Object Detection

*Object Detection :

```
* A computer vision technique to detect object in an image or video
 * Bounding Box information and Classification of Object
```

Three Types :

```
* Object Classification
* Object Detection
* Object Segmentation
```

*Object Classification :

```
* Image Recognition (What type of object in an image)
* A complete image is  sent for the classification. The output is single
class
```

*Object Detection :

```
* Identify and locate the presence of object in an image
* Bounding Box with class
* Can be multiple bounding box and class
```

*Object Segmentation :

```
        * Image Recognition, that identify and separate the distinct objects
in an image on pixel level
* More details
```

*Haar Feature :

```
* Mono Chromatic Image -> lighter area as white, dark area as black
```

*CNN => Convolutional Neural Network : [Classification, not detection]
Pattern Recognition -> Object Recognition -> Classification

*Performance Evaluation Metrics :

```
* Localization (IoU)
* Classification (mAP)
```

Localization (IoU) :

```
* Intersection Over Union
* If says how close the predicted boundary box is close to the Ground Truth [Over Lap]
* If IoU = 1 then perfect detection, If IoU < 1 then no perfect, if IoU = 0 then no over lap

* IoU = Area of Intersection / Area of Union
```

*Classification (mAP) :

```
* Confusion Matrix [True Positive, False Positive, False Negative, True Negative]
*  Precision [Actual Positives out of total positive predictions]
*  Precision = TP / TP + FP
* Recall [Actual Positive out of all predictions]
* Recall = TP / TP + FN
* Mean Average Precision is mAP
```