# *Computer Vision*

# *Deep Learning Algorithms for Object Detection / Face Verification / Face Recognition*

- Object Detection in images or videos – YOLO V3 & Darknet

Not everyone has the computational resources to build a DL model from scratch. That's where predefined frameworks and pretrained models come in handy. And one such framework for object detection is YOLO (You Only Look Once). It's a supremely fast and accurate framework.

https://towardsdatascience.com/review-yolov3-you-only-look-once-object-detection-eab75d7a1ba6

Darknet is a Feature Extractor that applies a single neural network to the full image. This network divides the image into regions and predicts bounding boxes and probabilities for each region. These bounding boxes are weighted by the predicted probabilities. Finally, we can threshold the detections by some value to only see high scoring detections:

https://pjreddie.com/darknet/

- Face Verification – Facenet402 or FaceNet408

FaceNet is a deep convolutional network designed by Google, trained to solve face verification, recognition and clustering problem with efficiently at scale. It is useful in case of one shot learning where u have only one shot of applicant and need to compare with one image of a beneficiary in a govt. scheme uploaded geotagged photo of beneficiary with the asset created.

1. directly learns a mapping from face images to a compact Euclidean space where distances directly correspond to a measure of face similarity.
2. optimize the embedding face recognition performance using only 128-bytes per face.
3. achieves accuracy of 99.63% on Labeled Faces in the Wild (LFW) dataset, and 95.12% on YouTube Faces DB.

https://towardsdatascience.com/one-shot-learning-face-recognition-using-siamese-neural-network-a13dcf739e

- Face AntiSpoofing for Attendance – RESNET152

The face anti-spoofing is one of the fundamental problem of biometric and computer vision. The texture-based analysis exploits the fact that real face contains different texture and illumination pattern as compared to a plastic or LCD surface used to accomplish the attack.

https://pdfs.semanticscholar.org/4acd/e00897b577488c5c8d5b0af905758215fb12.pdf

The ResNet152 model is the best suited one for face anti-spoofing task when only dense layers are trained with weight initialization through ImageNet weight transfer and learning rate of $10^{-3}$. It is also observed that the lower learning rate is better for ResNet152, whereas higher learning rate is better for ResNet50.

https://www.groundai.com/project/a-performance-evaluation-of-convolutional-neural-networks-for-face-anti-spoofing/

- Face Recognition

If your are trying to identify face, You can go via two approach

1. Use facenet : https://github.com/JerryJiaGit/facenet_trt it is optimized with TRT as well. Before that go through facenet : https://github.com/davidsandberg/facenet

2. You can use YOLO for face detection then use Resnet50 or VGG 16 for classification. You should not use YOLO only for face recognition, it won't be scalable solution.

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