



# DEEP LEARNING

Bariqi Abdillah

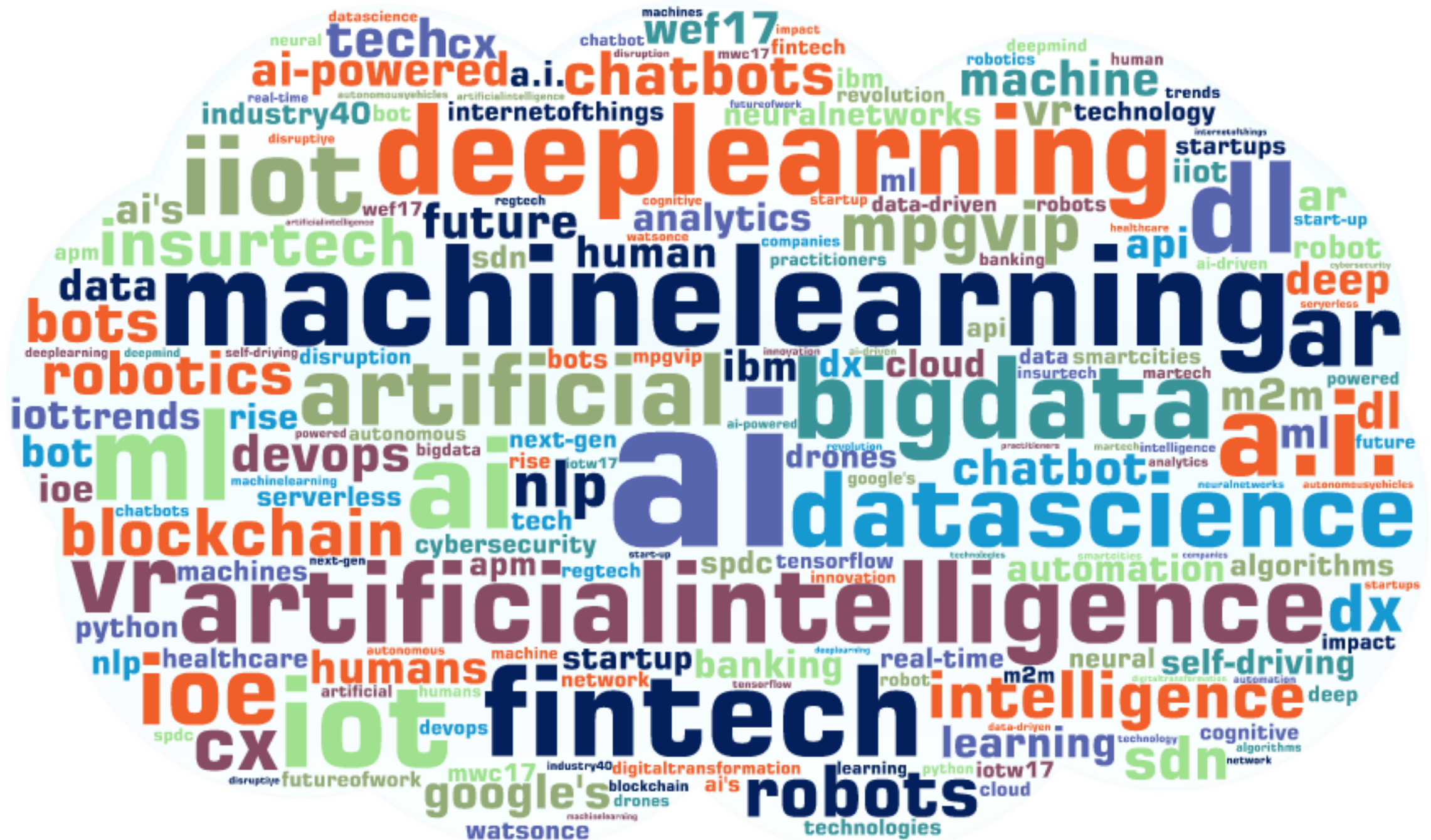
## Requirements:

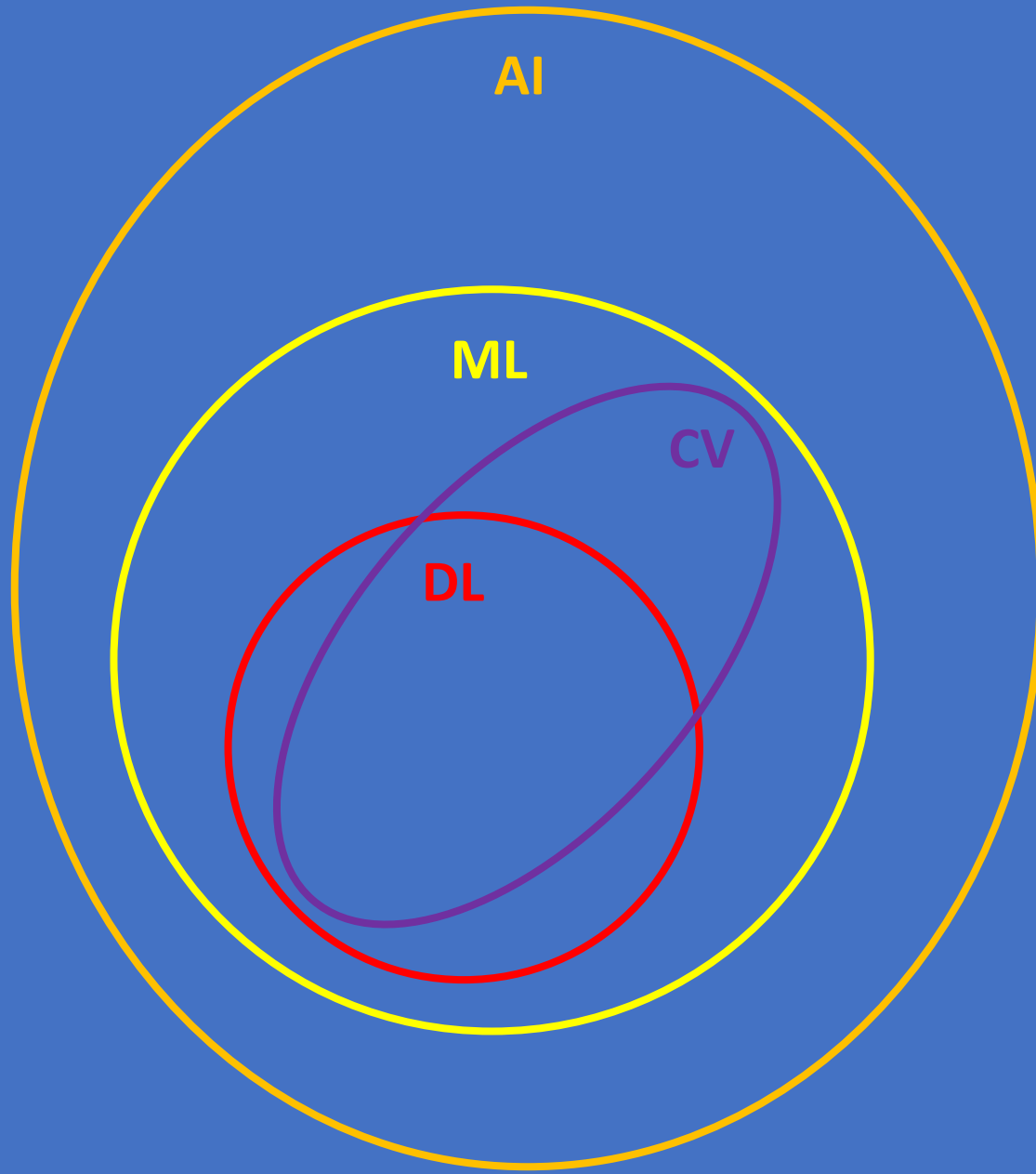
1. Google Account
2. Source Code

## Steps:

1. Download file from (<https://github.com/bariqi/DSC-Summit-DL-2019>)
2. Extract file
3. Go to [drive.google.com](https://drive.google.com)
4. Upload extracted file in main on your Drive







**AI** : Paradigma mengenai mesin dapat berpikir seperti manusia.

**ML**: Kemampuan mesin dapat belajar dari sekumpulan data.

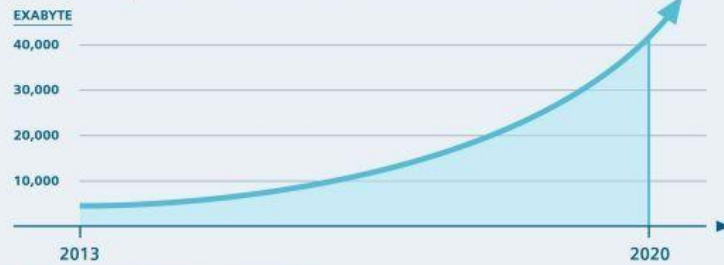
**DL** : Bagian dari ML dengan algoritma yang memiliki beberapa layer

**CV** : Kemampuan yang disematkan agar mesin dapat mengetahui apa yang dia lihat.

# Why deep learning

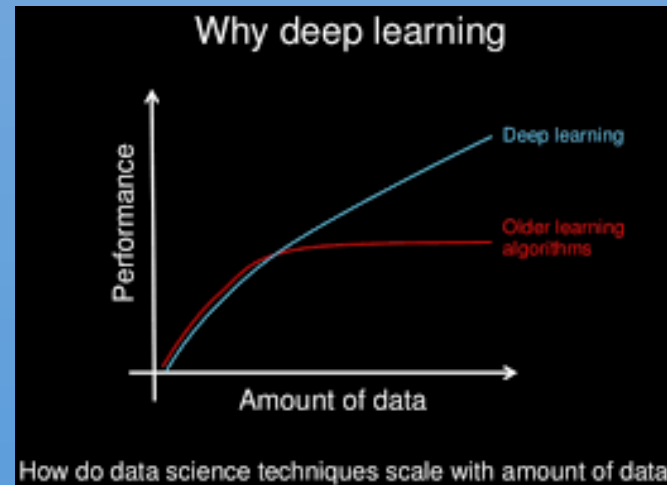
Really "Big Data" – Data volume is increasing exponentially

By the year 2020, the digital universe will reach 44 zettabytes – that's a 10-fold increase from 2013.



Source: IDC's Digital Universe Study, April 2014, sponsored by EMC

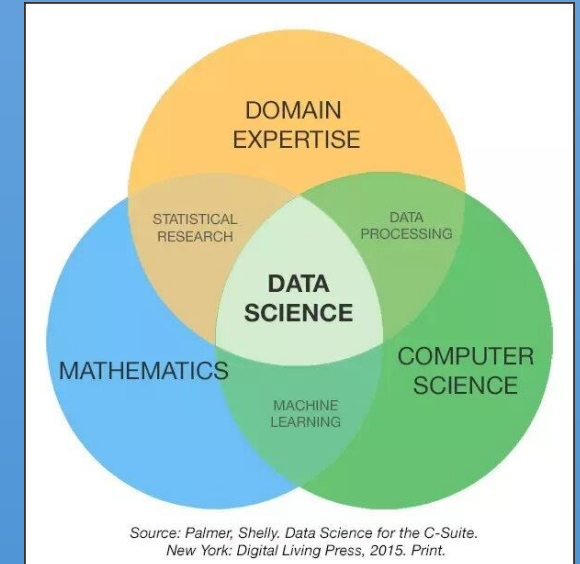
Volume and velocity of data



Much data greater accuracy



Inexpensice hardware



No need domain expertise

*Deep Learning is set of algorithms that parse data, learn from them, and then apply what they've learned to make intelligent decisions.*

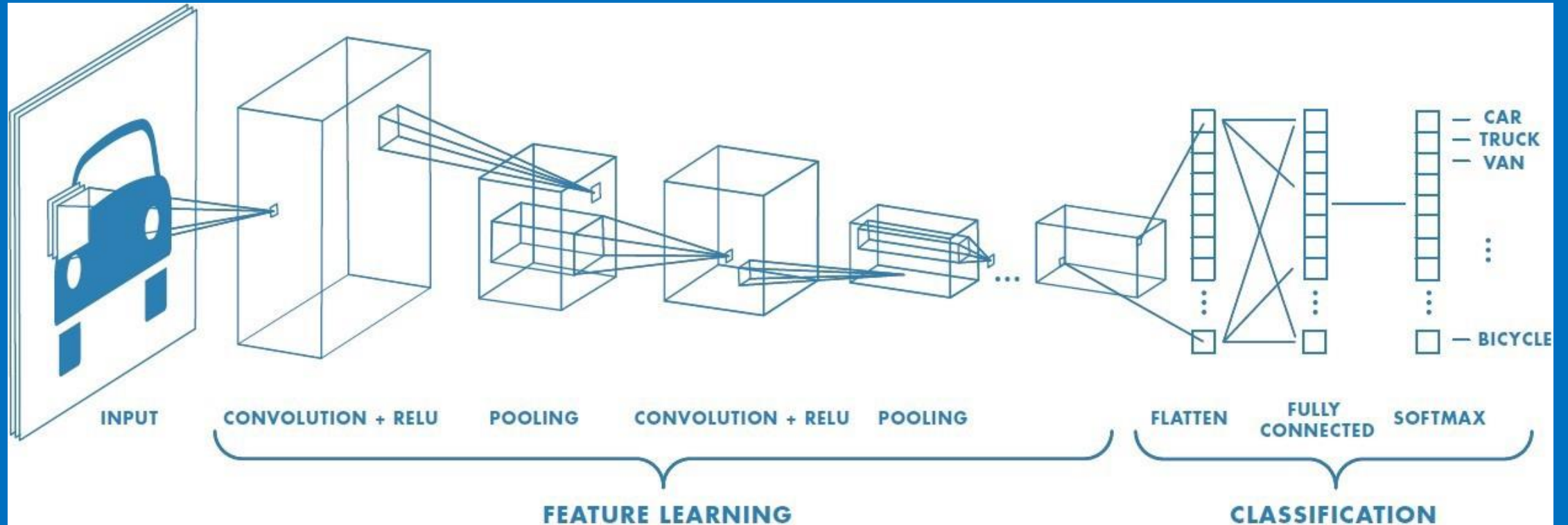




# Tutorial 1. Classification task using CNN



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# Convolutional Layer

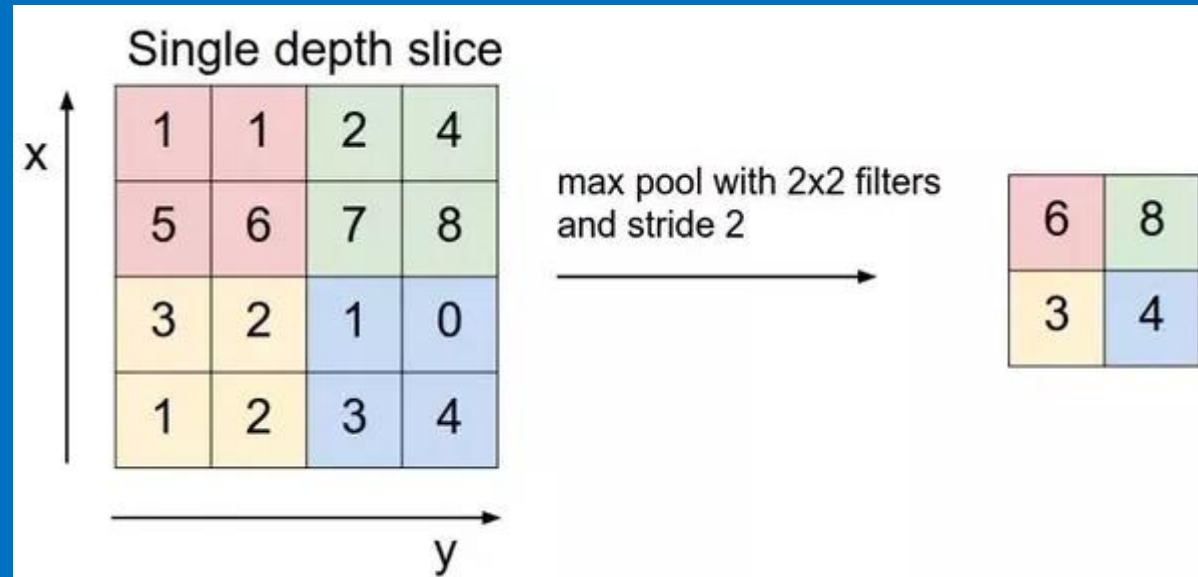
1 <sub>x1</sub>	1 <sub>x0</sub>	1 <sub>x1</sub>	0	0
0 <sub>x0</sub>	1 <sub>x1</sub>	1 <sub>x0</sub>	1	0
0 <sub>x1</sub>	0 <sub>x0</sub>	1 <sub>x1</sub>	1	1
0	0	1	1	0
0	1	1	0	0

Image

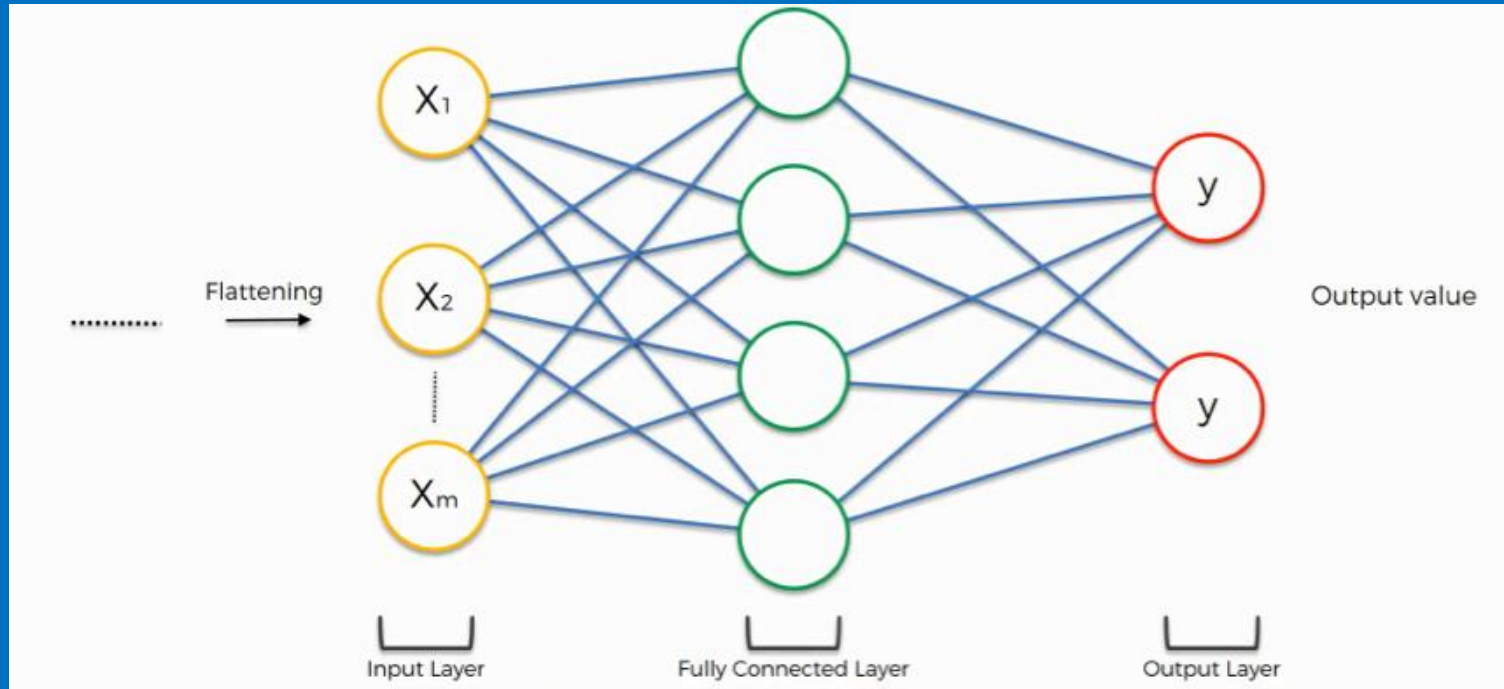
4		

Convolved  
Feature

## Pooling / Subsampling Layer



# Fully Connected Layer

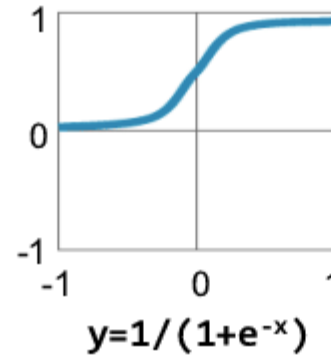




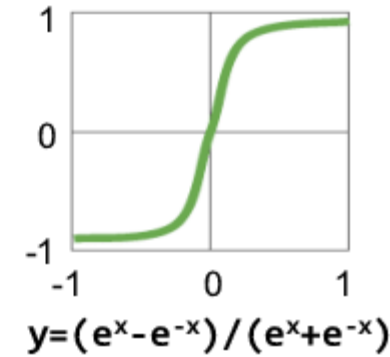
# Activation Function

## Traditional Non-Linear Activation Functions

Sigmoid

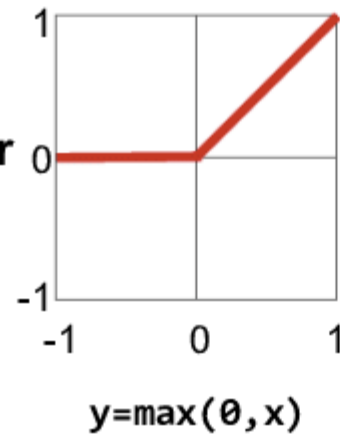


Hyperbolic Tangent

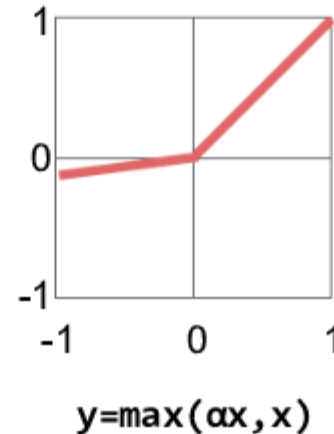


## Modern Non-Linear Activation Functions

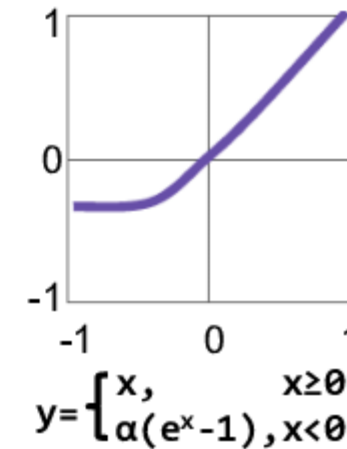
Rectified Linear Unit  
(ReLU)



Leaky ReLU



Exponential LU



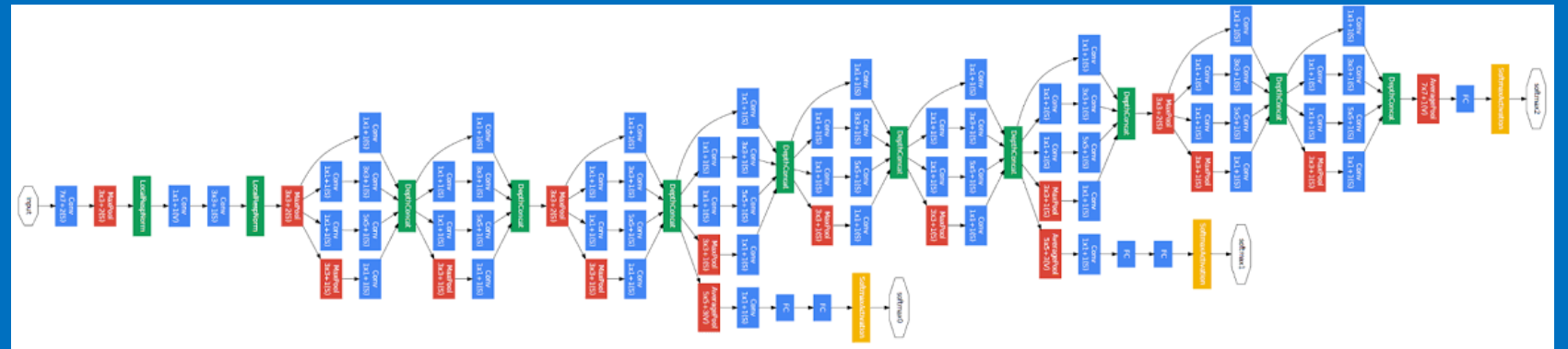
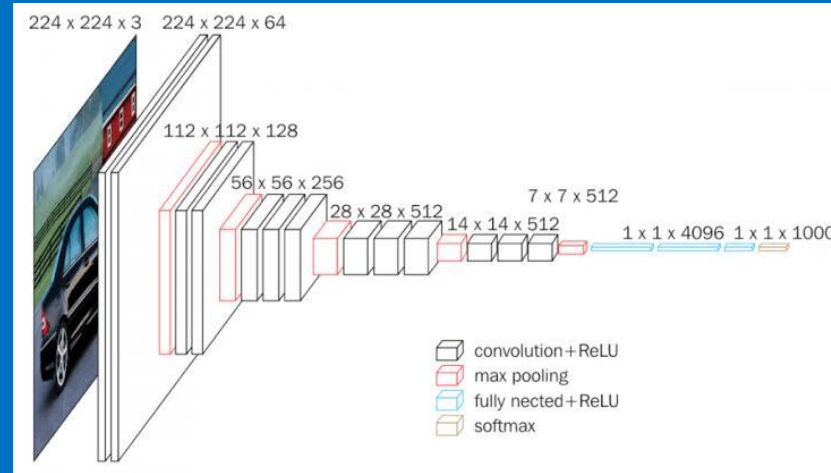
$\alpha$  = small const. (e.g. 0.1)



18.44 one wyłącznie na kartę PEKA. Zarząd Transportu Miejskiego zachęca do wymian

# Architecture of CNN

LeNet-5 (1998)  
AlexNet (2012)  
VGG-16 (2014)  
Inception-v1 (2014)  
Inception-v3 (2015)  
ResNet-50 (2015)  
Xception (2016)  
Inception-v4 (2016)  
Inception-ResNets (2016)  
ResNeXt-50 (2017)





Question?



# Tutorial 2. Face Recognition



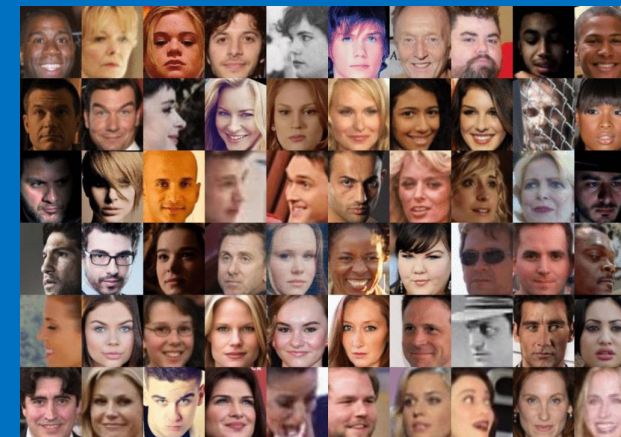


Labelled Faces in the Wild (LFW)  
 $\pm 6.000$  Entity  
Break 99.65% accuracy by facenet



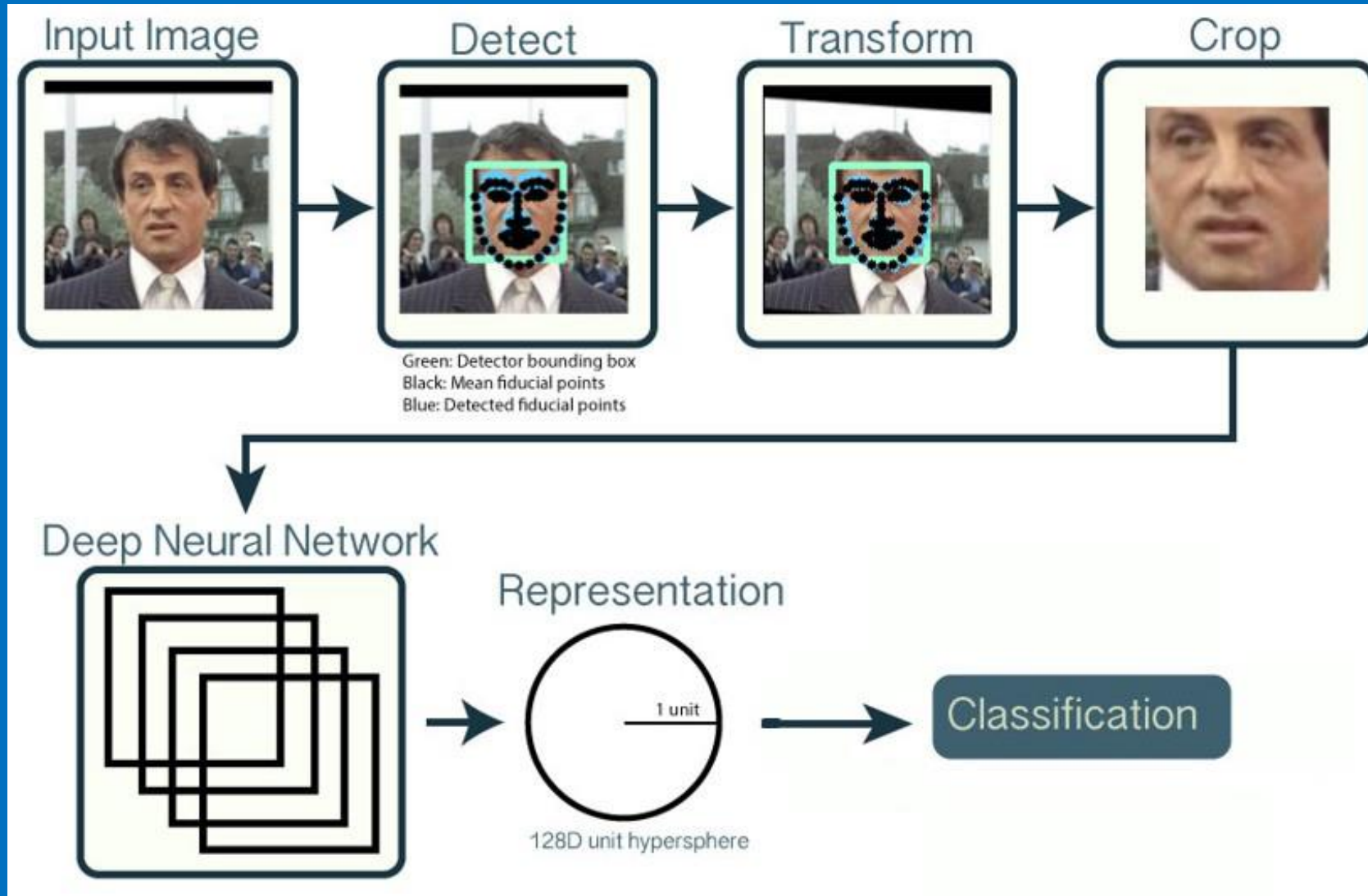
CASIA WebFace Dataset  
 $\pm 10.575$  Entity  
Break 99.05% accuracy by facenet

MegaFace Dataset  
 $\pm 672.000$  Entity  
Break 90% accuracy by TencentAILab

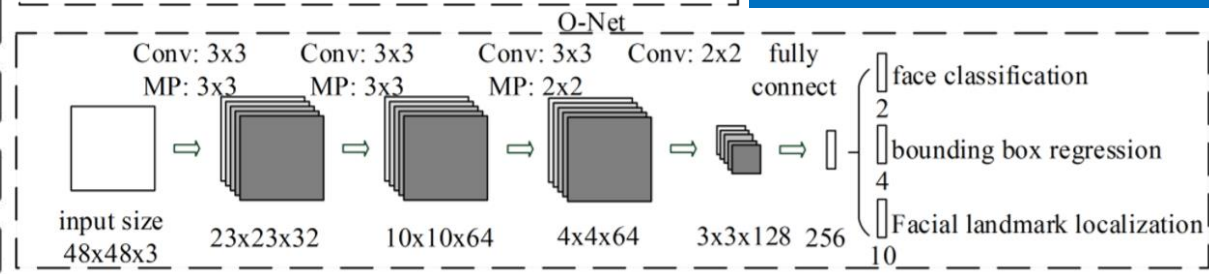
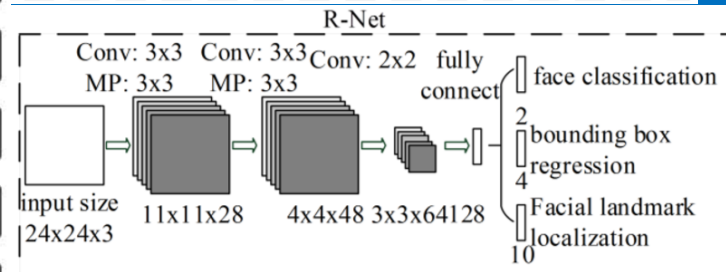
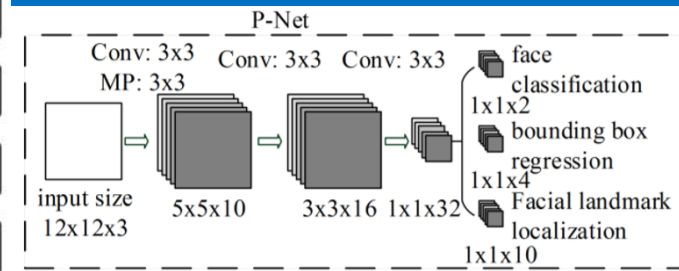
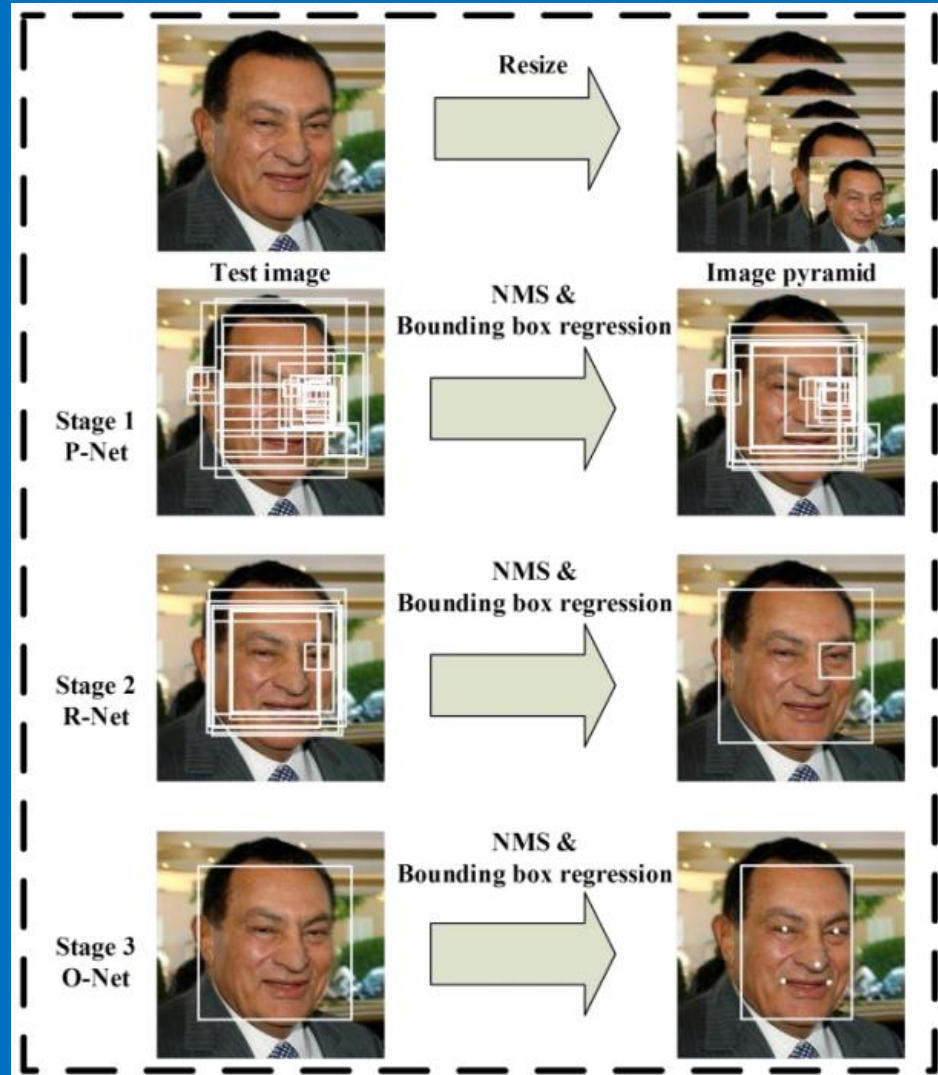


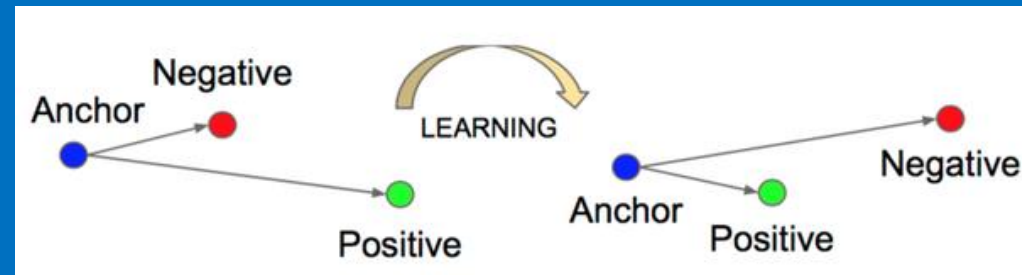
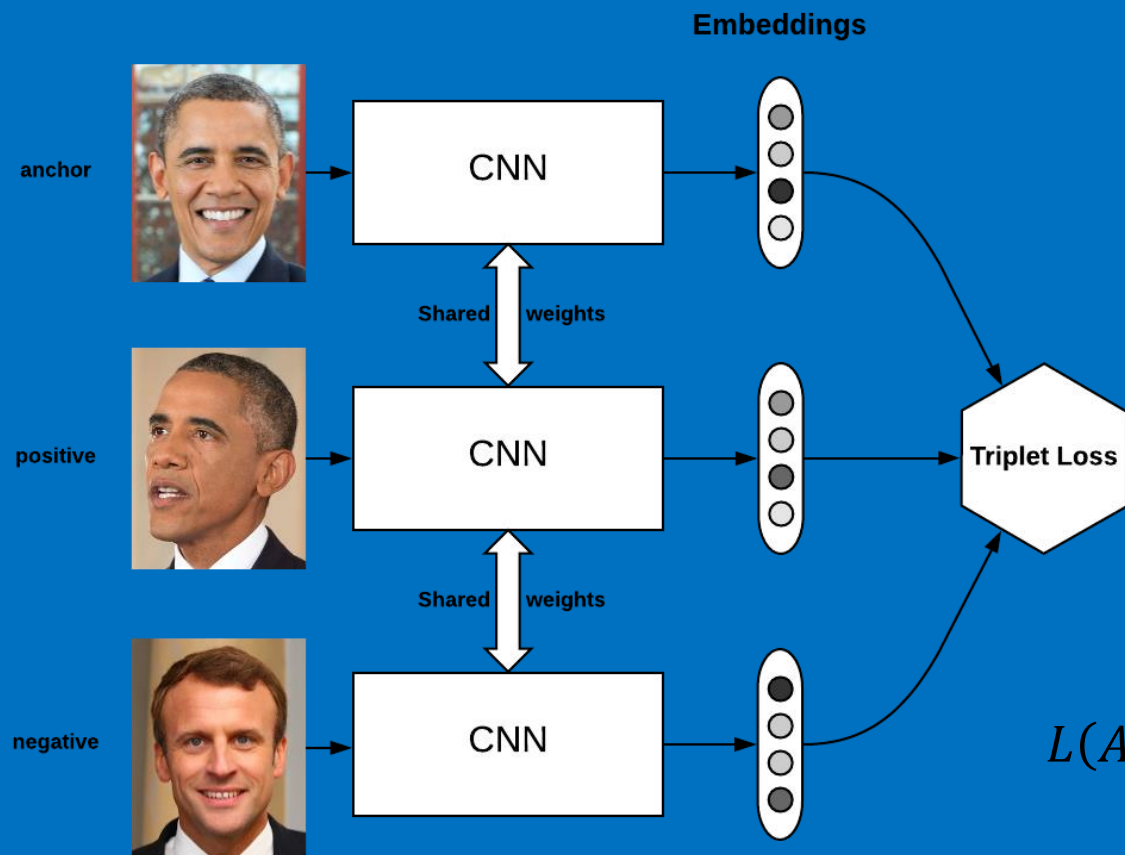


# Face Recognition Workflow



# Face Detection





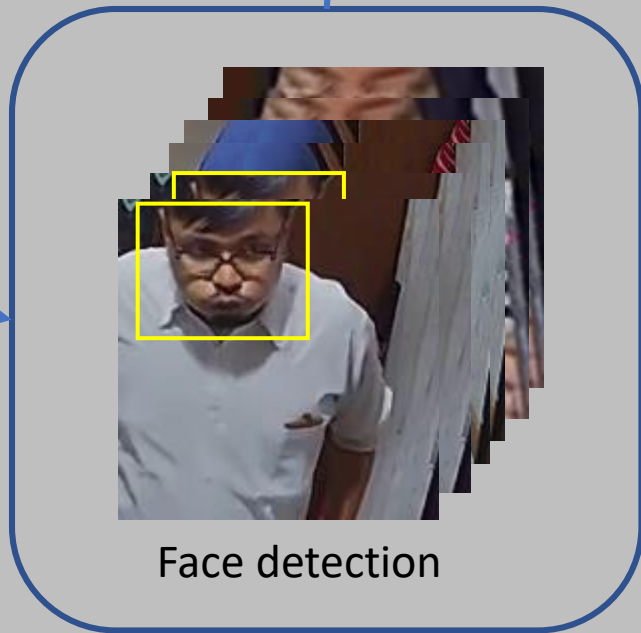
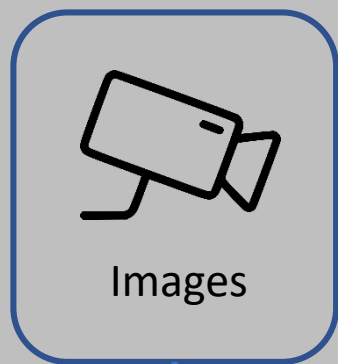
$$d(a, p) \leq d(a, n)$$

$$d(a, p) + \alpha \leq d(a, n), \alpha = \text{margin}$$

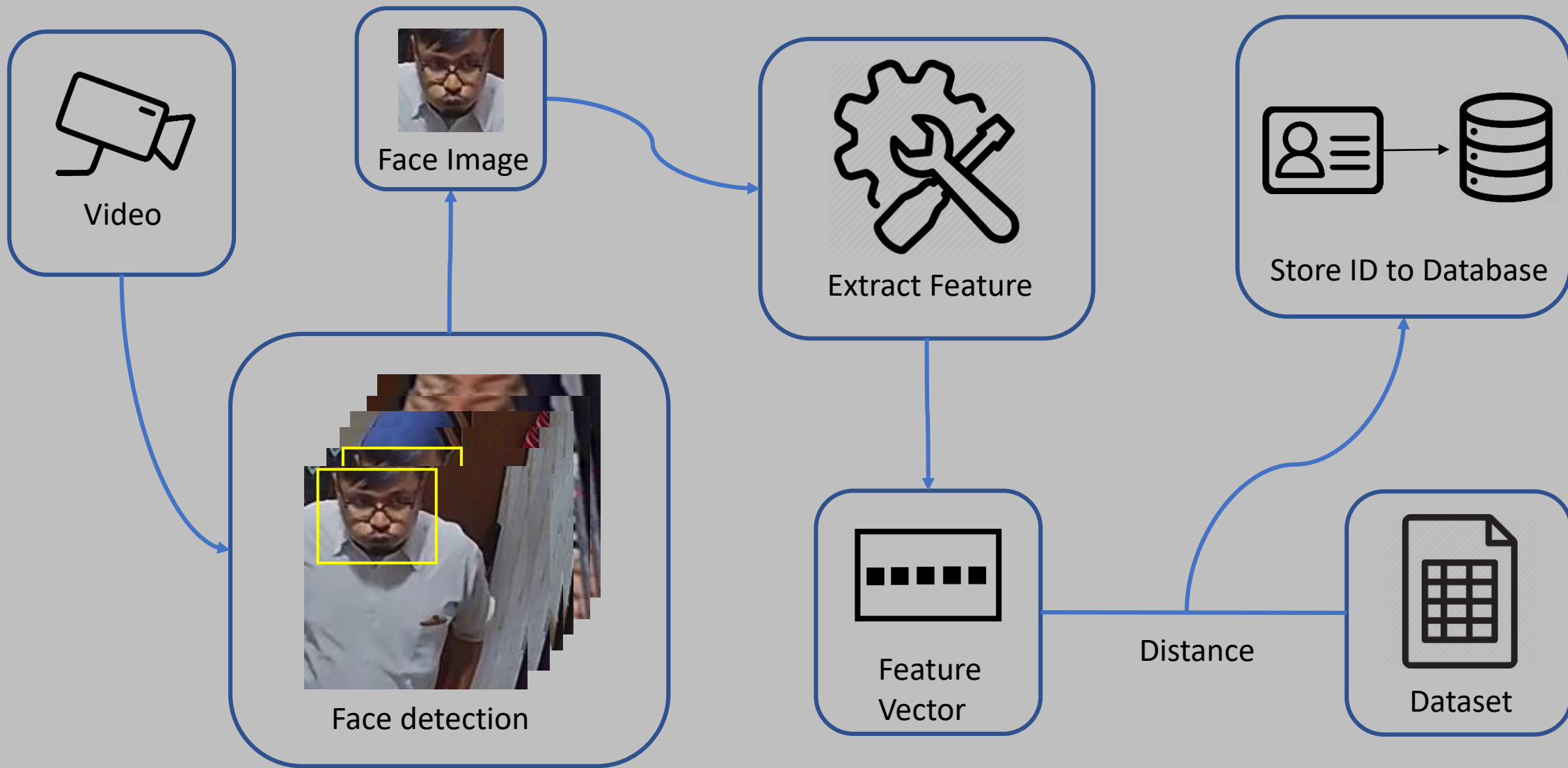
$$L(A, P, N) = \max(\|f(A) - f(P)\| + \alpha - \|f(A) - f(N)\|, 0)$$

$$w^{t+1} = w^t + \eta \cdot L(A, P, N)$$

Model





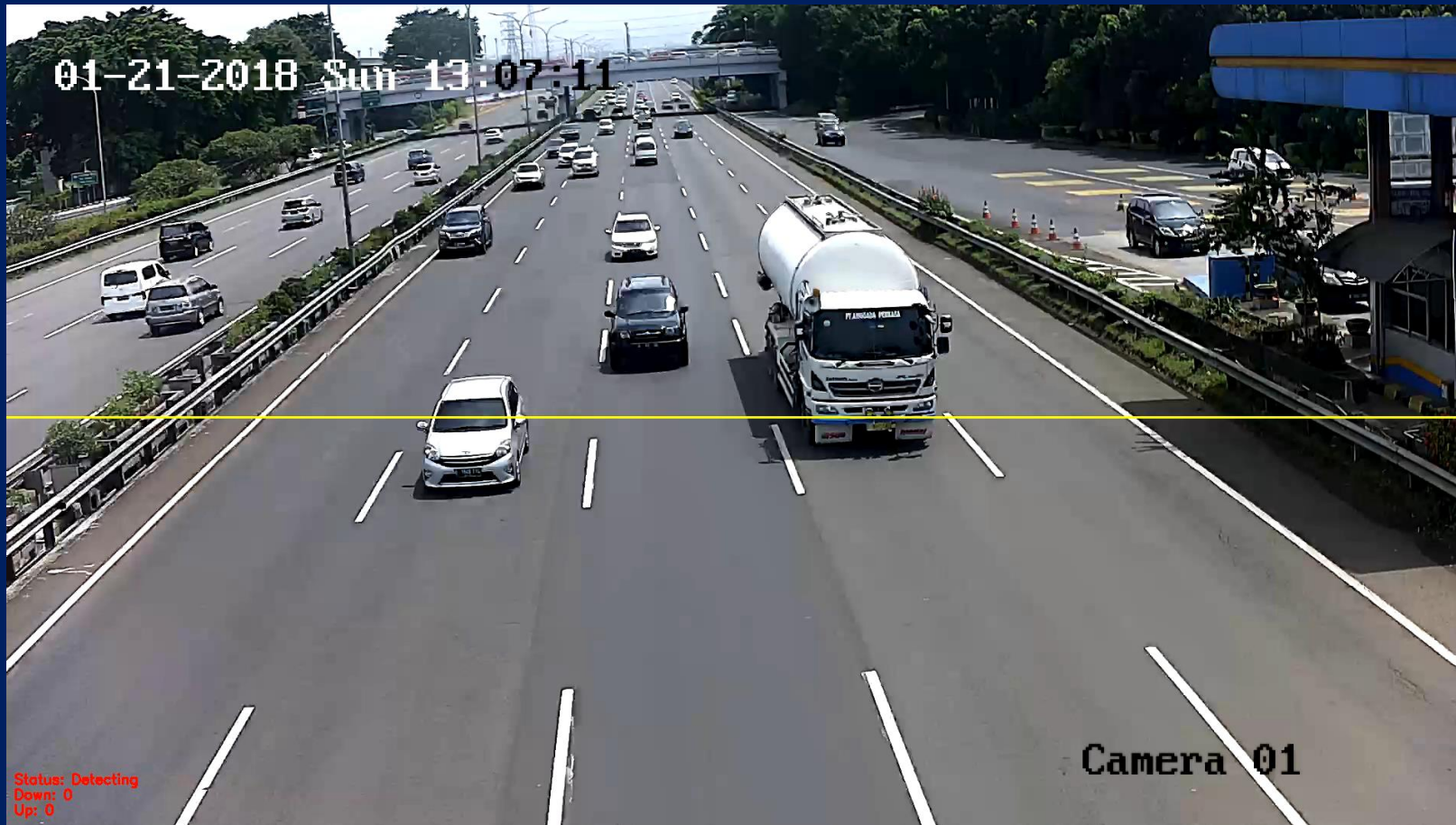




# Question?

**Source:** <https://www.pyimagesearch.com/2018/09/24/opencv-face-recognition/>

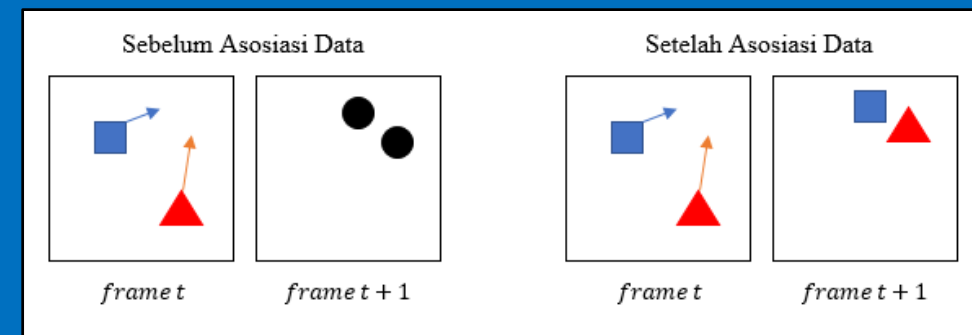
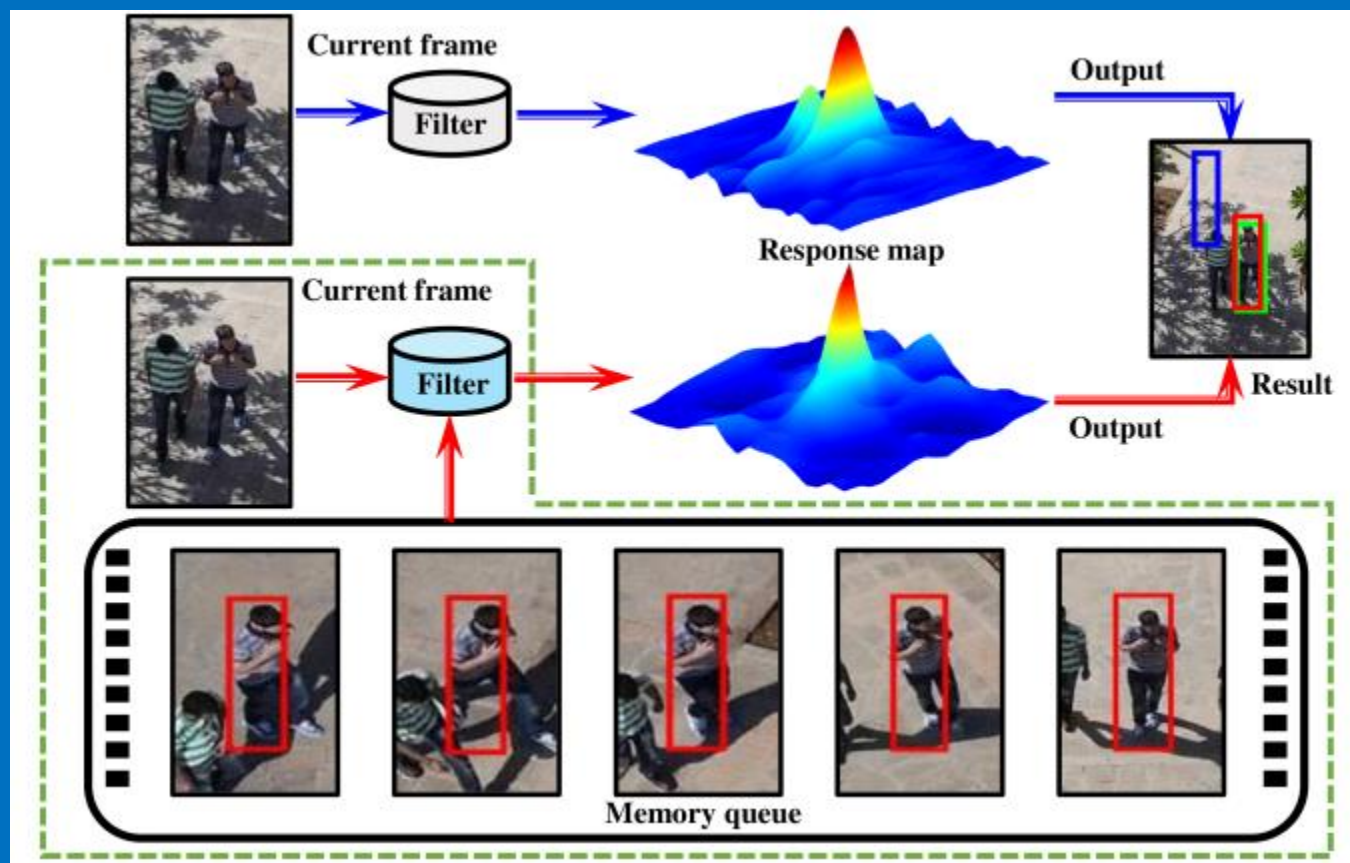
## Tutorial 3. Object Counting



Source: <https://www.pyimagesearch.com/2018/08/13/opencv-people-counter/>

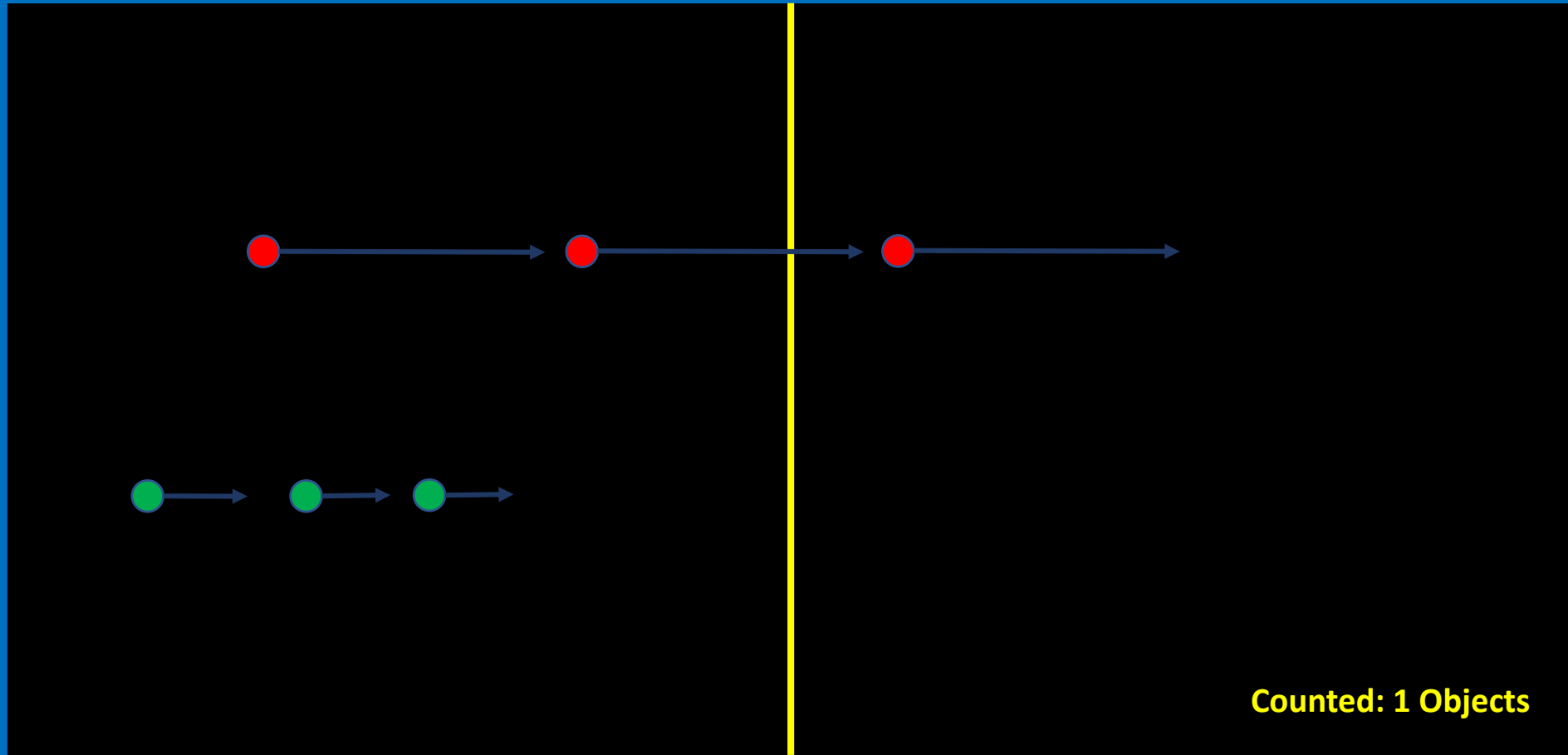
Source: <https://www.pyimagesearch.com/2018/07/23/simple-object-tracking-with-opencv/>

# Object Tracking

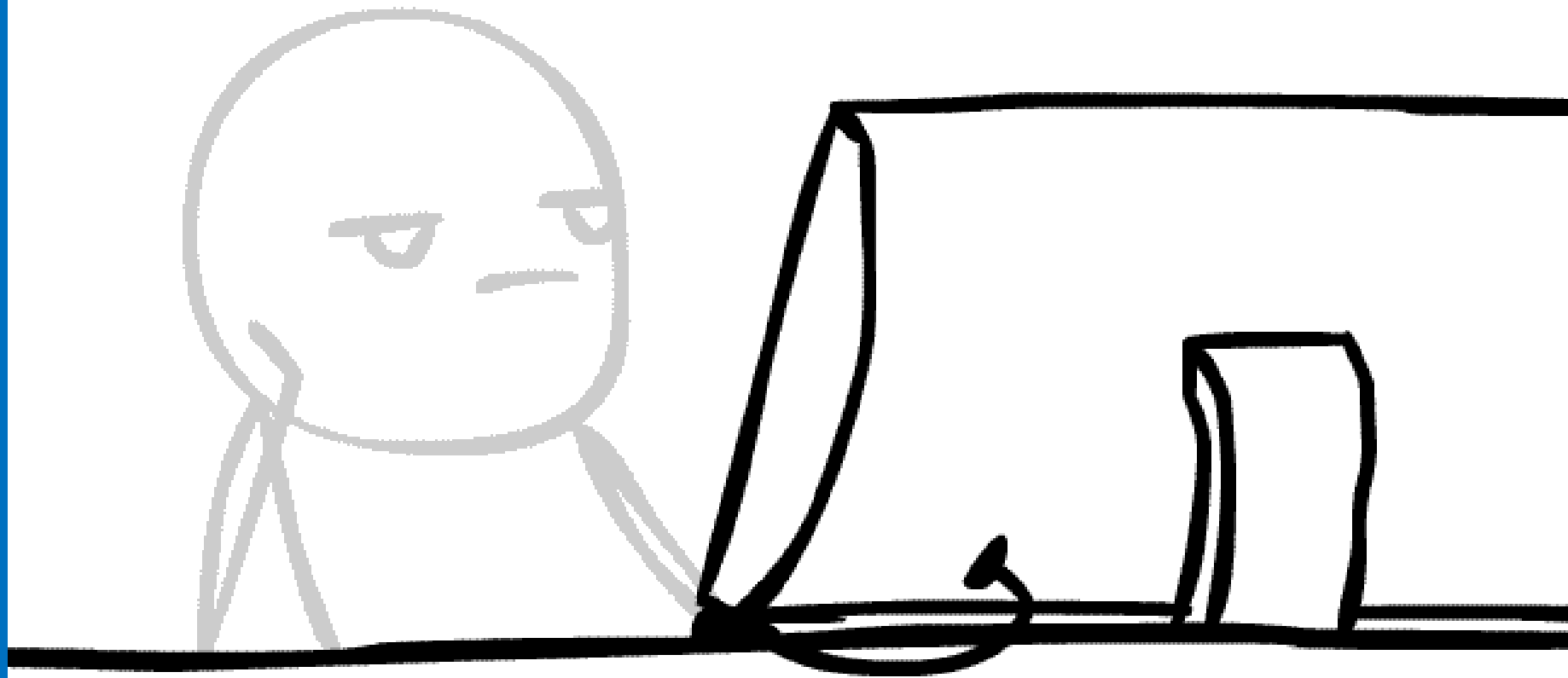




# Object Counting



MY CODE ISN'T WORKING ...



Question?

Thank You