MINOR PROJECT ON:
OBJECT DETECTION AND TRACING USING DEEPSORT AND YOLOV3

PRESENTED BY:

SHIVANGI PATHAK (9918102174)

TUSHAR CHAUDHARY (9917102251)

UNDER THE SUPERVISION OF:

DR. PRIYANKA KWATRA

JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY SECTOR-128 NOIDA, U.P.

OUTLINE

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TC1

INTRODUCTION

Fig. 1

Abundant masses of Digital visual information

To analyse and understand this data using one the many image analysis technique.

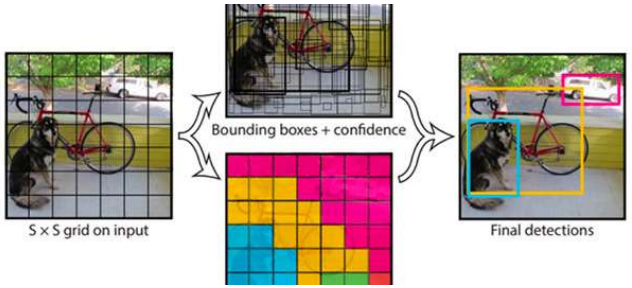


Fig. 2

The methods to analyse and understand

The important aspect of an image be recognized and further processed to get the necessary information.

Fig. 3

Important context in a video

A set of known tags can be used to identify what really is the object is and help to extract information.

Slide 3

TC1 Tushar Chaudhary, 10-05-2021

MOTIVATION

- The basic motivation behind this topic is that it is something that will overdo all the physical tasks.
- Object recognition and tracking reduces human efforts and provides efficiency.
- It is of interest as it may help humans to be aware of minute information about particular objects and reduce human tasks.
- Automatic recognition and extraction adds to the smart systems used today.

Fig. 4

Fig. 5

LITERATURE REVIEW

YOLO- You Only Look Once

- You Only Look Once: Unified, Real-Time object detection by Joseph Redmon in 2015.
- Subsequent versions were published in 2016 and 2017.
- YOLO v3 has DARKNET-53.
- YOLO v3 is able to identify more than 80 different objects in one image.
- YOLO algorithm divides any image into 13x13 grid system

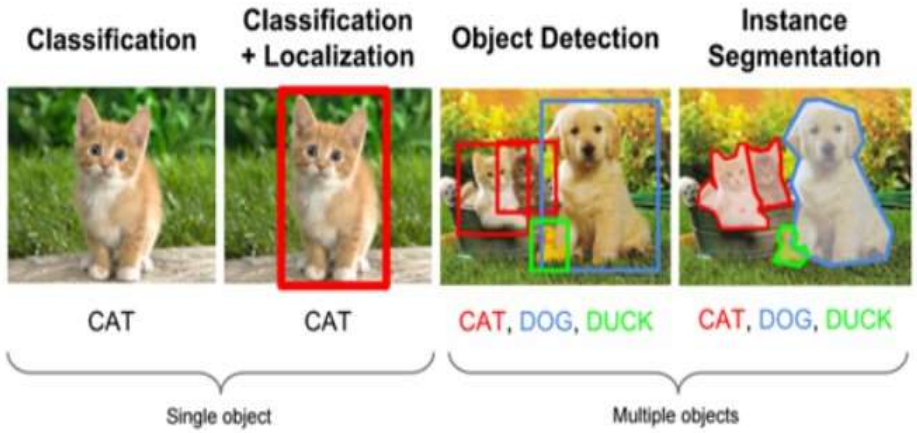


Fig. 6

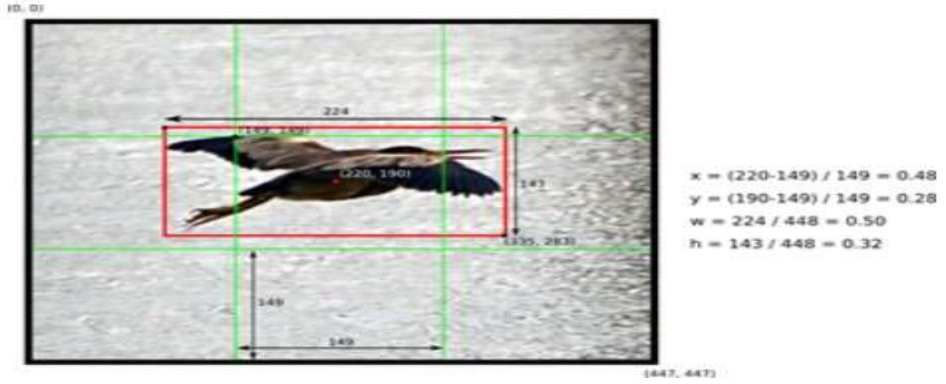


Fig. 7

LITERATURE REVIEW

DeepSORT- Simple Online and Real-time Tracking

- Algorithm for tracking that extends Simple Online and Real-time Tracking.
- The deepSORT was authored by Nicolai Wojke , Alex Bewley , Dietrich Paulus in 2017.
- SORT comprises of 4 core components which are :
  1. Detection
  2. Estimation
  3. Association
  4. Tracking.
- Uses Kalman filter.

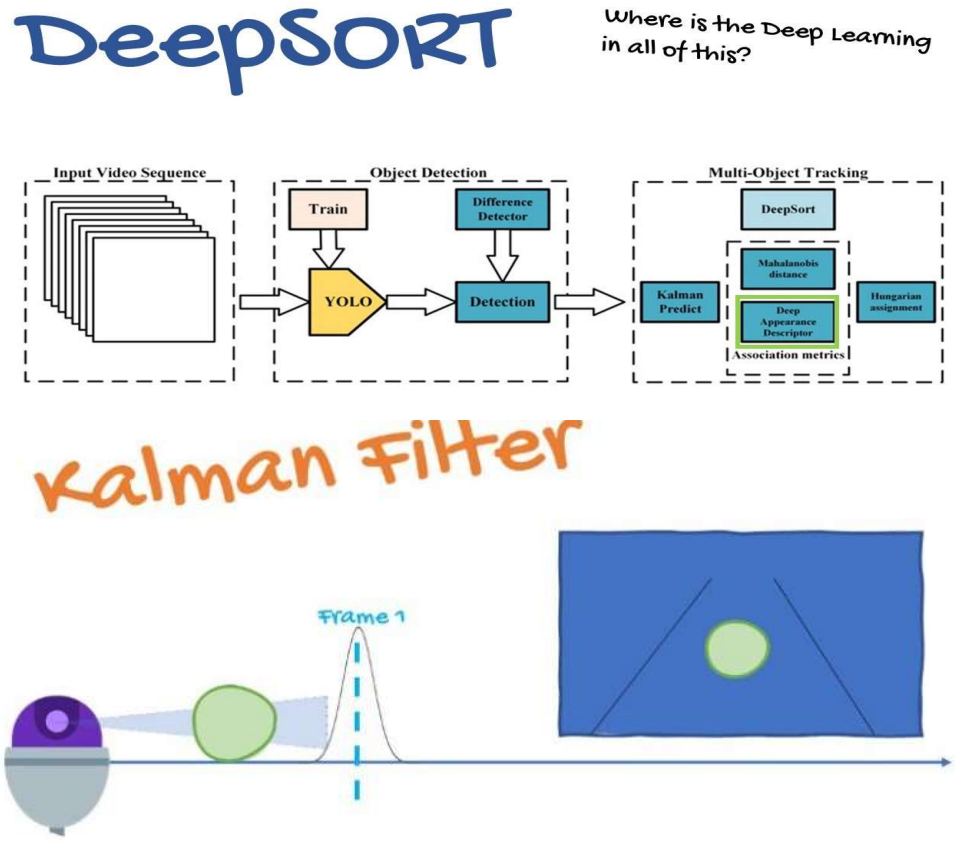


Fig. 8

OBJECT REPRESENTATION

Fig. 9

Points

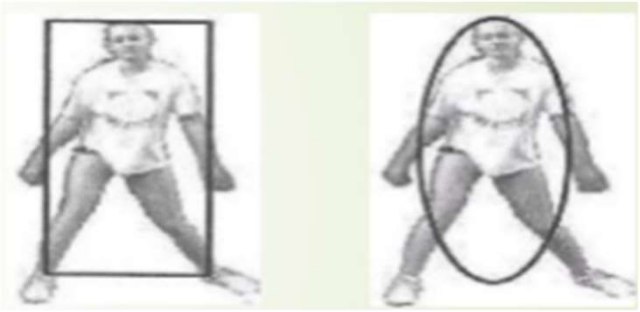


Fig. 10

Primitive geometric shapes

Fig. 11

Object silhouette and contour

OBJECT REPRESENTATION

Fig. 12

Articulated shape model

Fig. 13

Skeletal Model

Fig. 14

Probability densities of object appearance

DIFFICULTIES AND PROBLEMS IN OBJECT DETECTION.

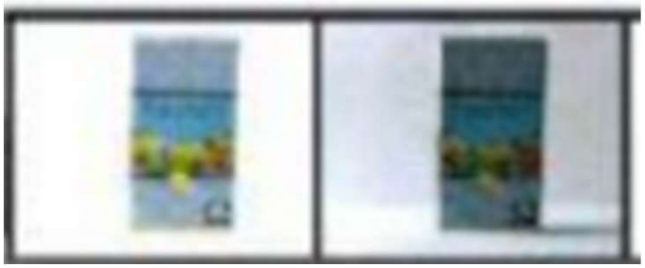


Fig. 15

Illumination

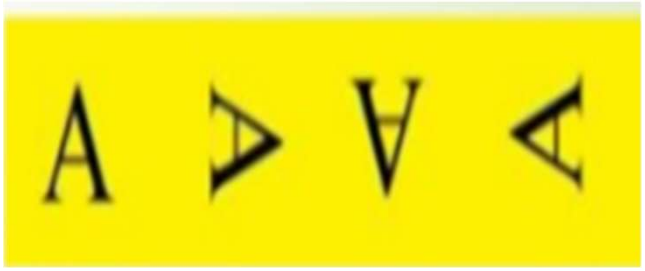


Fig. 16

Rotation

Fig. 17

Positioning

RESEARCH OBJECTIVE

Fig. 18

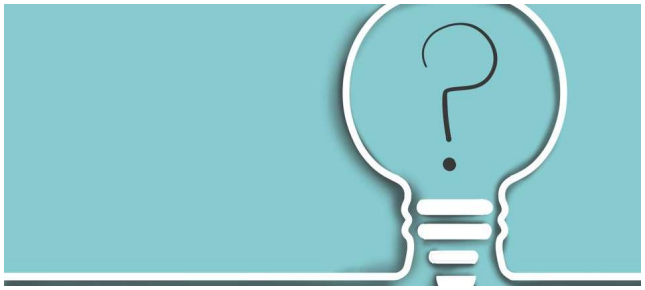


Fig. 19

Focus

In our project we mainly focus on neural network based artificially intelligent systems capable of recognizing the object and tracking it using live picture

The Question.

How can an artificial neural network or algorithm be used for interpreting different types of objects and their motion?

TECHNIQUES USED

Dataset: yolov3 weights

YOLO divides up the image into a grid of 13 by 13 cells: Each of these cells is responsible for predicting 5 bounding boxes. ... 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.

COCO:- COCO(common objects in context)is a large-scale object detection, segmentation, and captioning dataset. COCO has several features.

Fig. 20

YOLO V3 ARCHITECTURE

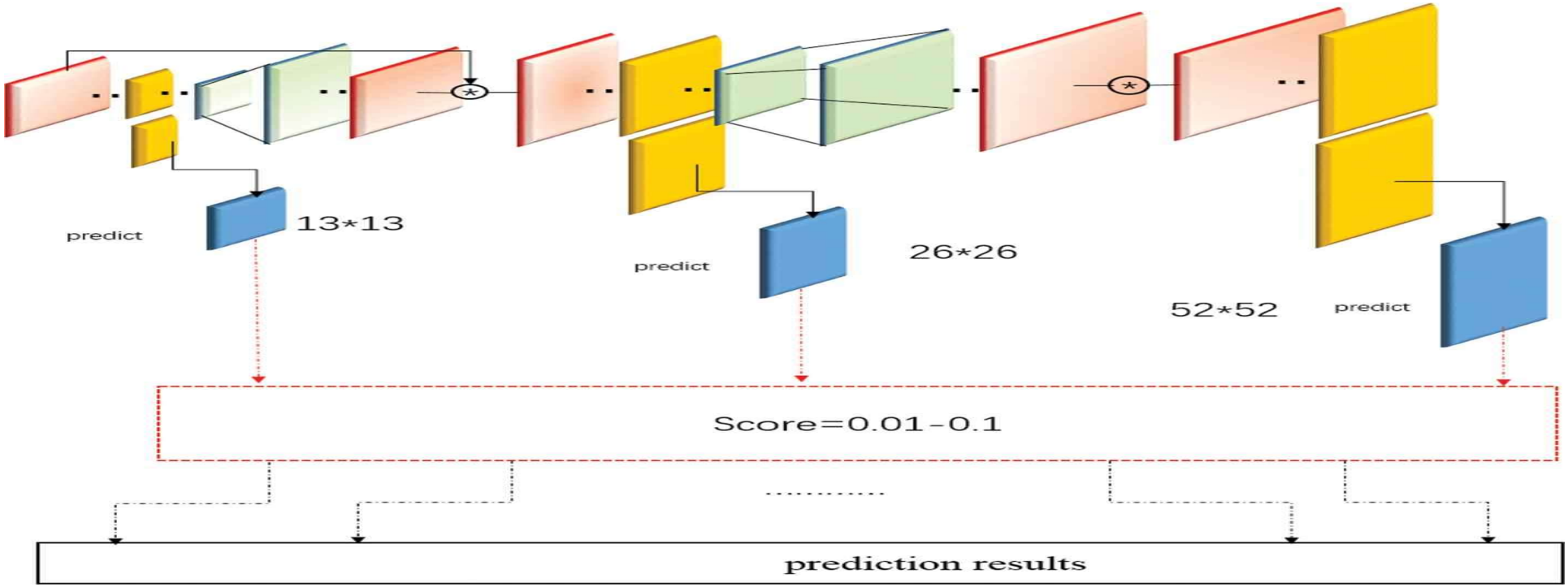


Fig. 21

TECHNIQUES USED

Feature Generation: Deepsort.

Deep SORT is a recent algorithm for tracking that extends Simple Online and Real-time Tracking and has shown remarkable results in the Multiple Object Tracking (MOT) problem. In the problem setting of MOT, each frame has more than one object to track.

Software used: OpenCV, Anaconda prompt

Library used are keras=2.1.5, numpy==1.14.2 ,opencv-python==3.4.0.12, scikit-learn==0.19.1 ,sklearn==0.0 , tensorflow==1.7.0, tflearn==0.3.1 ,etc.

Fig. 22

DEEPSORT ARCHITECTURE

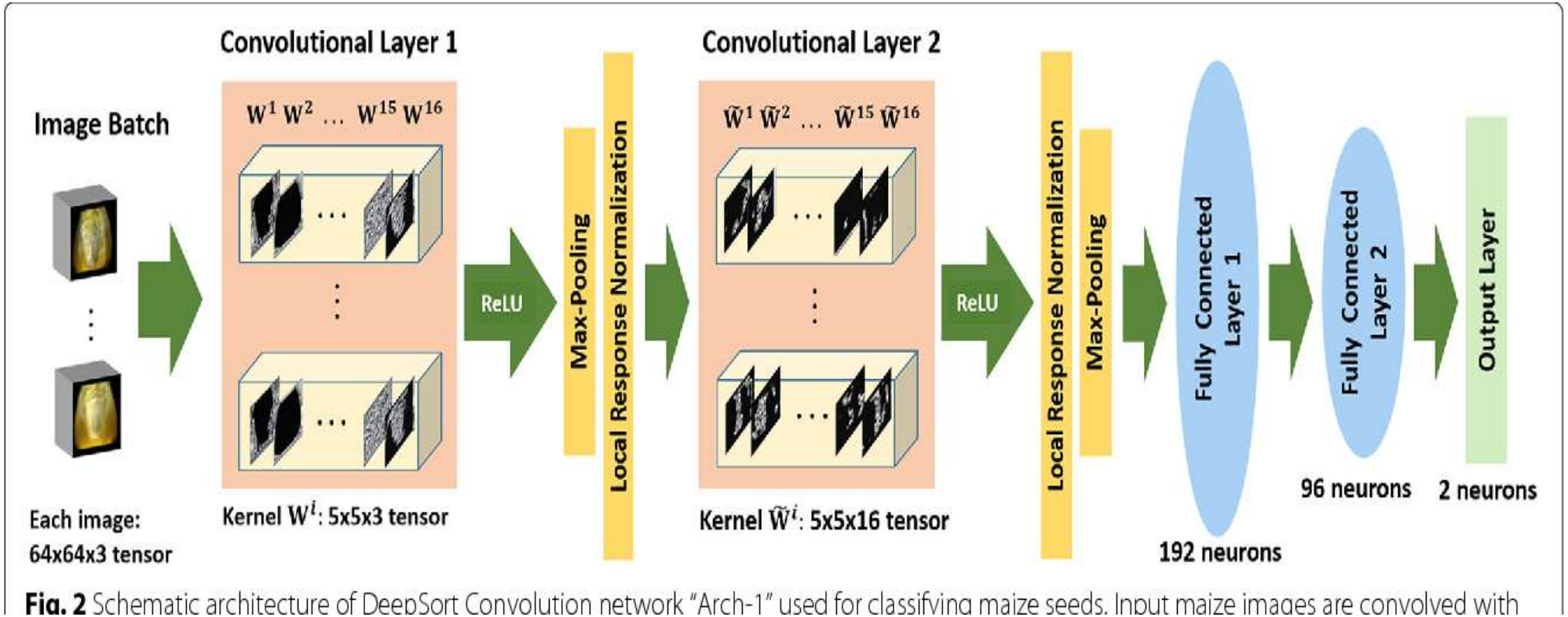
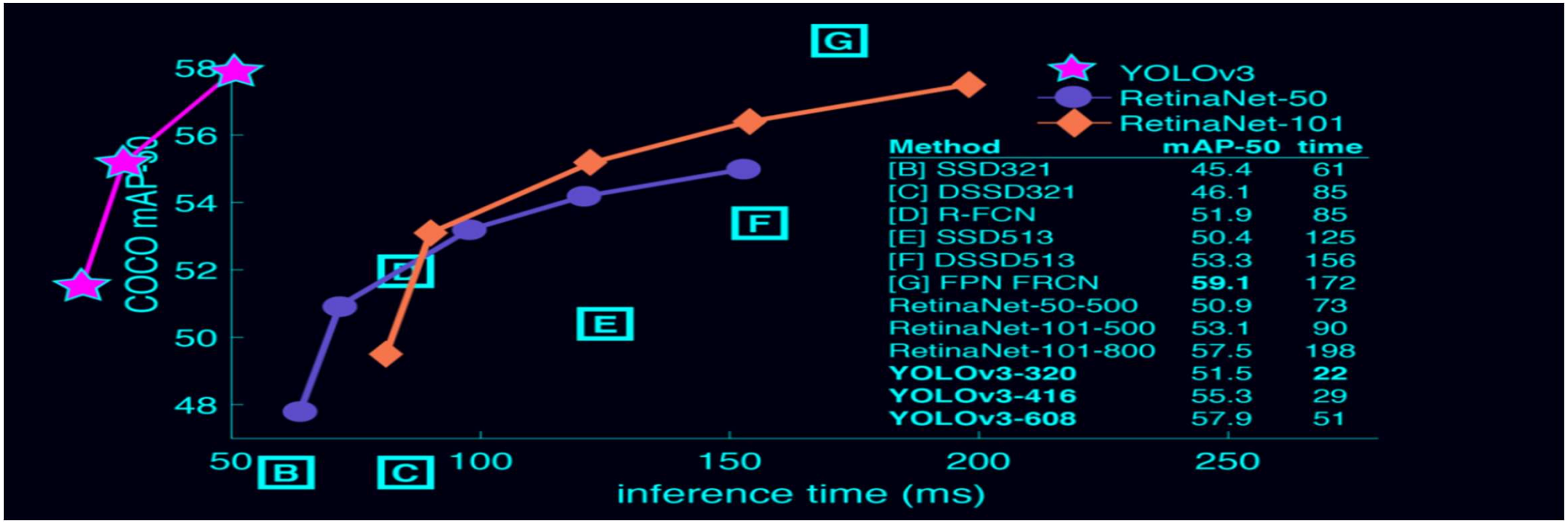


Fig. 2 Schematic architecture of DeepSort Convolution network "Arch-1" used for classifying maize seeds. Input maize images are convolved with

Fig. 23

COMPARISON WITH OTHER DETECTORS



Method	mAP-50	time
[B] SSD321	45.4	61
[C] DSSD321	46.1	85
[D] R-FCN	51.9	85
[E] SSD513	50.4	125
[F] DSSD513	53.3	156
[G] FPN FRCN	**59.1**	172
RetinaNet-50-500	50.9	73
RetinaNet-101-500	53.1	90
RetinaNet-101-800	57.5	198
YOLOv3-320	51.5	**22**
YOLOv3-416	55.3	29
YOLOv3-608	57.9	51

Fig. 24

RESULTS AND DISCUSSION

Applications-

- **Biometric recognition**
- **Surveillance**
- **Industrial inspection**
- **Content-based image retrieval**
- **Robotics**
- **Medical analysis**
- **Autonomous vehicles**

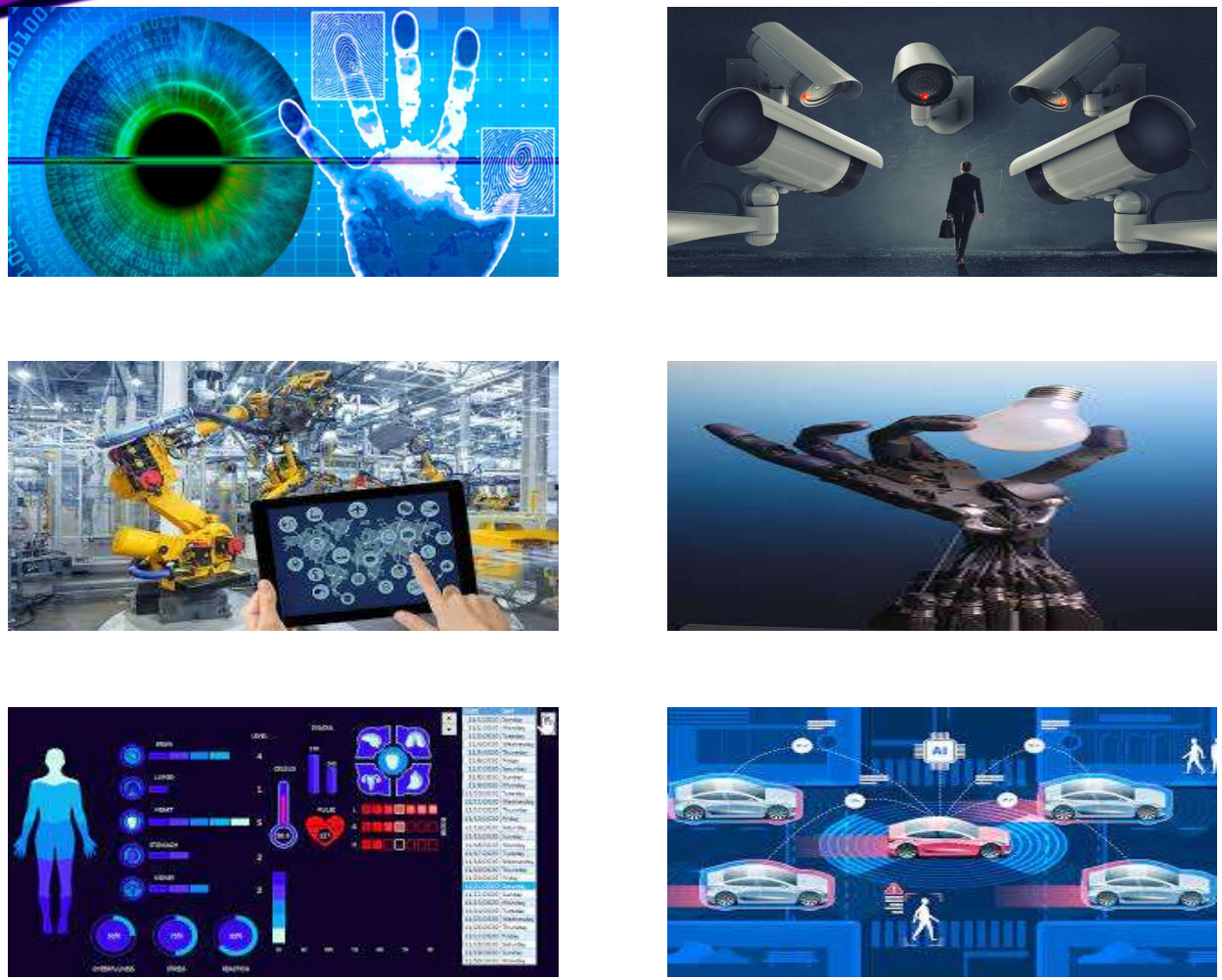


Fig. 25

EXTENDED SOFTWARE USABILITY

Targeted object tracking

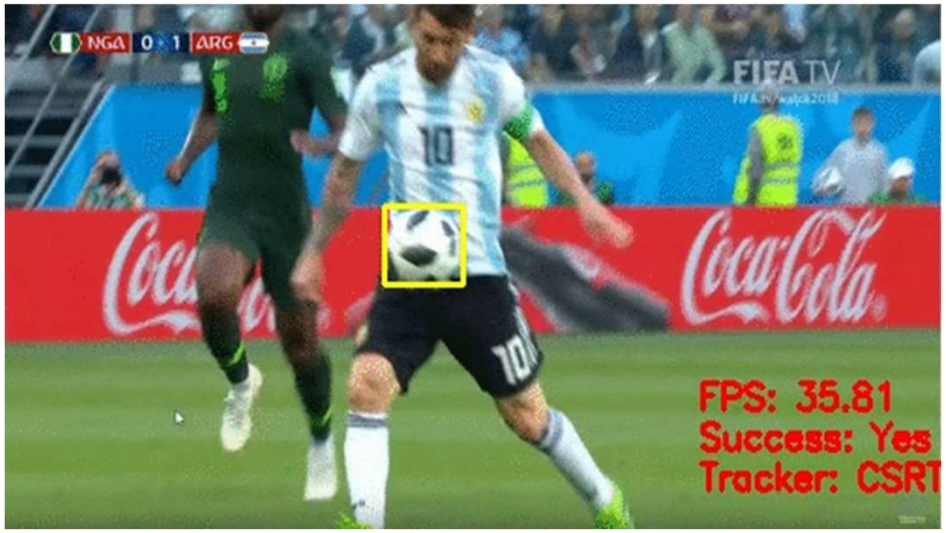


Fig. 26

Multiple object tracking

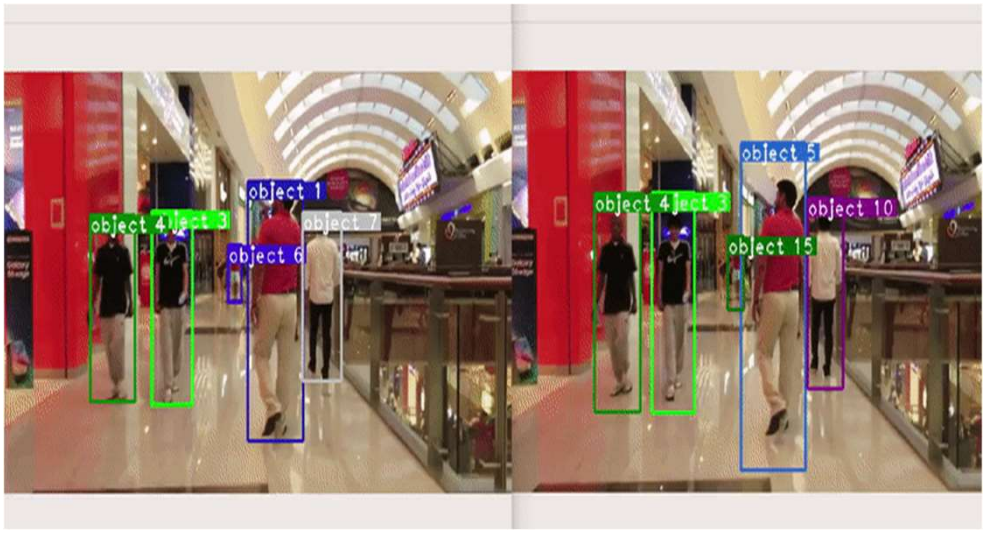


Fig. 27

LANE DETECTION

- **Lane detection:**

  Technically lane detection is defined , as well-researched area of computer vision with application in autonomous vehicles and driver support systems.

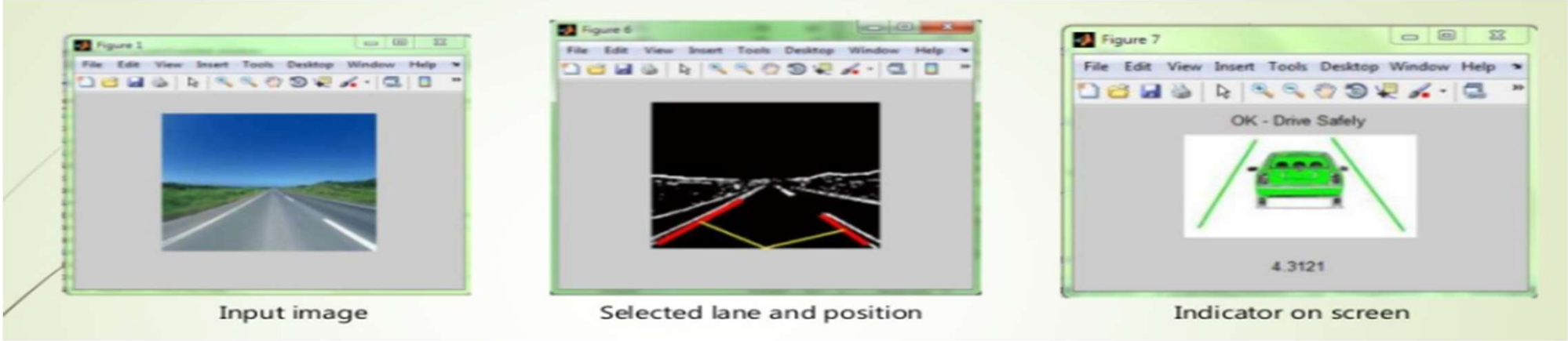


Fig. 28

CONCLUSION

In this presentation, we have overviewed the following points –

1.Basic concept of Object Detection and Tracking.

2. Problems and difficulties in Object Recognition.

3.Representation of objects.

4.Techniques in object recognition.

5. Multiple and single object detection and machine learning process.

6.Object tracking.

7.Applications.

REFERENCES

- TFlearn. Tflearn: Deep learning library featuring a higher-level api for tensorflow. URL-http://tflearn.org/.
- OpenSourceComputerVision:Deepsort – Multiple object tracking model
- URL:-https://nanonets.com/blog/object-tracking-deepsort/
- YOLOV3: Object detection model
- URL's:- https://pjreddie.com/media/files/papers/xnor.pdf, https://pjreddie.com/darknet/yolo/
- Dataset - coco dataset , yolo weights.
- URL-https://cocodataset.org/#download; https://pjreddie.com/media/files/yolov3.weights
- Augmented Media Startups:-

https://augmentedstartups.medium.com/deepsort-deep-learning-applied-to-object-tracking-924f59f99104

REFERENCES

- P. Viola and M. Jones, Rapid object detection using a boosted cascade of simple features, Proc. of the 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition, 2001.
- G. Feng et al., Template-based object detection through partial shape matching and boundary verification, International Journal of Signal Processing, vol.4, pp.148-157, 2008.
- G. Cheng and J. Han, A survey on object detection in optical remote sensing images, ISPRS Journal of Photogrammetry and Remote Sensing, vol.117, pp.11-28, 2016.
- J. Choi, M. Han and N. Kim, Object detection of cochlea in micro-computed tomography using faster region convolutional neural network, ICIC Express Letters, Part B: Applications, vol.10, no.7, pp.651-656, 2019.
- J. Redmon et al., You only look once: Unified, real-time object detection, Proc. of the IEEE Conference on Computer Vision and Pattern Recognition, pp.779-788, 2016.

THANK YOU!