

## index

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1	소개	- 소개
2	얼굴 인식	- MTCNN - FaceNet
3	사물 인식	- YOLO

## 1. 소개

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소개 및 라이선스 소개

## 1. 라이선스 소개

### ● 라이선스 정보

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

# 1. 소개 및 환경설정

## ● 구글 코랩(google colab)

The image shows a Google search for 'google colab' and the Colaboratory web interface. In the search results, the top result is 'google.com' with the URL 'https://colab.research.google.com'. Below this, the text 'Google Colab' is displayed, followed by a description: 'When you create your own Colab notebooks, they are stored in your Google Drive account. You can easily share your Colab notebooks with co-workers or friends, ...'. The Colaboratory interface is shown below the search results. It features a header with the Colab logo and the text 'Colaboratory에 오신 것을 환영합니다'. Below the header, there are navigation links: '파일', '수정', '보기', '삽입', '런타임', '도구', and '도움말'. The main area is divided into two panels. The left panel shows a file explorer with a search bar and icons for uploading, creating a new file, and deleting. A red box highlights the 'drive' icon. The right panel shows a file explorer with a search bar and icons for uploading, creating a new file, and deleting. A red box highlights the 'drive' folder. Below the 'drive' folder, there is a folder named 'sample\_data'. A red box also highlights the 'drive' folder in the right panel.

Google

google colab

전체 이미지 동영상 도서 뉴스 더보기 도구

검색결과 약 29,000,000개 (0.33초)

google.com  
https://colab.research.google.com

Google Colab

When you create your own **Colab** notebooks, they are stored in your **Google** Drive account. You can easily share your **Colab** notebooks with co-workers or friends, ...

Colaboratory에 오신 것을 환영합니다

파일 수정 보기 삽입 런타임 도구 도움말

파일

drive

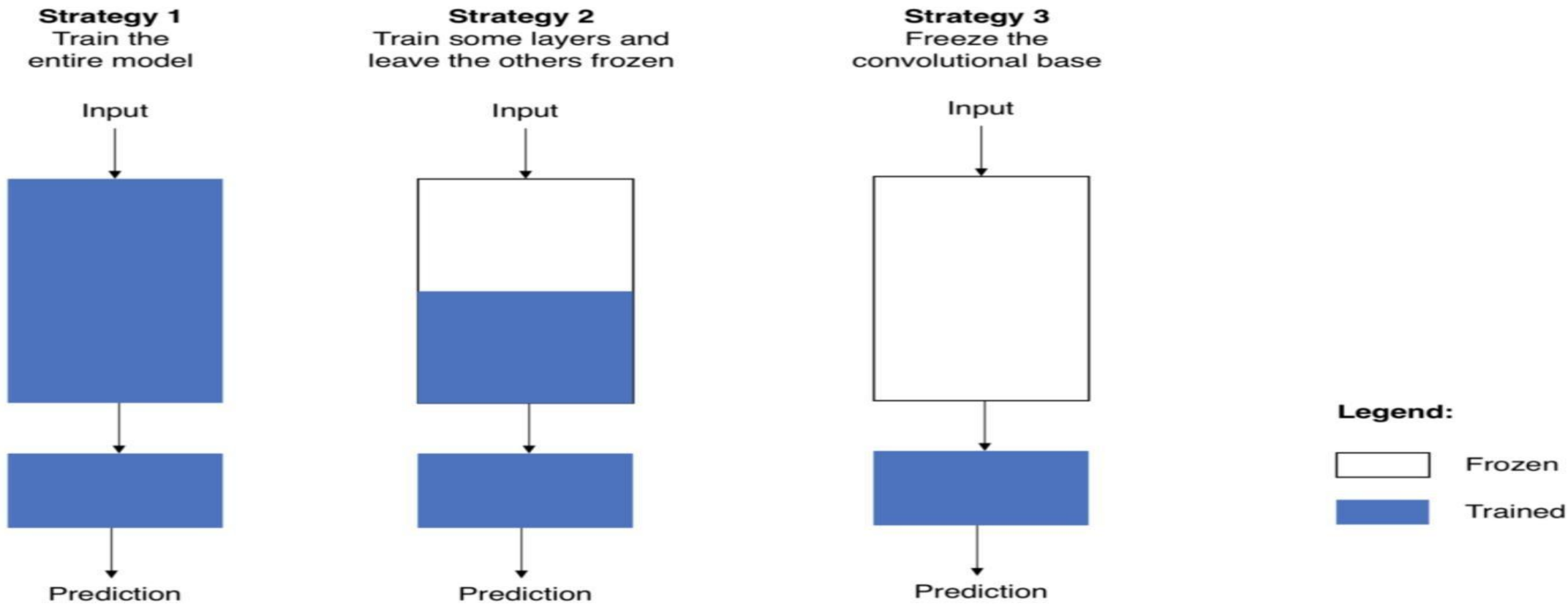
sample\_data

drive

sample\_data

# 1. 소개 및 환경설정

## ● 사전학습, 파인튜닝, 전이학습



<https://jeinalog.tistory.com/13>

## 2. 얼굴인식

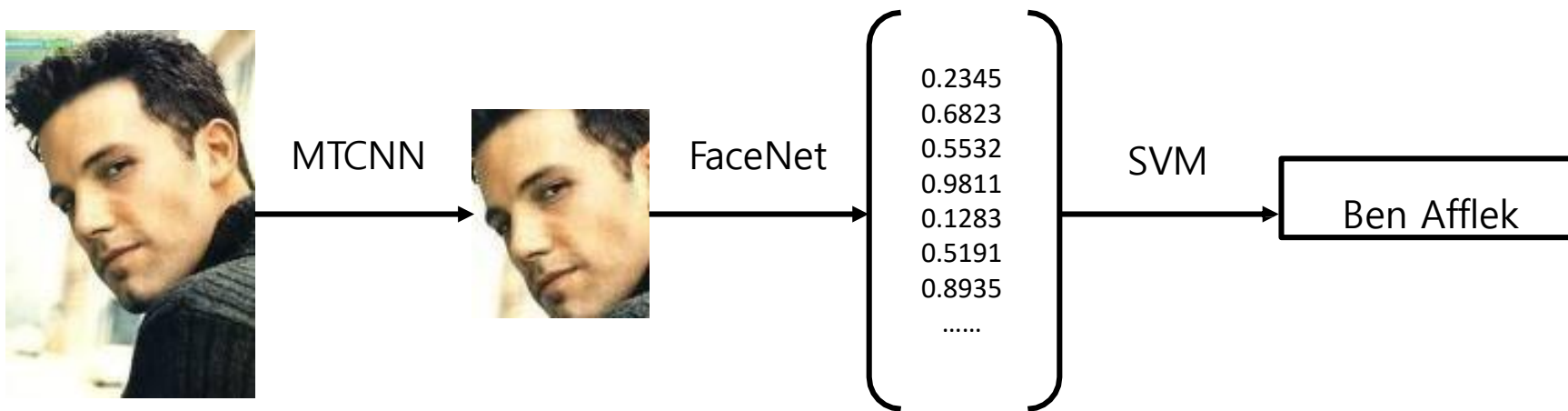
---



얼굴인식

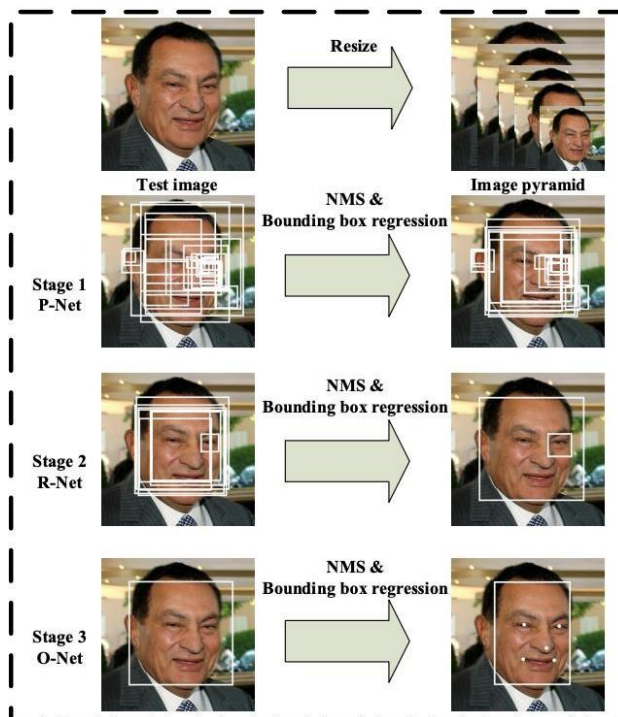
## 2. 얼굴인식

### ● MTCNN & FaceNet

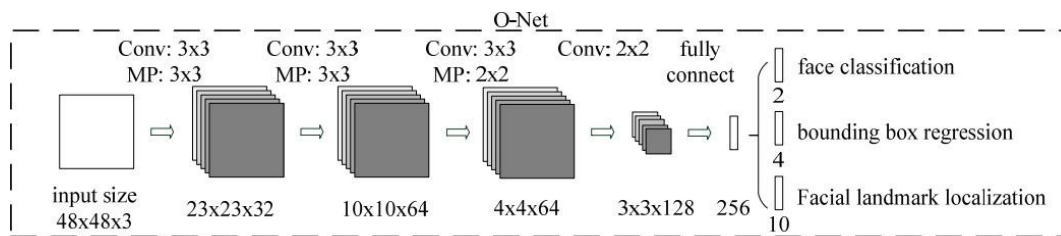


## 2. 얼굴인식

### ● MTCNN(The Multi-task Cascaded Convolutional Networks)



1. 다양한 크기로 이미지를 만듭니다. 얼굴 크기가 작을 수도, 클 수도 있기 때문입니다.
2. 1번 이미지 중 얼굴로 인식되는 부분을 찾아 다음 원래 크기로 확대합니다. -> 박스 크기가 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)
  }
}
```

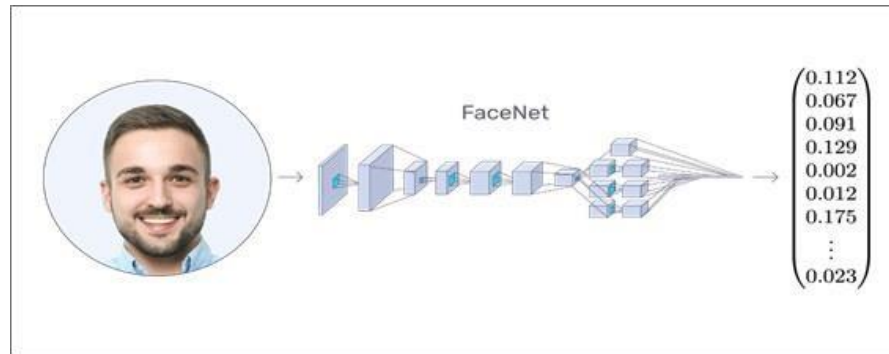


<https://yeomko.tistory.com/16>  
<https://youtu.be/w4tigQn-7Jw>

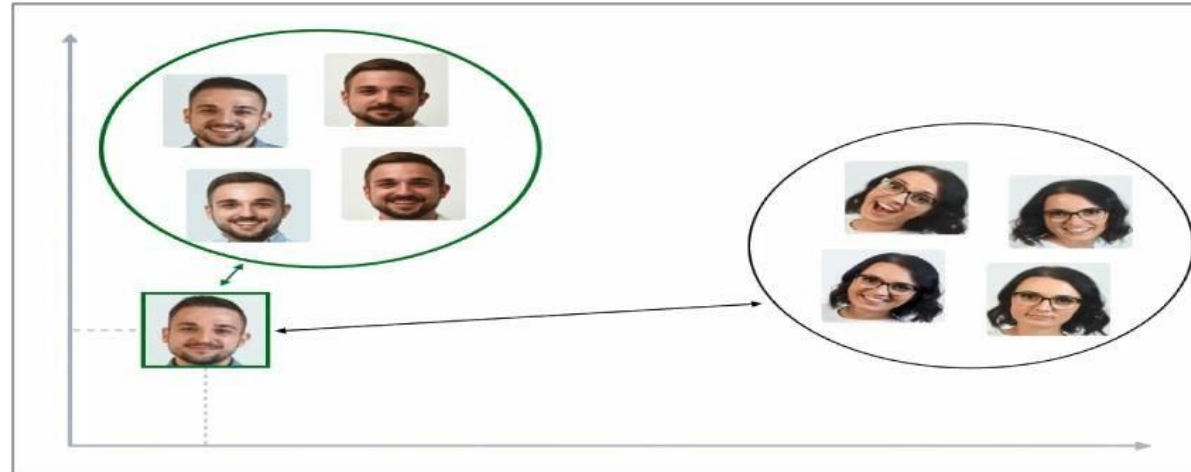


## 2. 얼굴인식

### ● FaceNet

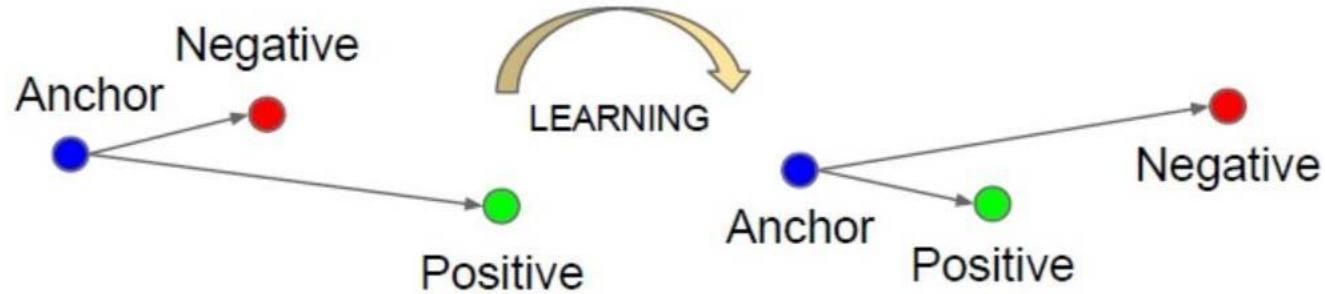


128차원 Embedding



## 2. 얼굴인식

### ● FaceNet



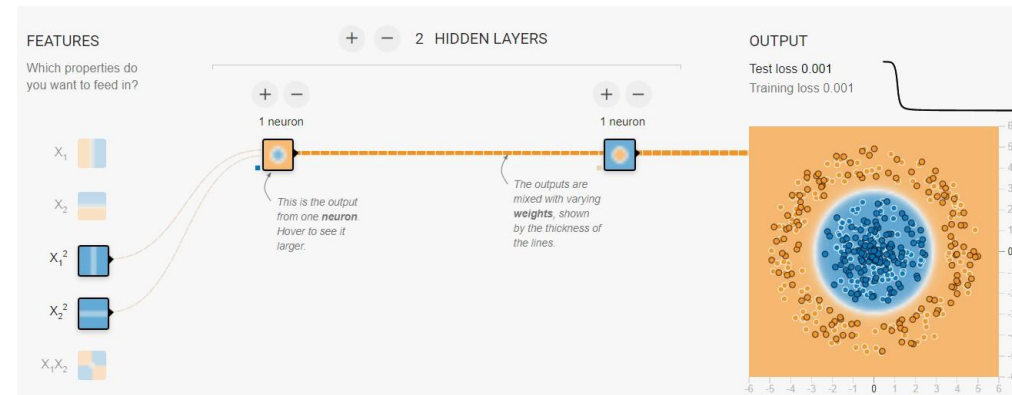
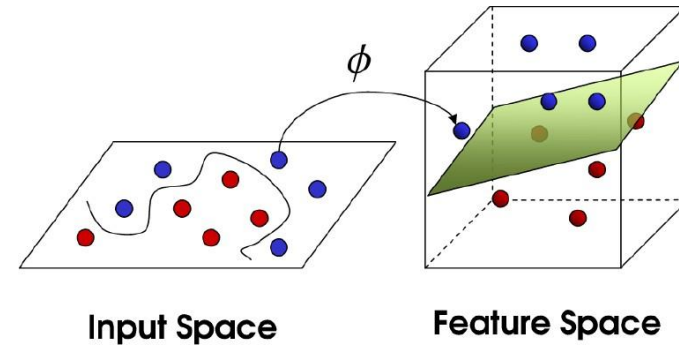
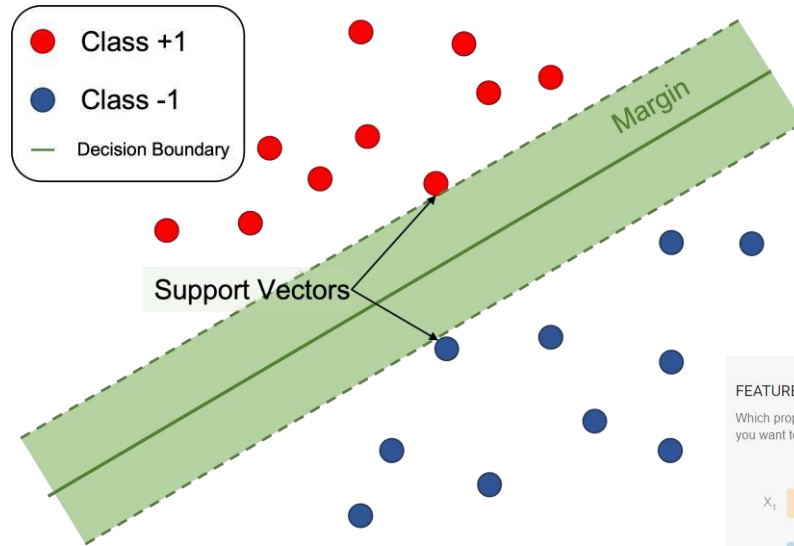
$$\operatorname{argmax}_{x_i^p} \|f(x_i^a) - f(x_i^p)\|_2^2$$

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

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

<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/dansbecker/5-celebrity-faces-dataset?resource=download>

## 2. 얼굴인식

### 데이터셋

#### 5 Celebrity Faces Dataset

Data Card Code (41) Discussion (1)

160

New Notebook

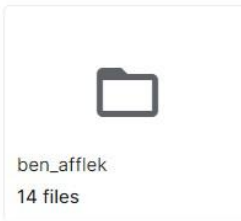
Download (5 MB)

Arts and Entertainment

News

train (5 directories)

Full Screen >



#### 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

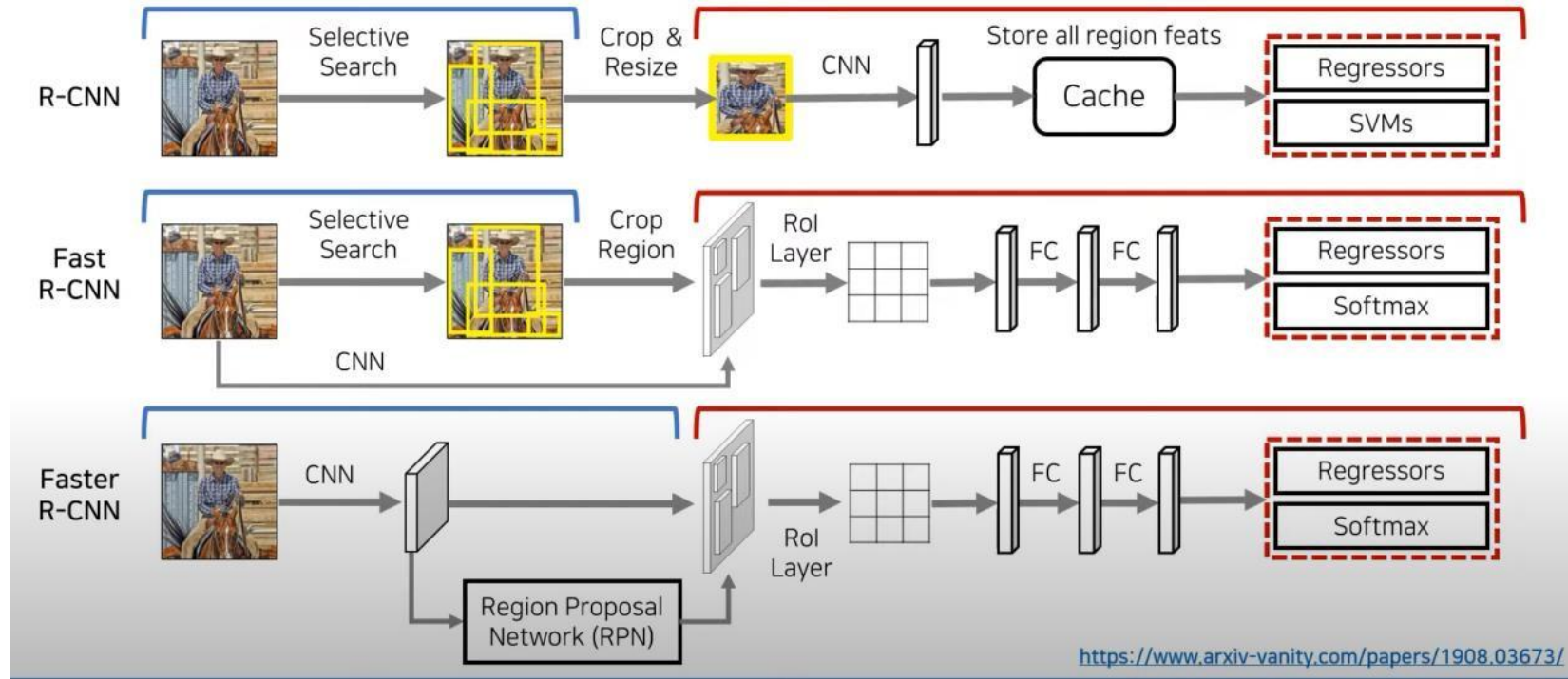
### 3. 사물인식

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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)



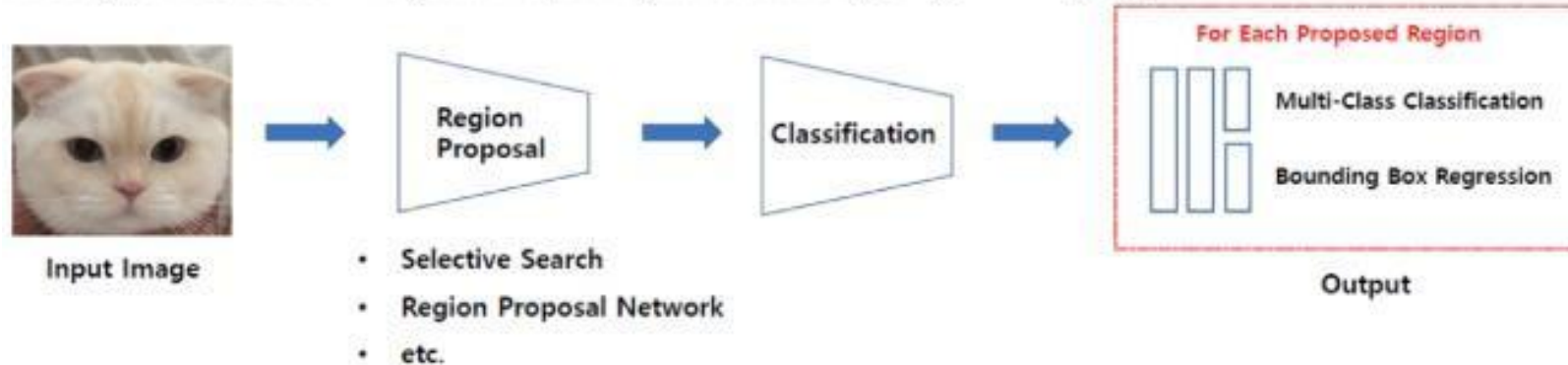
1. 초기 segment 생성
2. 영역 통합
3. 후보 영역 생성
4. 영역의 확률 계산  
(객체존재확률+ B  
ounding Box 좌표)



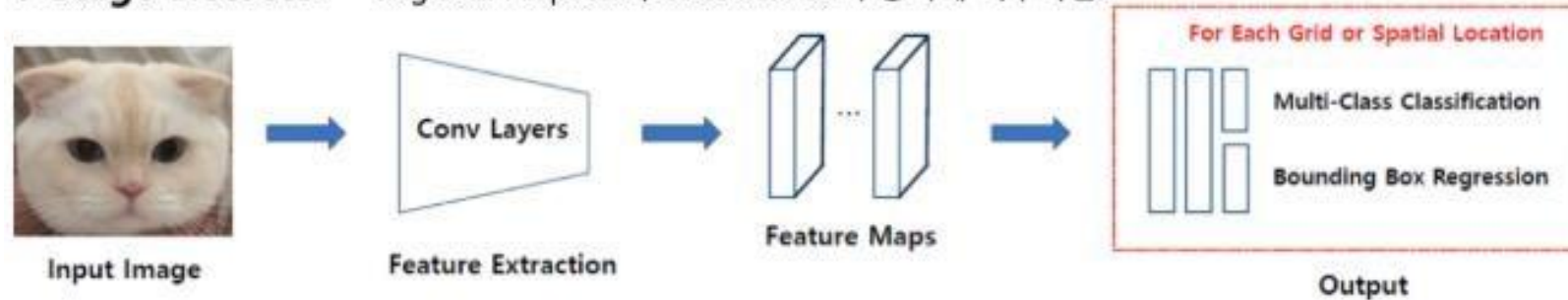
### 3. 사물인식

#### ● 1stage vs 2stage

**2-Stage Detector** - Regional Proposal와 Classification이 순차적으로 이루어짐.



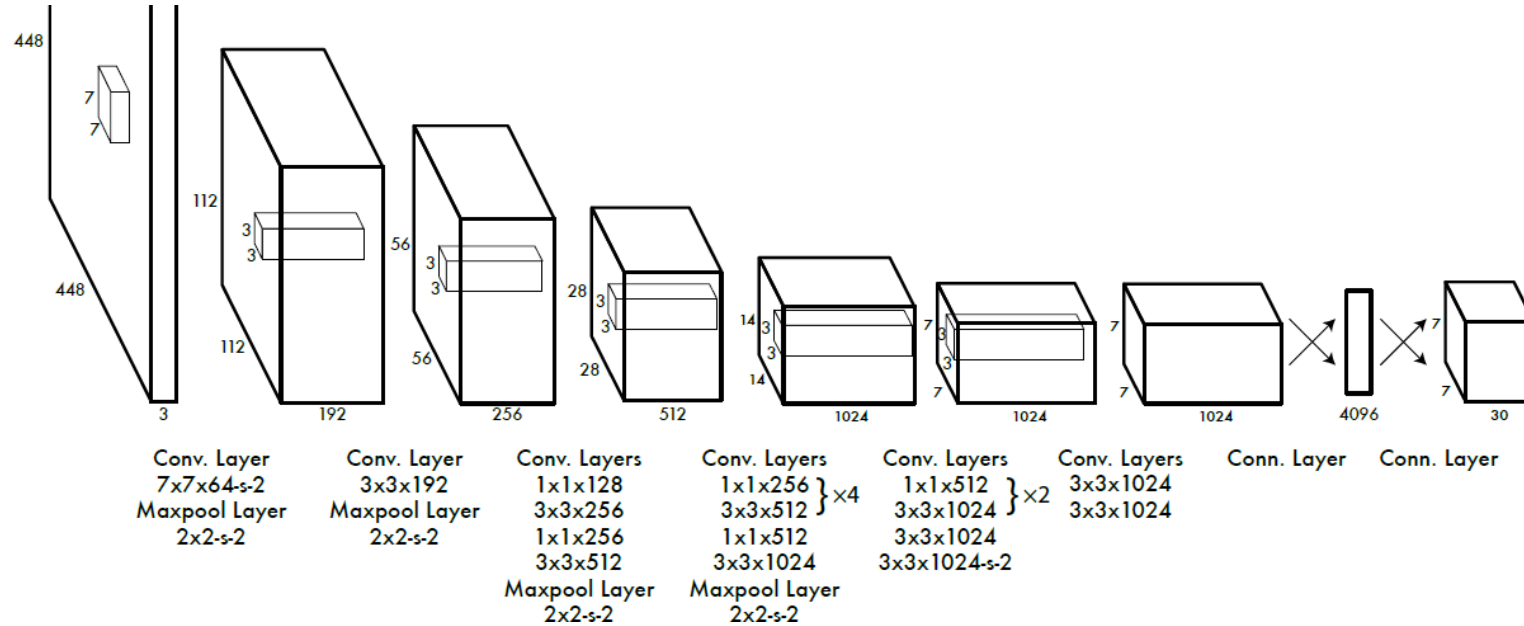
**1-Stage Detector** - Regional Proposal와 Classification이 동시에 이루어짐.



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

### 3. 사물인식

#### ● YOLO(You Only Look Once)



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

### 3. 사물인식

#### ● YOLO 실습

