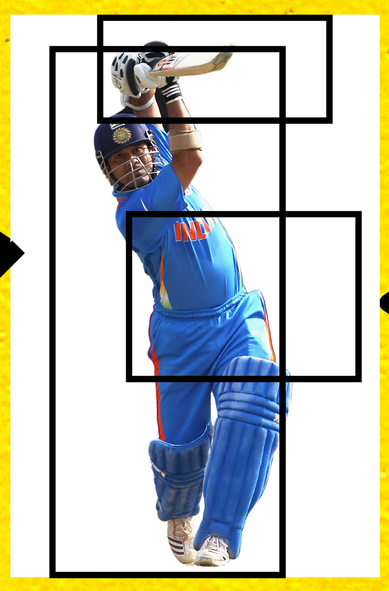
CNN

Any proposed method

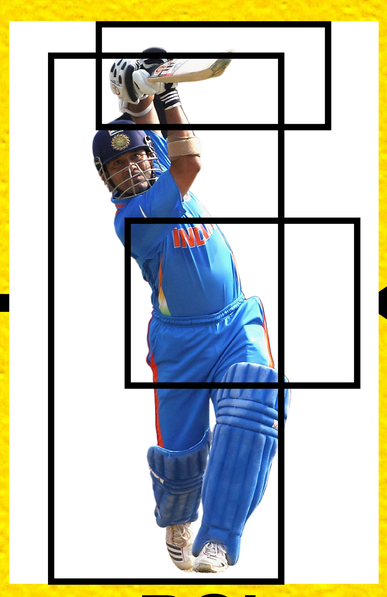
Feature map

Class object

classification head



ROI
Pooling



ROI
proposal

Box co-ordinates

Regression head

PROJECT FLOW

OBJECT DETECTION?

Using machine learning

It starts with manual feature extraction, such as the color histogram or edges, to identify groups of pixels that may belong to an object. These features are then fed into a regression model that predicts the location of the object along with its label.

Using Deep learning

Deep learning-based approaches employ convolutional neural networks (CNNs) to perform end-to-end, unsupervised object detection, in which features don’t need to be defined and extracted separately.

HOW DOES IT WORK

- Object detection models typically have two parts.
- An encoder takes an image as input and runs it through a series of blocks and layers that learn to extract statistical features used to locate and label objects.
- Outputs from the encoder are then passed to a decoder, which predicts bounding boxes and labels for each object.

DIFFERENT MODEL ARCHITECTURES

- CNN
- Region-based Convolutional Neural Networks (R-CNN)
- Fast R-CNN
- Faster R-CNN
- Mask R-CNN
- YOLO(You Only Look Once) and its versions
- MobileNet + SSD
- SqueezeDet
- CenterNet
- Histogram of Oriented Gradients (HOG)
- Region-based Fully Convolutional Network (R-FCN)
- Spatial Pyramid Pooling (SPP-net)

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APPLICATIONS OF OBJECT DETECTION

- Video surveillance
- Crowd counting
- Anomaly detection
- Self-driving cars
- logo detection
- Tracking objects
- Person Detection
- Optical character recognition
- Face detection
- Object extraction
- many more.....

CHALLENGES OF OBJECT DETECTION

- Detection at different scales
- Training for different image resolutions
- Speed/Accuracy
- Class Imbalance
- Anchor Free Detection

RESOURCES

CLICK THE LINKS TO GET RESOURCES

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- Find all resources here