index

소개 및 라이선스 소개

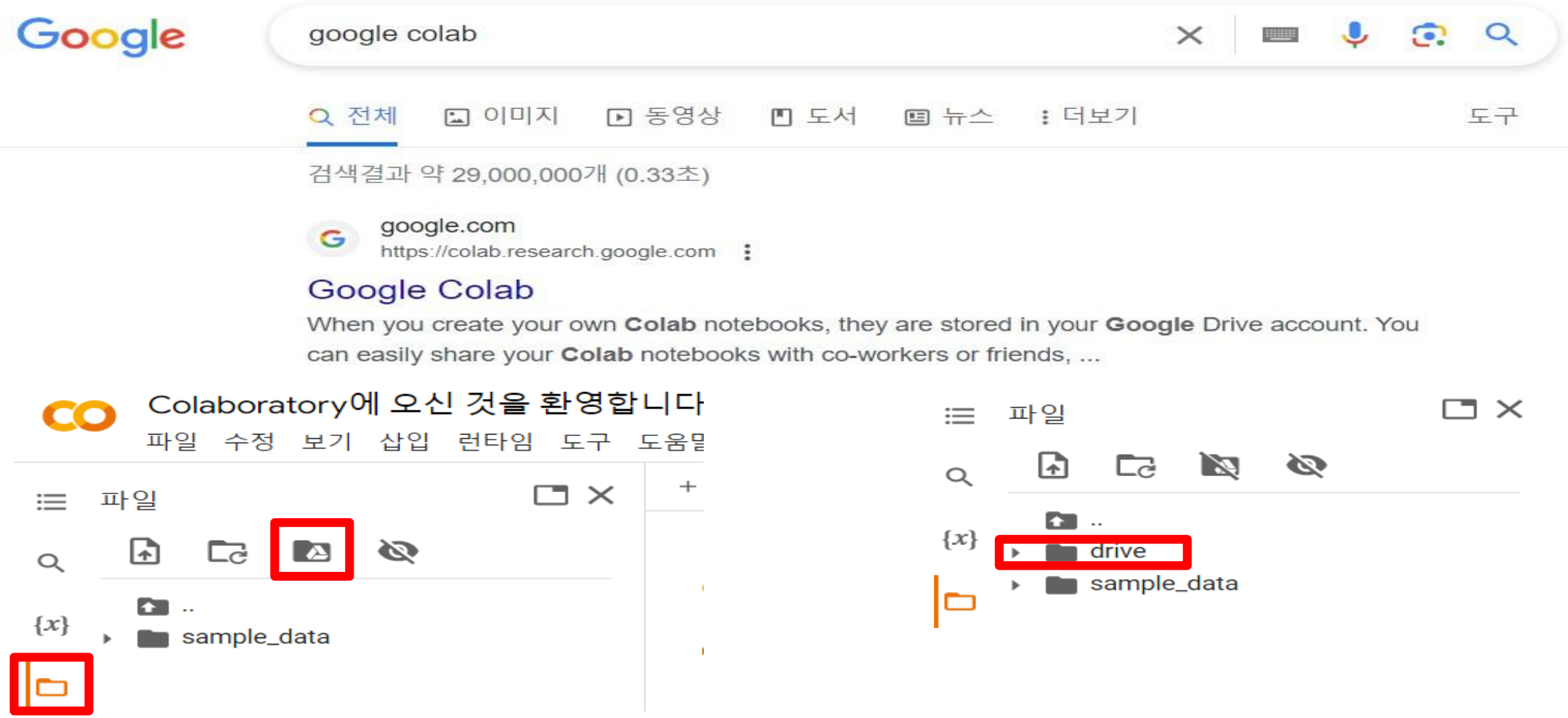
1. 라이센스 소개

라이선스 정보

패키지명	라이선스	URL
MTCNN	MIT	https://github.com/ipazc/mtcnn/blob/master/LICENSE
FaceNet	MIT	https://github.com/davidsandberg/facenet/blob/master/LICENSE.md
Yolov8 (Yolox)	AGPL-3.0* (Apache2.0)	https://www.ultralytics.com/ko/license (https://github.com/MegEngine/YOLOX/blob/main/LICENSE)

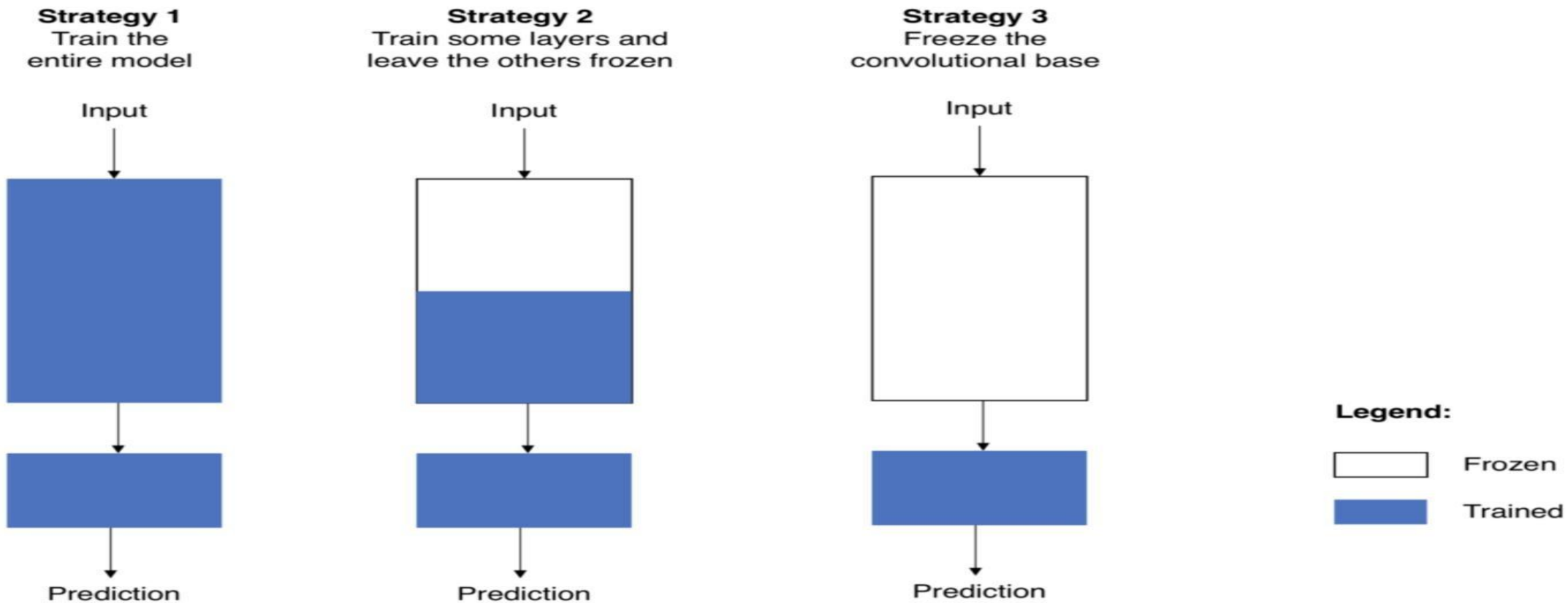
1. 소개 및 환경설정

⭘ 구글 코랩(google colab)



1. 소개 및 환경설정

사전학습, 파인튜닝, 전이학습



https://jeinalog.tistory.com/13

2. 얼굴인식

얼굴인식

2. 얼굴인식

이미지 분류 모델의 접근

350

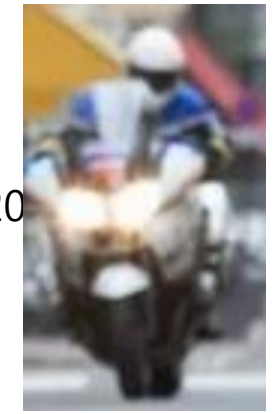
250

350 x 250 = 87,500

100

100

20



100 x 200 x 2 = 40,000

20

30

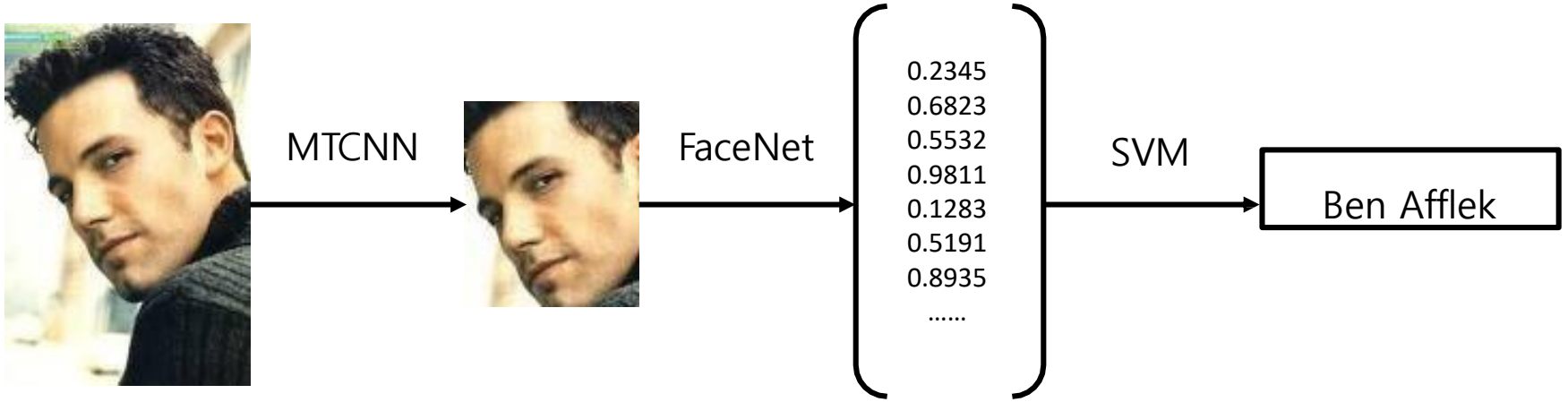
20

20 x 30 x 2 = 1,200

오토바이 탑승자 중 헬멧을 안 쓴 사람 찾기

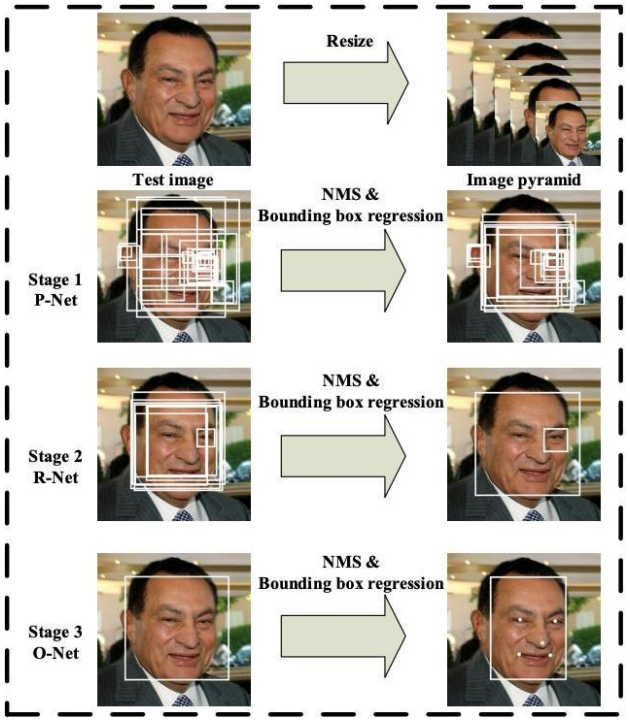
2. 얼굴인식

MTCNN & FaceNet

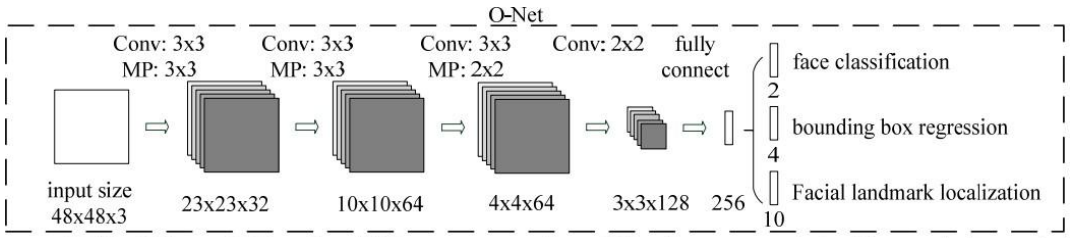


2. 얼굴인식

MTCNN(The Multi-task Cascaded Convolutional Networks)



1. 다양한 크기로 이미지를 만듭니다. 얼굴 크기가 작을 수도, 클 수도 있기 때문입니다.
2. 1번이미지 중 얼굴로 인식되는 부분을 찾은 다음 원래 크기로 확대합니다. -> 박스크기가 다양하게 나타남
3. 박스의 영역 중 가장 얼굴일 신뢰도가 높은 영역을 찾아냅니다.
4. 이 영역에서 얼굴 특징위치(양쪽눈, 코, 입 등)의 좌표를 찾습니다.



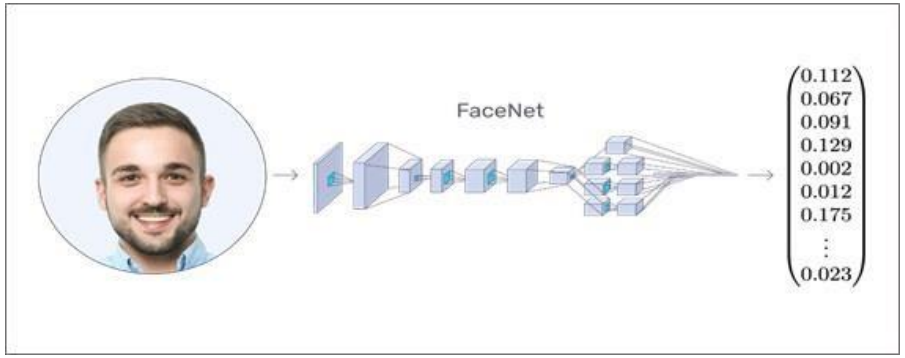
$$L_i^{det} = -(y_i^{det} \log(p_i) + (1 - y_i^{det})(1 - \log(p_i)))$$

```
[{'box': [14, 27, 81, 95],
'confidence': 0.99,
'keypoints':
{'left_eye': (28, 74),
'right_eye': (53, 61),
'nose': (38, 90),
'mouth_left': (45, 109),
'mouth_right': (65, 98)}}]
```

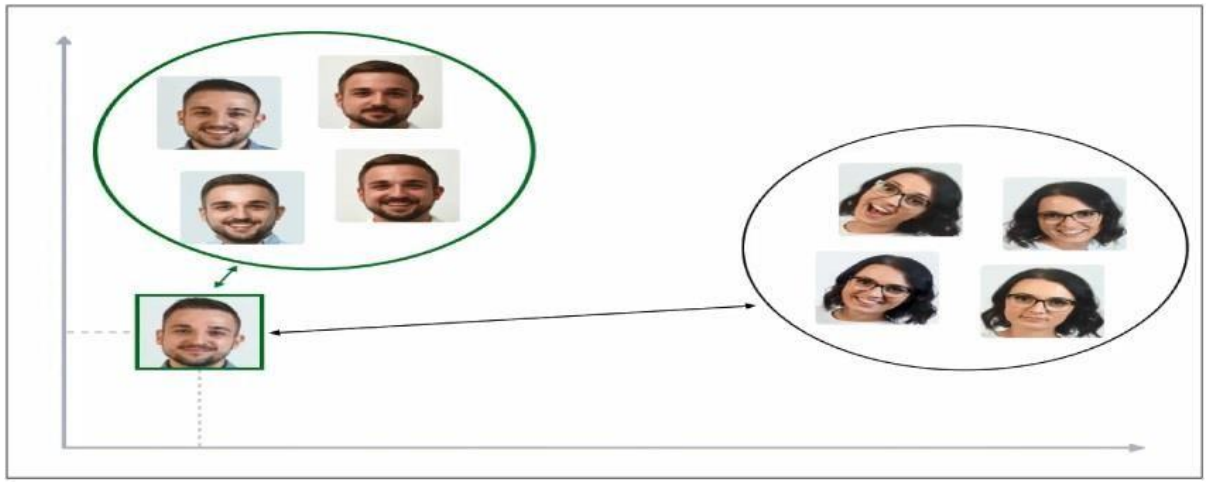
https://yeomko.tistory.com/16
https://youtu.be/w4tigQn-7Jw

2. 얼굴인식

FaceNet

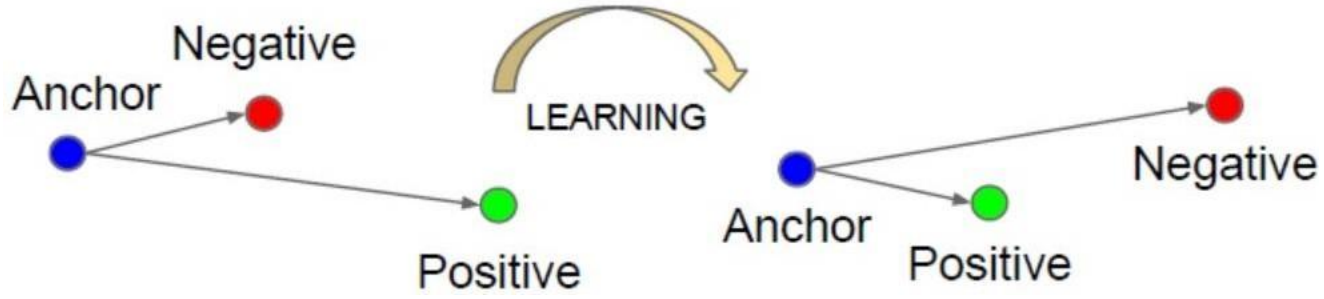


128차원 Embedding



2. 얼굴인식

FaceNet



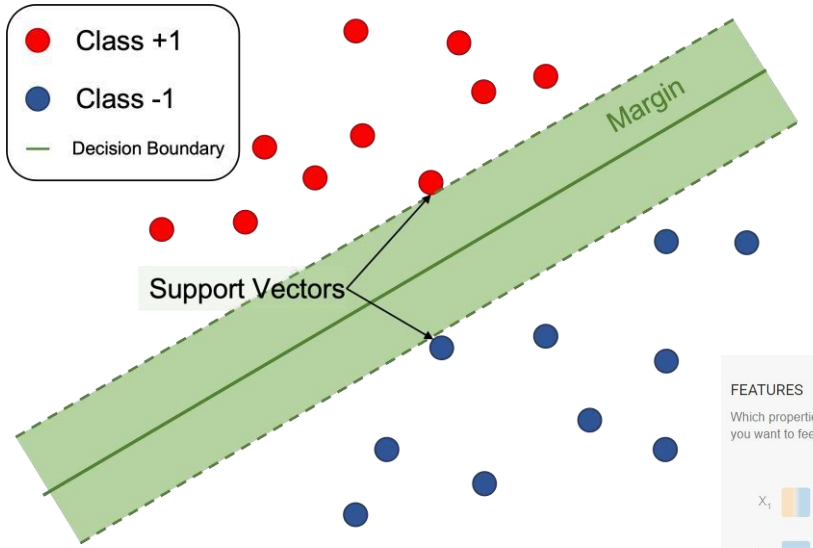
$$\text{argmax}_{x_i^p} \|f(x_i^a) - f(x_i^p)\|_2^2$$

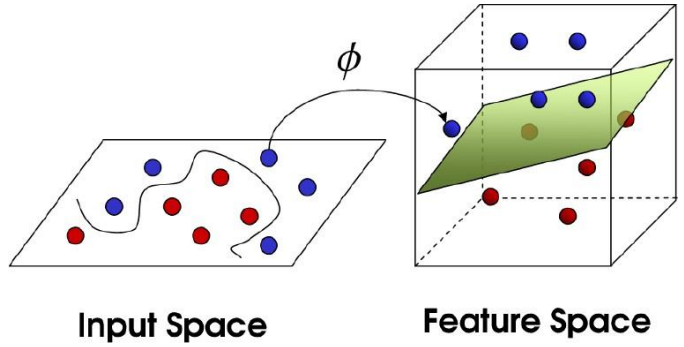
$$\text{argmin}_{x_i^n} \|f(x_i^a) - f(x_i^n)\|_2^2$$

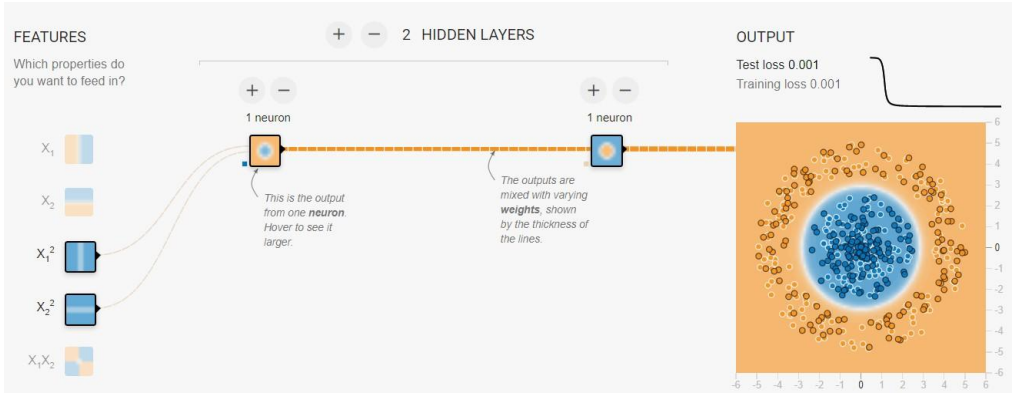
$$\|f(x_i^a) - f(x_i^p)\|_2^2 < \|f(x_i^a) - f(x_i^n)\|_2^2$$

https://hwangtoemat.github.io/paper-review/2020-04-02-FaceNet-내용/

2. 얼굴인식







https://ratsgo.github.io/machine%20learning/2017/05/30/SVM3/
https://velog.io/@shlee0125/머신러닝-정리-서포트-벡터-머신Support-Vector-Machine-06.-Soft-margin-SVM-1
https://playground.tensorflow.org/

2. 얼굴인식

데이터셋

5 Celebrity Faces Dataset

Can you identify faces based on very few photos?

Data Card | Code (41) | Discussion (1)

About Dataset

Context

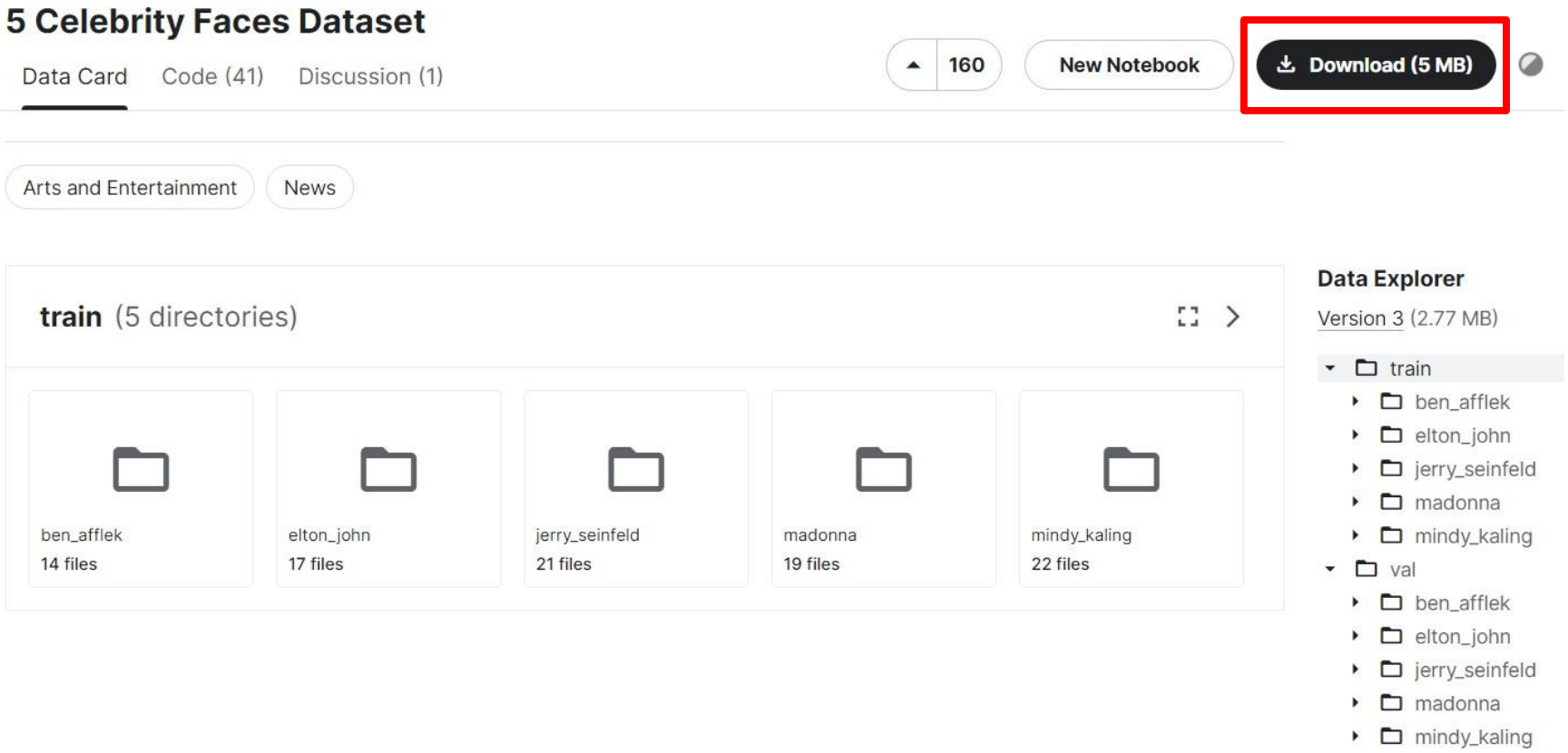
This is a small dataset for experimenting with computer vision techniques. It has a training directory containing 14-20 photos each of celebrities

- Ben Afflek
- Elton John
- Jerry Seinfeld
- Madonna
- Mindy Kaling

https://www.kaggle.com/datasets/dansbecker/5-celebrity-faces-dataset?resource=download

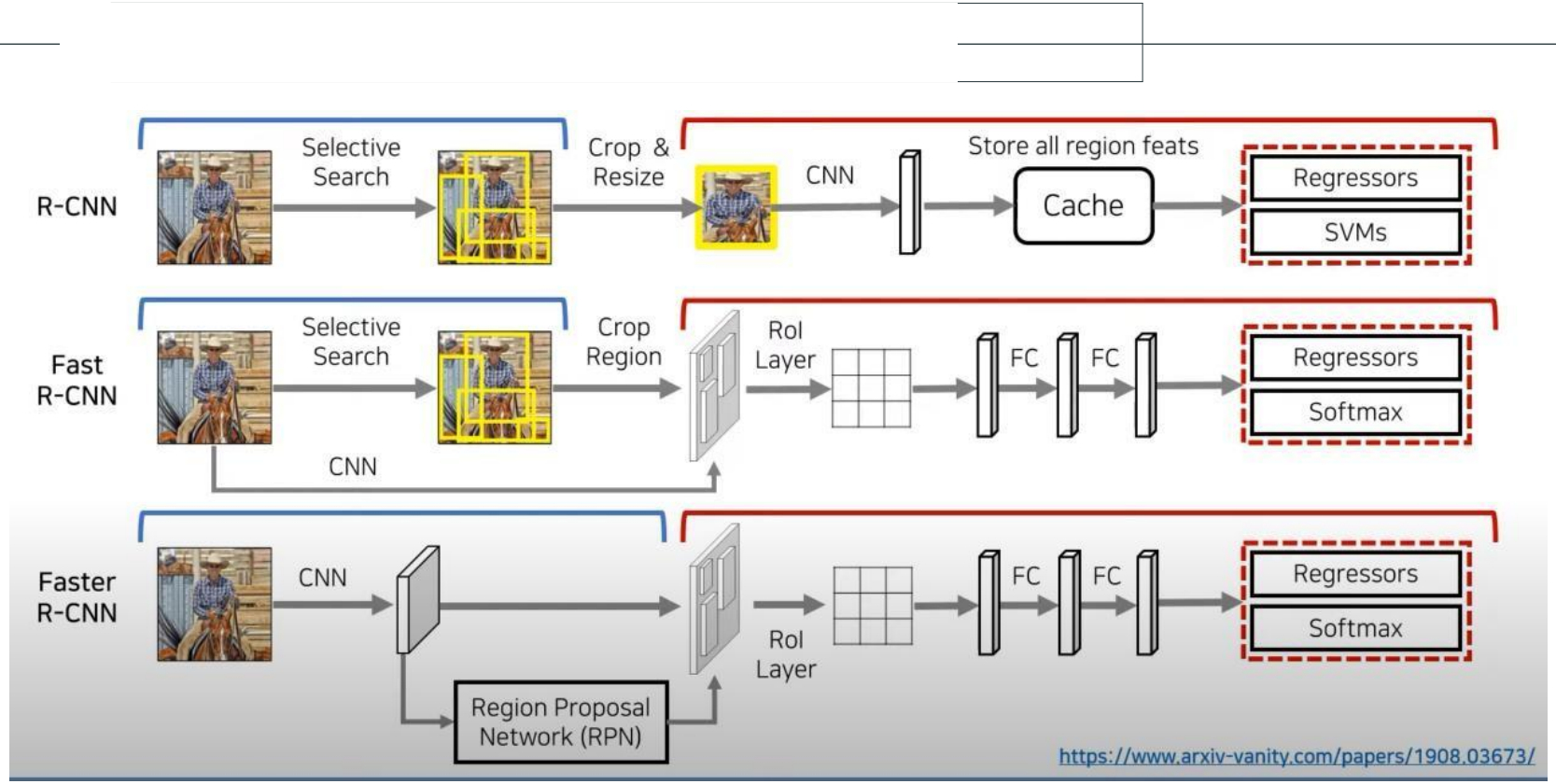
2. 얼굴인식

데이터셋


5 Celebrity Faces Dataset
Data Card
Code (41)
Discussion (1)
160
New Notebook
Download (5 MB)
Arts and Entertainment
News
train (5 directories)
ben_afflek
14 files
elton_john
17 files
jerry_seinfeld
21 files
madonna
19 files
mindy_kaling
22 files
Data Explorer
Version 3 (2.77 MB)
train
ben_afflek
elton_john
jerry_seinfeld
madonna
mindy_kaling
val
ben_afflek
elton_john
jerry_seinfeld
madonna
mindy_kaling

3. 사물인식

3. 사물인식



1 stage에 비해 대체로 정확한 편이나 속도 느림, Region Proposal 사용
Fast r-cnn : resize없이 사물추정 영역을 가지고 cnn
Faster r-cnn : selective search를 아예 cnn으로 수행해서 size 맞춤

* R-CNN(Region Based Convolutional Neural Networks)

3. 사물인식

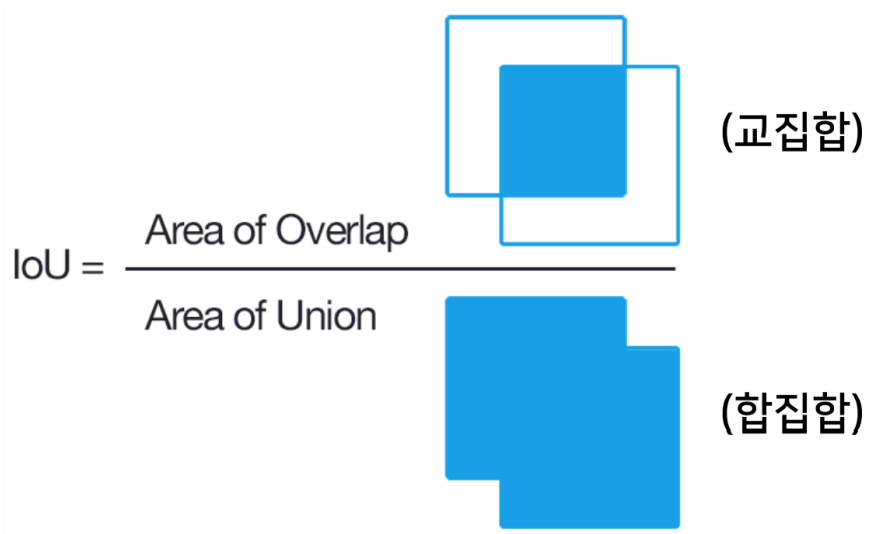
Region Proposal(Selective Search)

1. 초기 segment 생성
2. 영역 통합
3. 후보 영역 생성
4. 영역의 확률 계산 (객체존재확률+ Bounding Box 좌표)

https://bigdata-analyst.tistory.com/269

3. 사물인식

IoU(Intersection over Union)



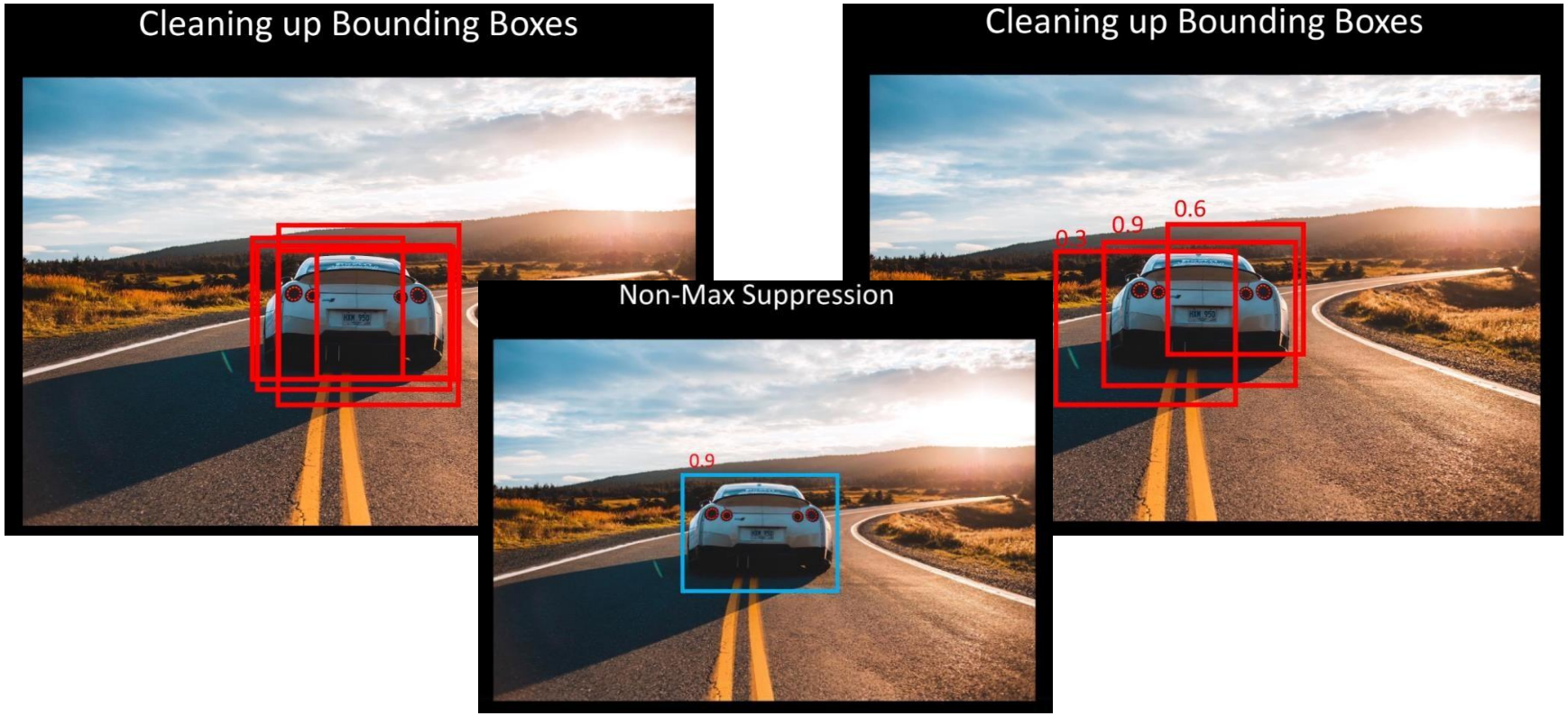
mAP@0.5 = 정답과 예측의 IoU가 50% 이상일 때 정답으로 판정하겠다는 의미

NMS = 같은 class 끼리 IoU가 50% 이상일 때 낮은 confidence box를 제거하여
중복된 box를 지우는 것

https://bigdata-analyst.tistory.com/269

3. 사물인식

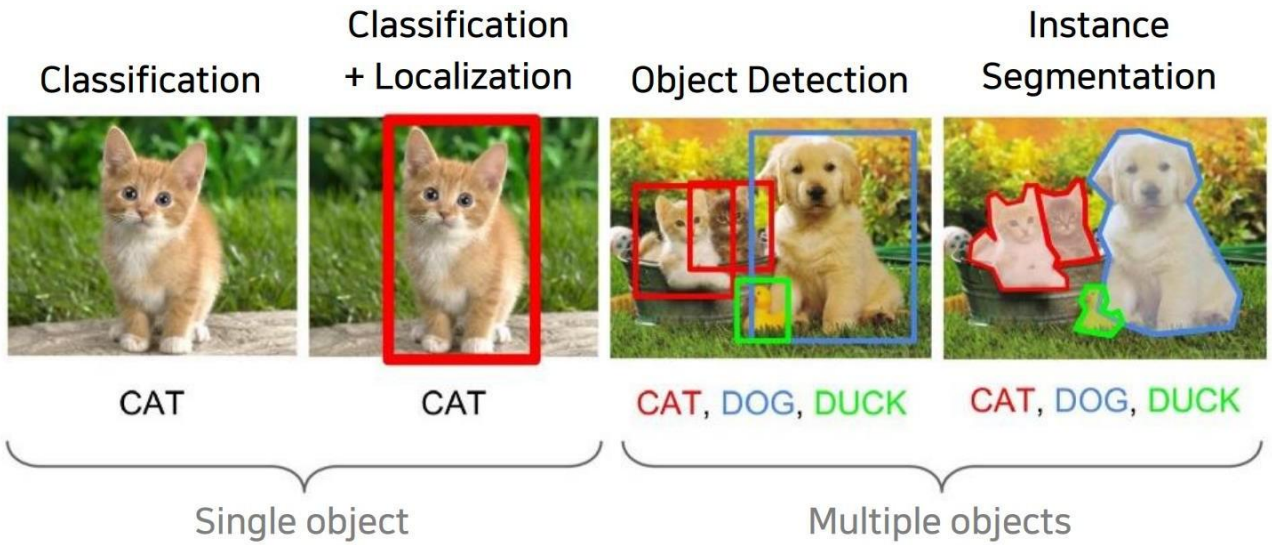
NMS(Non Max Suppression)



https://visionhong.tistory.com/11

3. 사물인식

1stage vs 2stage



2 stage detector
(R-CNN)
- Localization
- Classification

1 stage detector
(YOLO)
- Localization
+ Classification

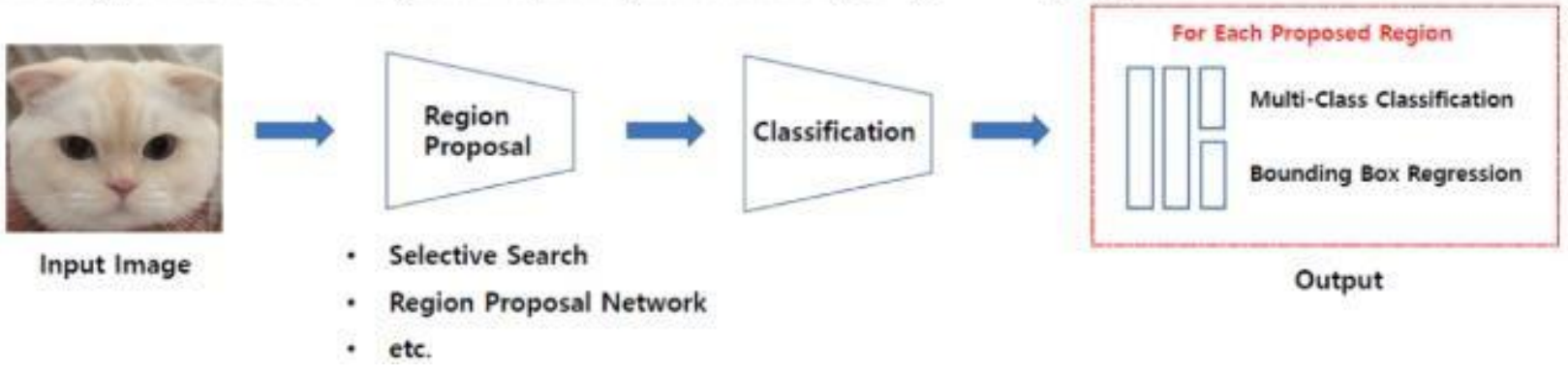
Classification(이미지분류) : 이미지가 무엇인지
Object Detection(사물인식) : 분류 + 위치 Seg
mentation(이미지세분화) : 사물인식 + 영역

https://bigdata-analyst.tistory.com/269

3. 사물인식

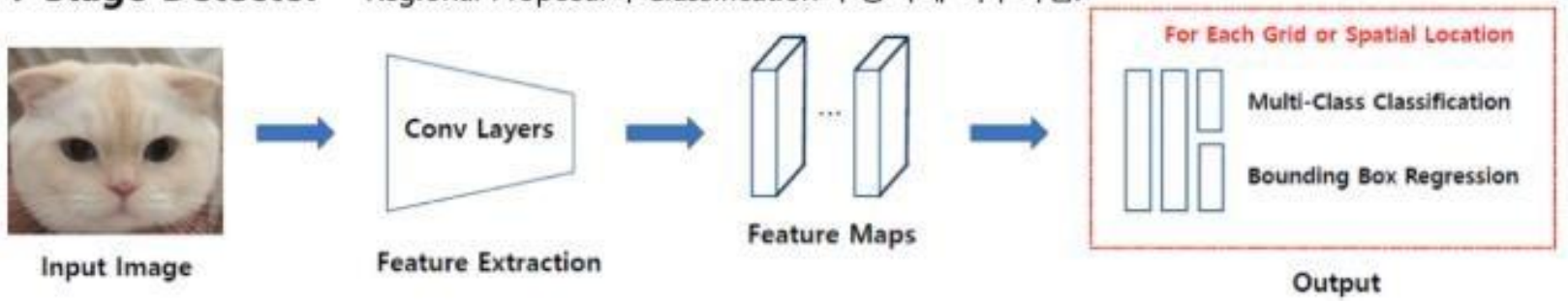
1stage vs 2stage

2-Stage Detector - Regional Proposal와 Classification이 순차적으로 이루어짐.



- Selective Search
- Region Proposal Network
- etc.

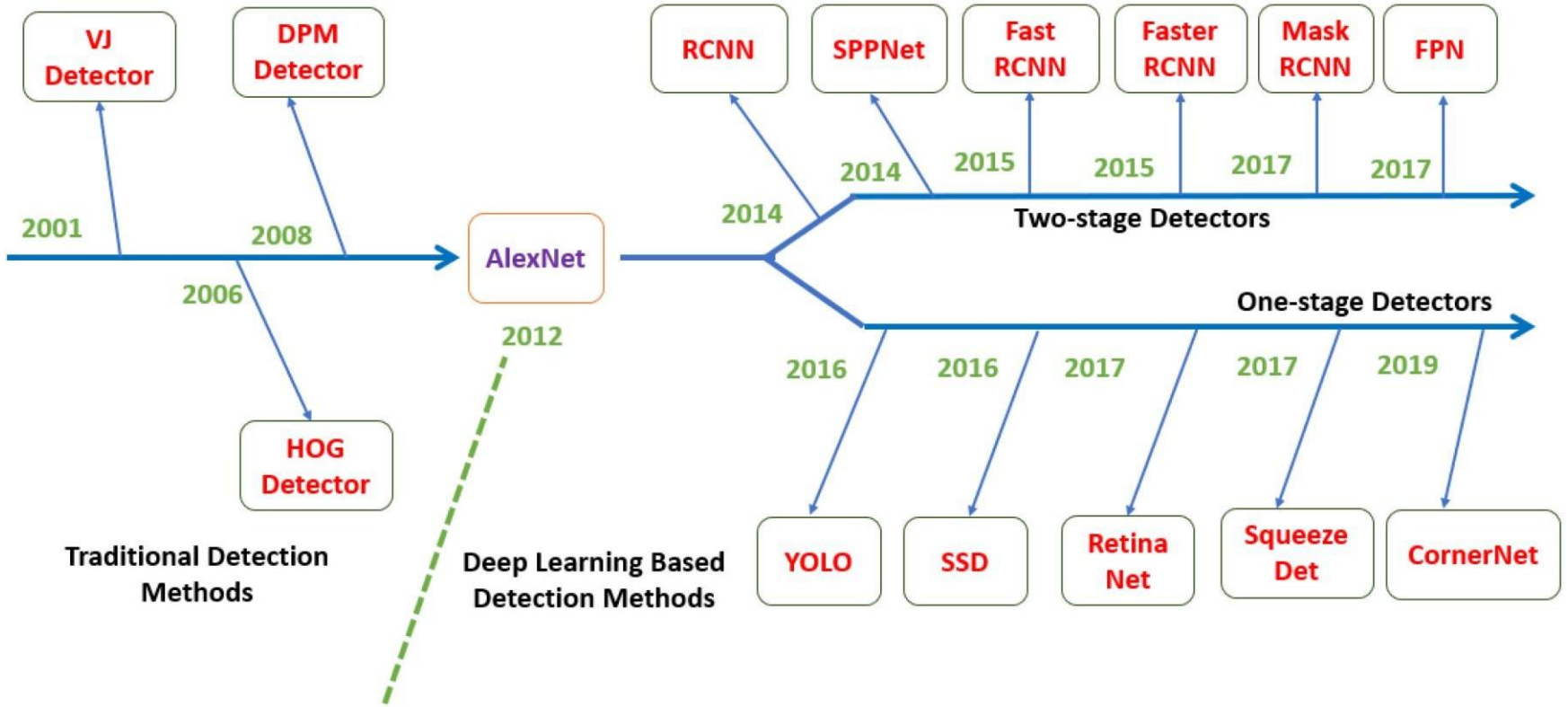
1-Stage Detector - Regional Proposal와 Classification이 동시에 이루어짐.



https://velog.io/@hhhong/Object-Detection-with-YOLO

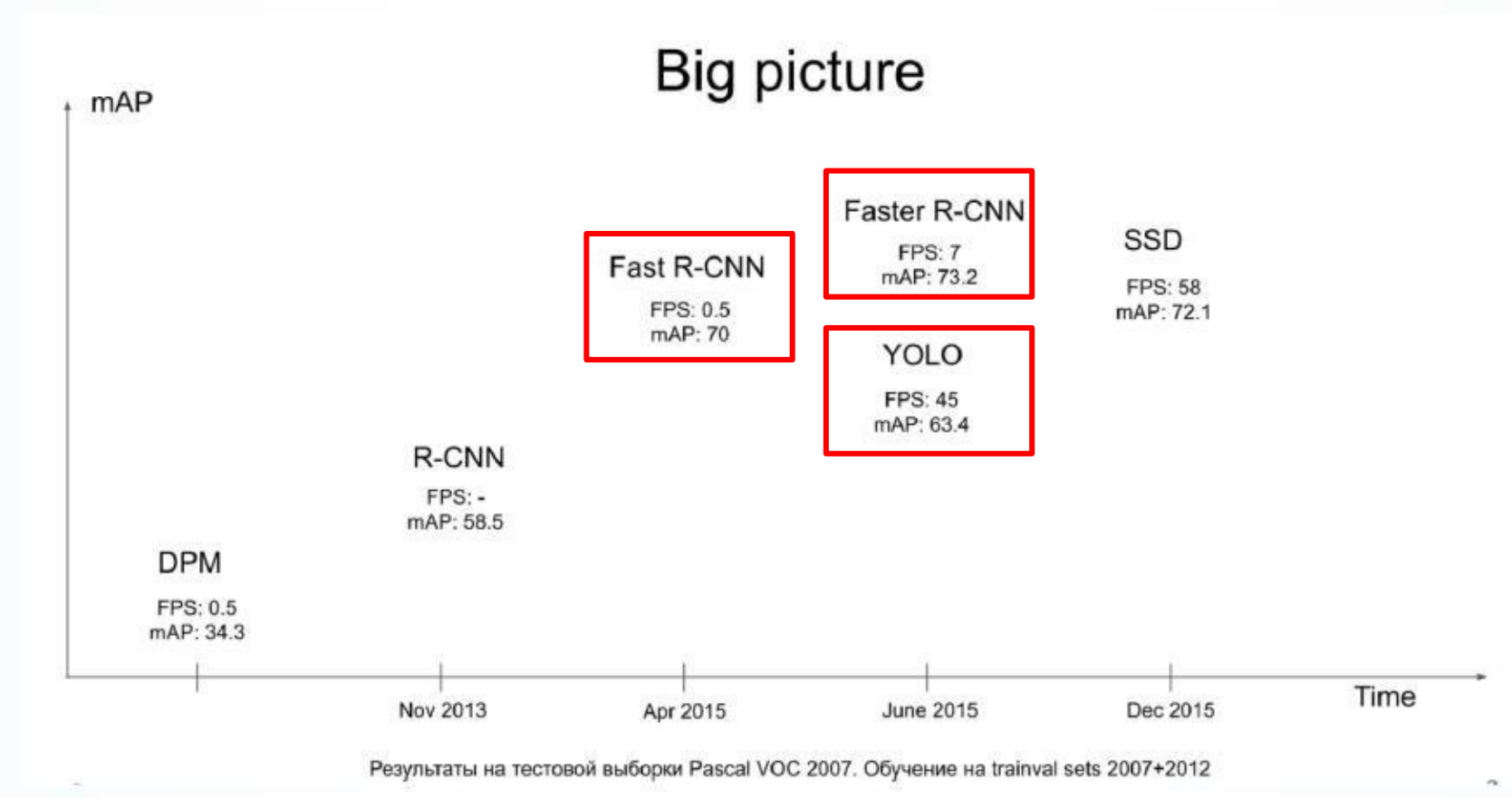
3. 사물인식

1stage vs 2stage



3. 사물인식

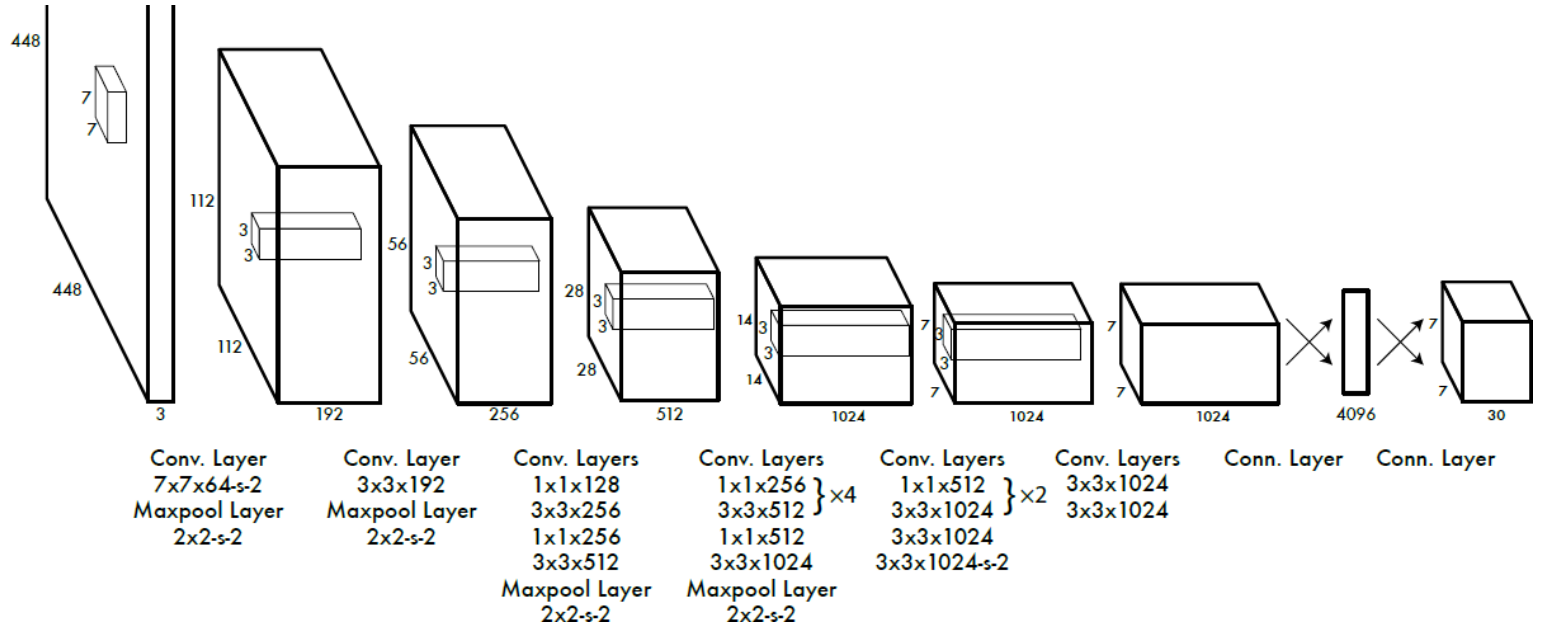
- YOLO(You Only Look Once)



https://visionhong.tistory.com/15

3. 사물인식

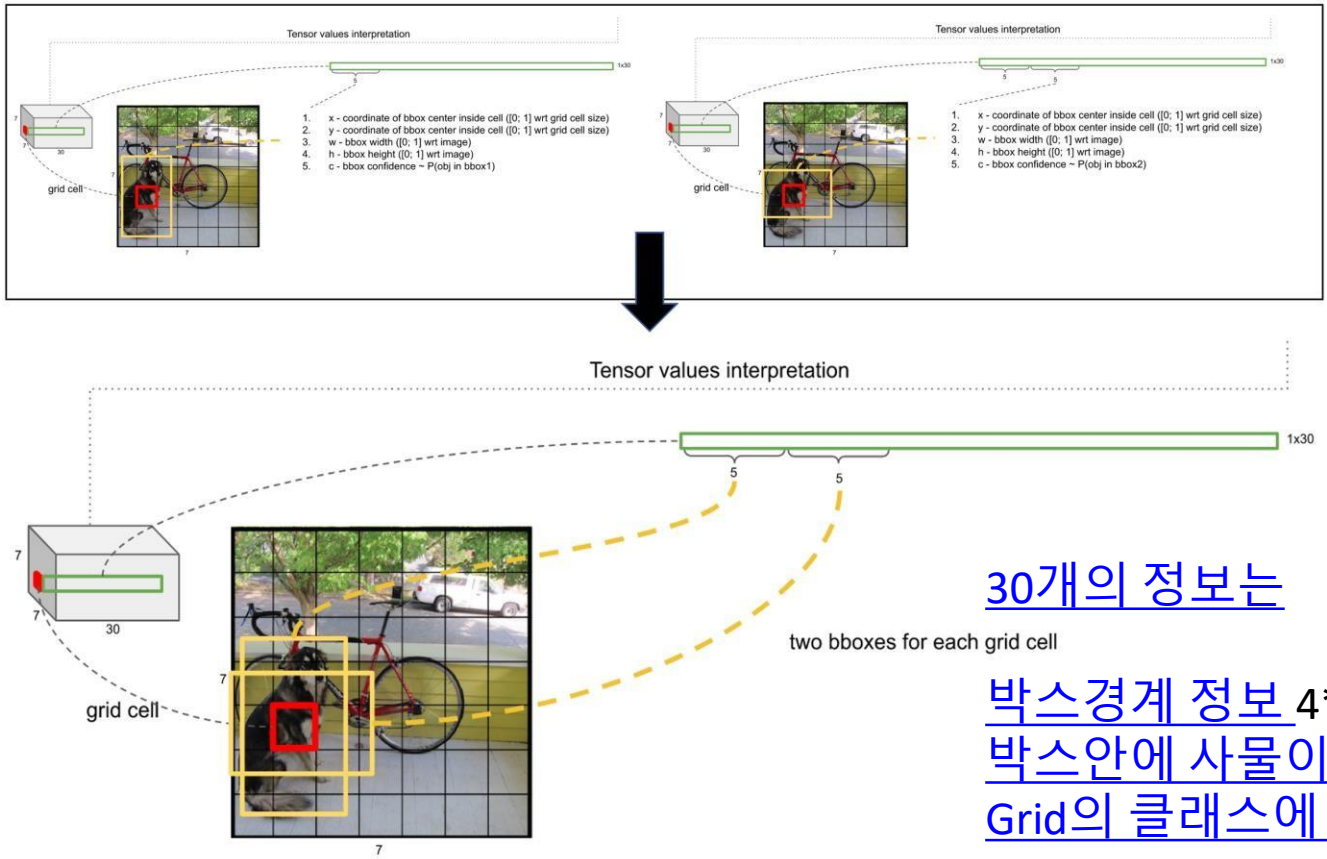
YOLO(You Only Look Once)



https://towardsdatascience.com/yolov1-you-only-look-once-object-detection-e1f3ffec8a89

3. 사물인식

YOLO(You Only Look Once)



https://ctkim.tistory.com/91 https://docs.google.com/presentation/d/1aeRvtKG21KHdD5lg6_Hgyhx5rPq_ZOsGjG5rJ1HP7BbA/pub?start=false&loop=false&delayms=3000&slide=id.g137784ab86_4_484

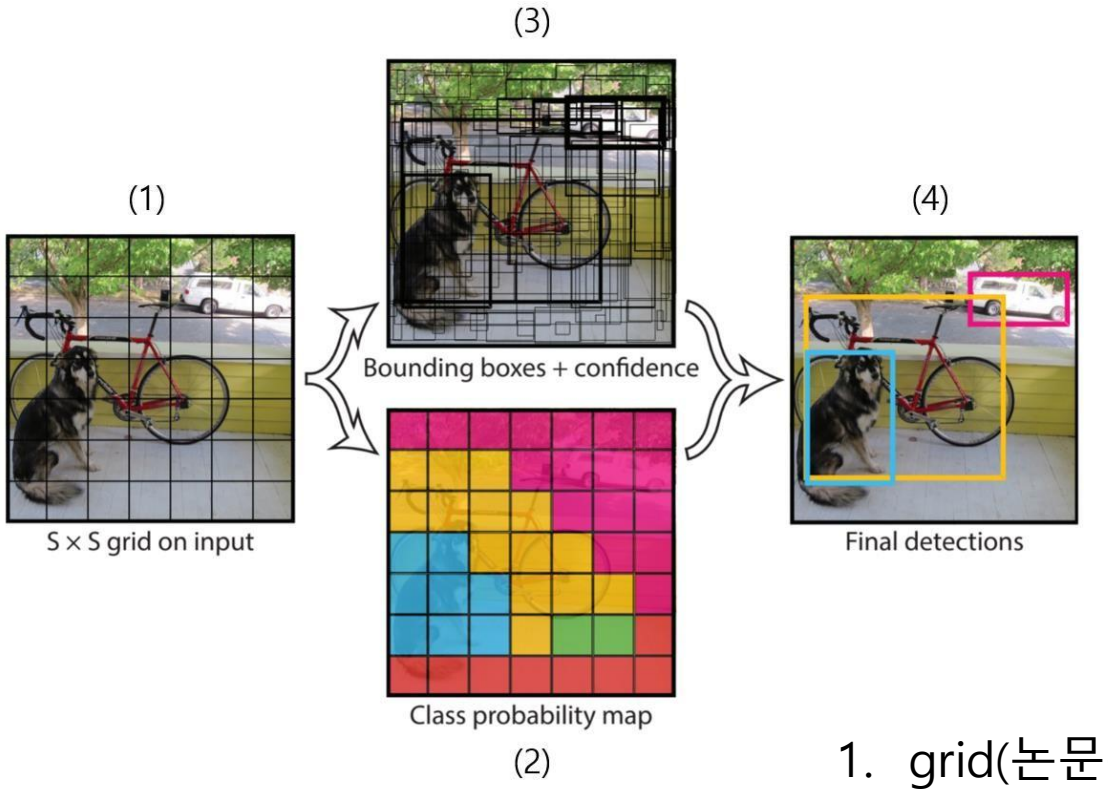
30개의 정보는

박스경계 정보 4*2
박스안에 사물이 있을 confidence 1*2
Grid의 클래스에 대한 확률 20

⇒ 클래스에 대한 분류와 함께
⇒ 박스의 confidence를 함께 구함

3. 사물인식

YOLO(You Only Look Once)

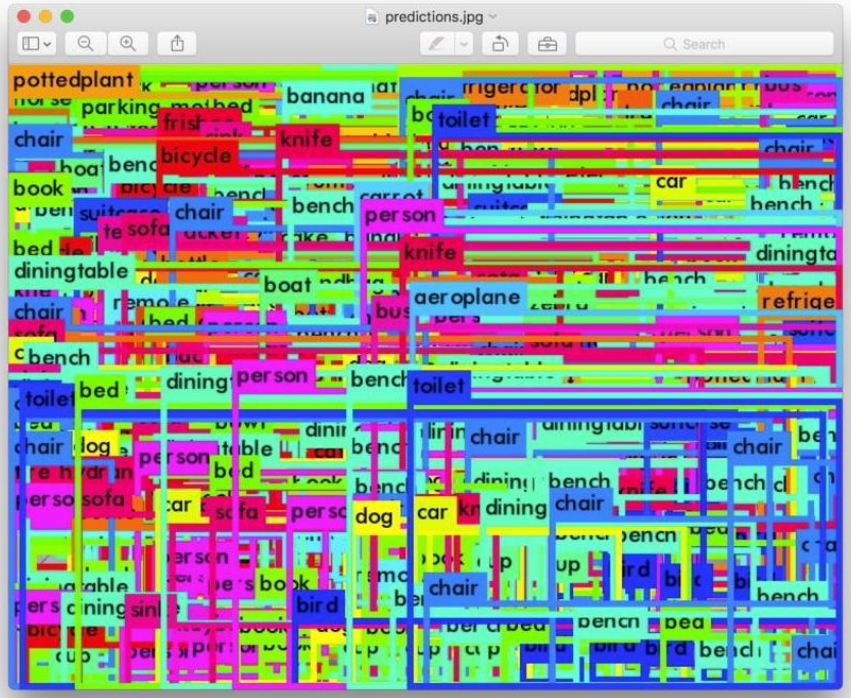


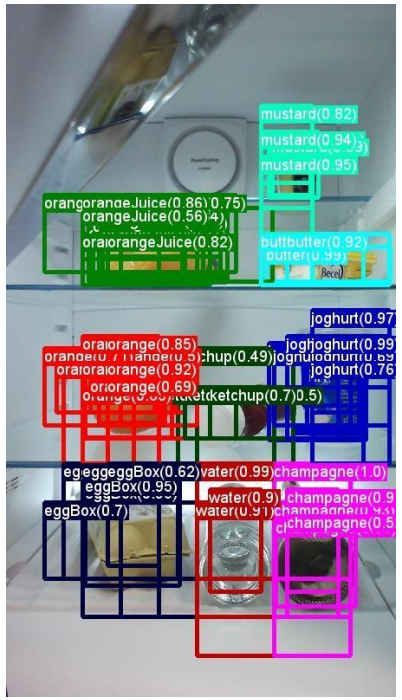
1. grid(논문은 7X7)로 이미지를 나눠줌
2. grid중심으로 B개의 박스를 그림
3. confidence score를 구함
4. class 판별

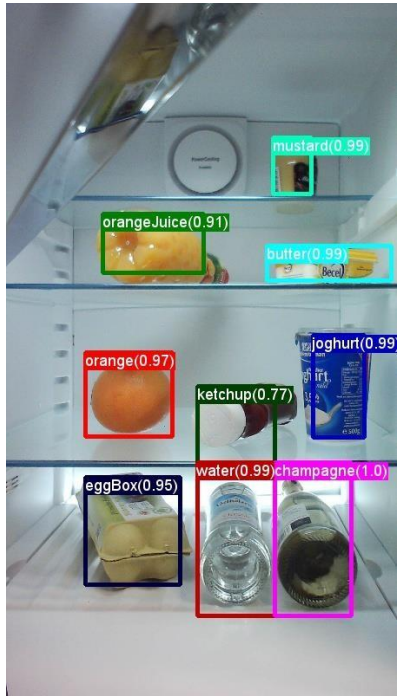
https://ctkim.tistory.com/91

3. 사물인식

YOLO(You Only Look Once)







Threshold를 적용하지 않고 모든 경우를 출력하면...

https://ctkim.tistory.com/91

3. 사물인식

YOLO 실습