

# Machine Learning

# Phân loại

- Supervised learning
- Unsupervised learning
- Re-inforcement learning

# Bài toán nhận dạng ảnh

**Supervised**

Learning



“Dog”



“Cat”

AI label














# Một cách khác để label cho ảnh

**Security Check**

Please select all the photos which show a butterfly.

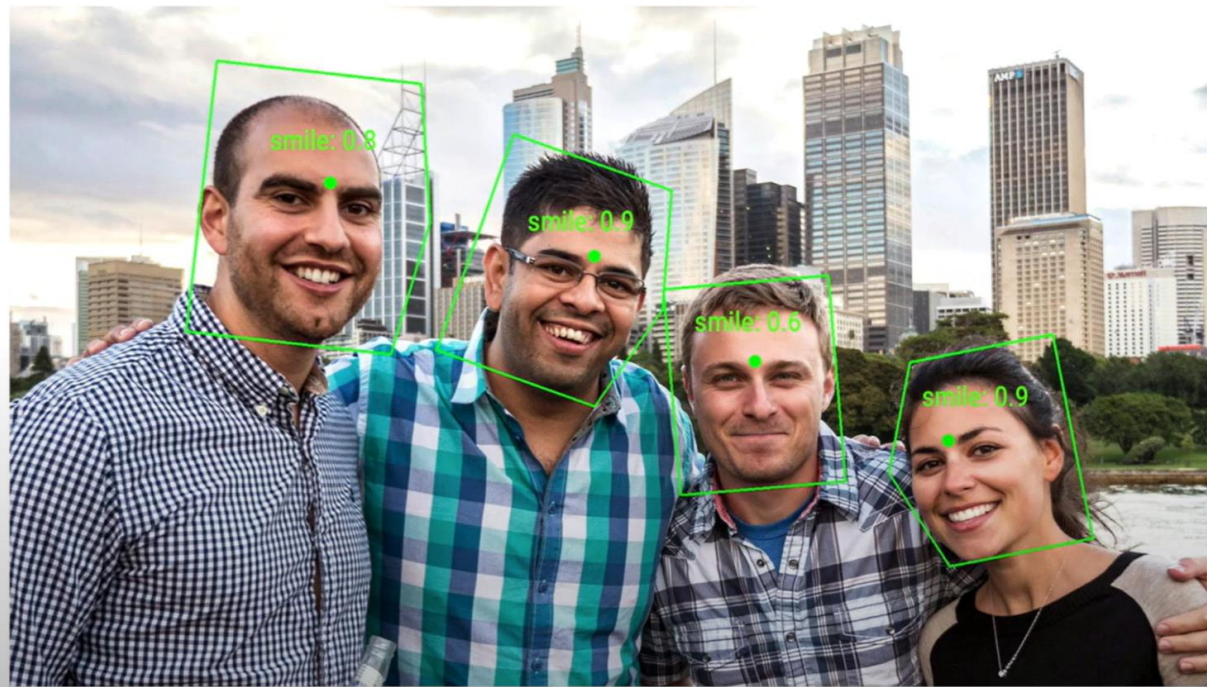
You can also do this security check with text or audio instead of photos.

If you think you're seeing this by mistake, please let us know.

# Bài toán nhận dạng khuôn mặt

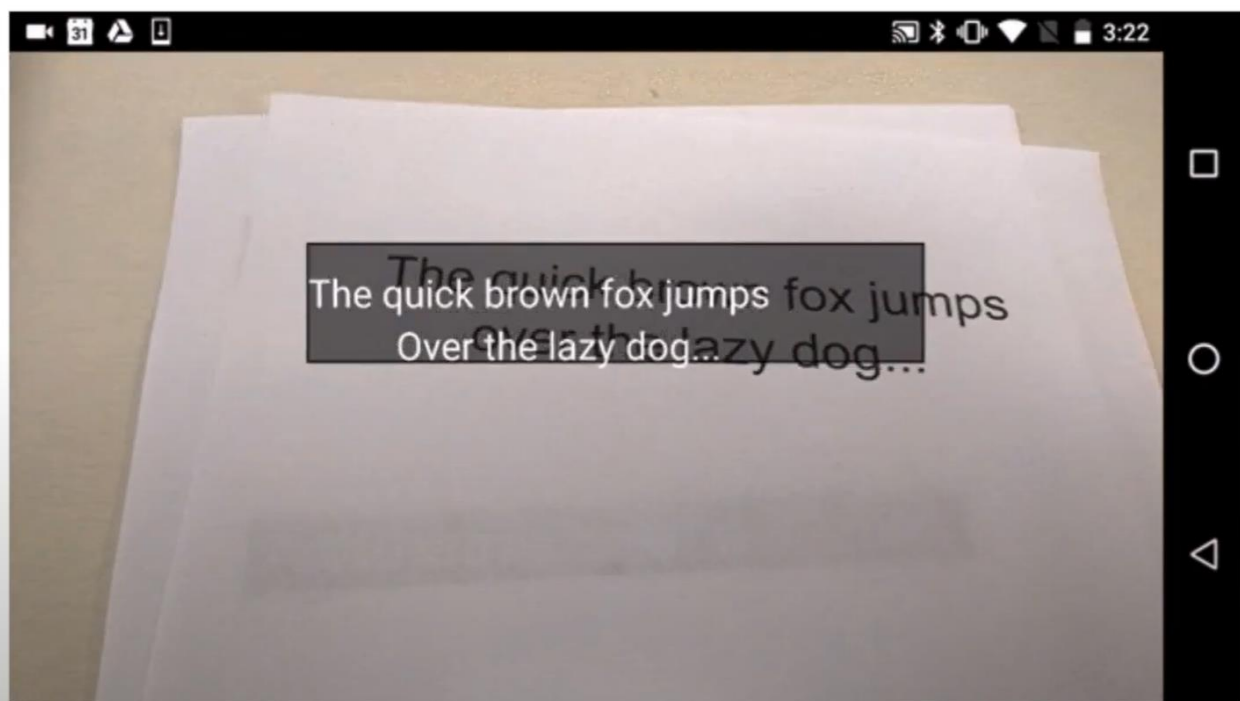
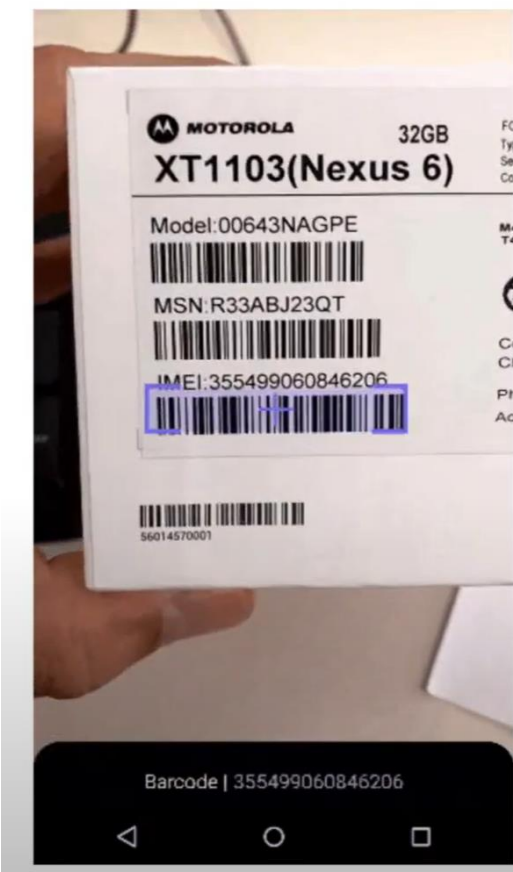
## Face Recognition





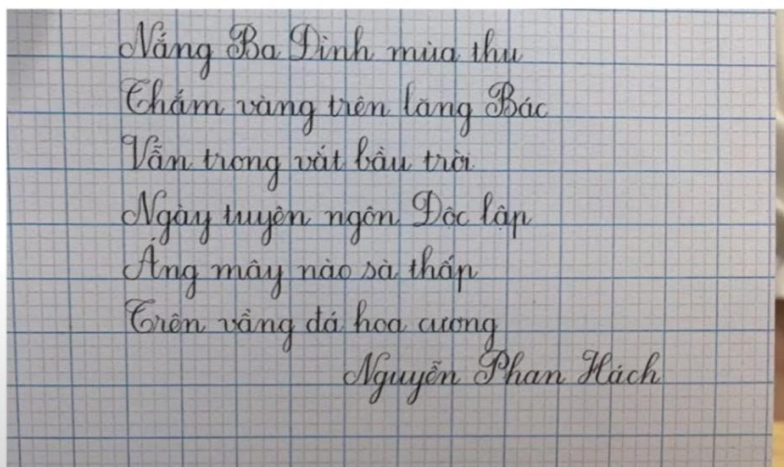
# Text/Barcode detection

## Text/Barcode Detection

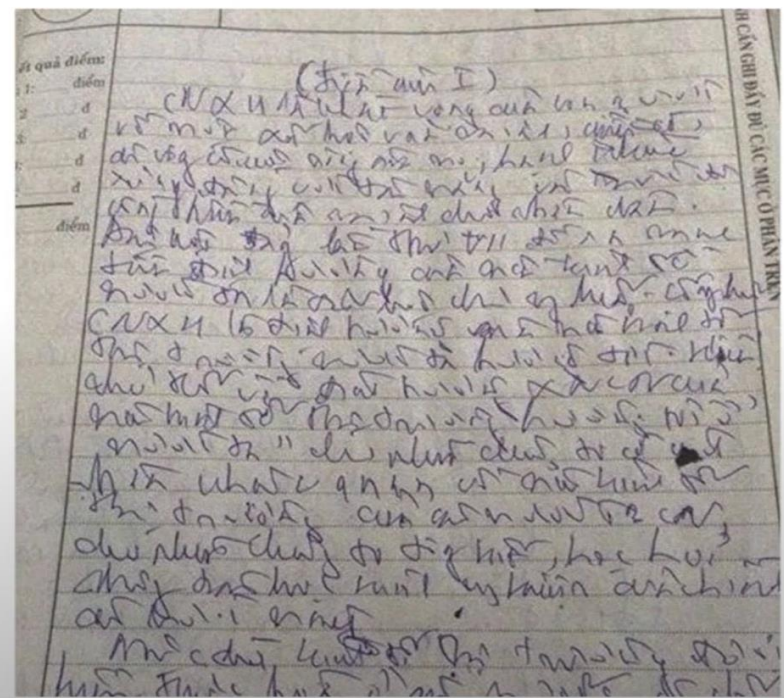


# Bài toán nhận dạng chữ viết tay

## Demo Data



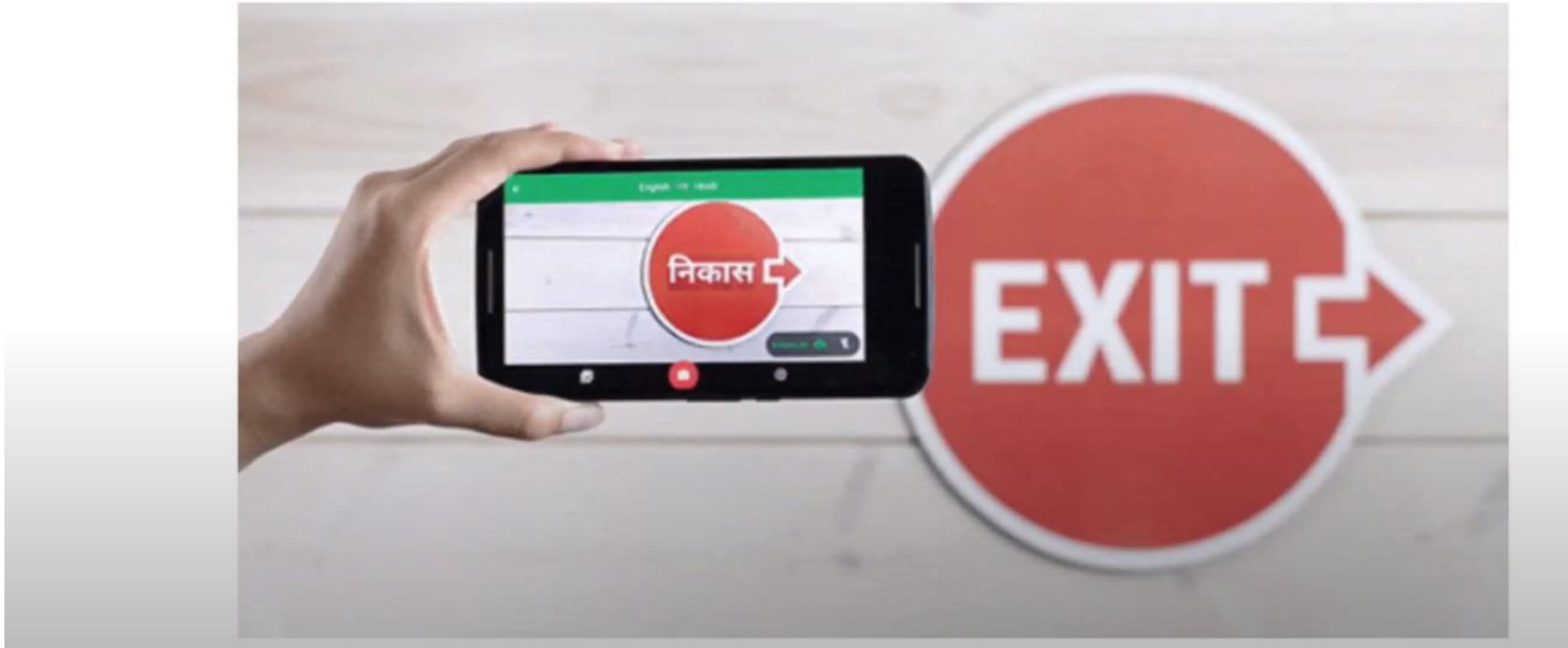
## Real Data



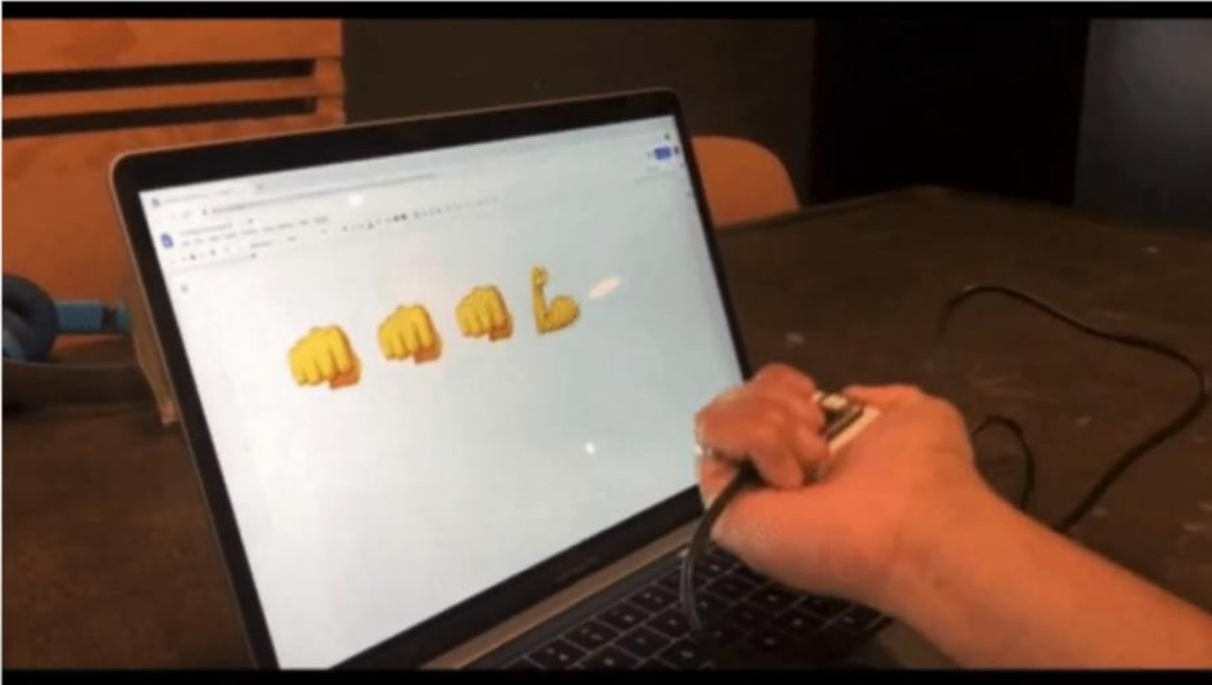


# Bài toán dịch ảnh realtime

## Translation



# Nhận dạng cử chỉ

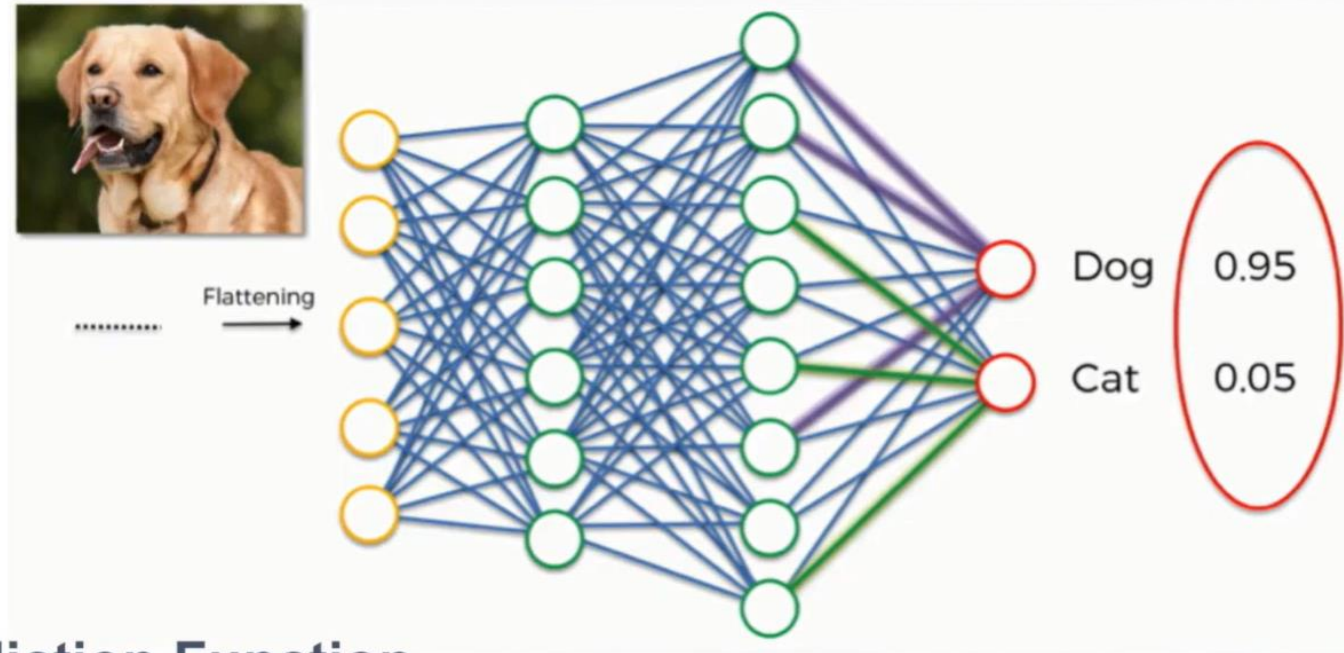


## Gesture Recognition



# Fundamentals

Minimize the  
**deviations** between  
**prediction** and **real**  
**labels**



Prediction Function

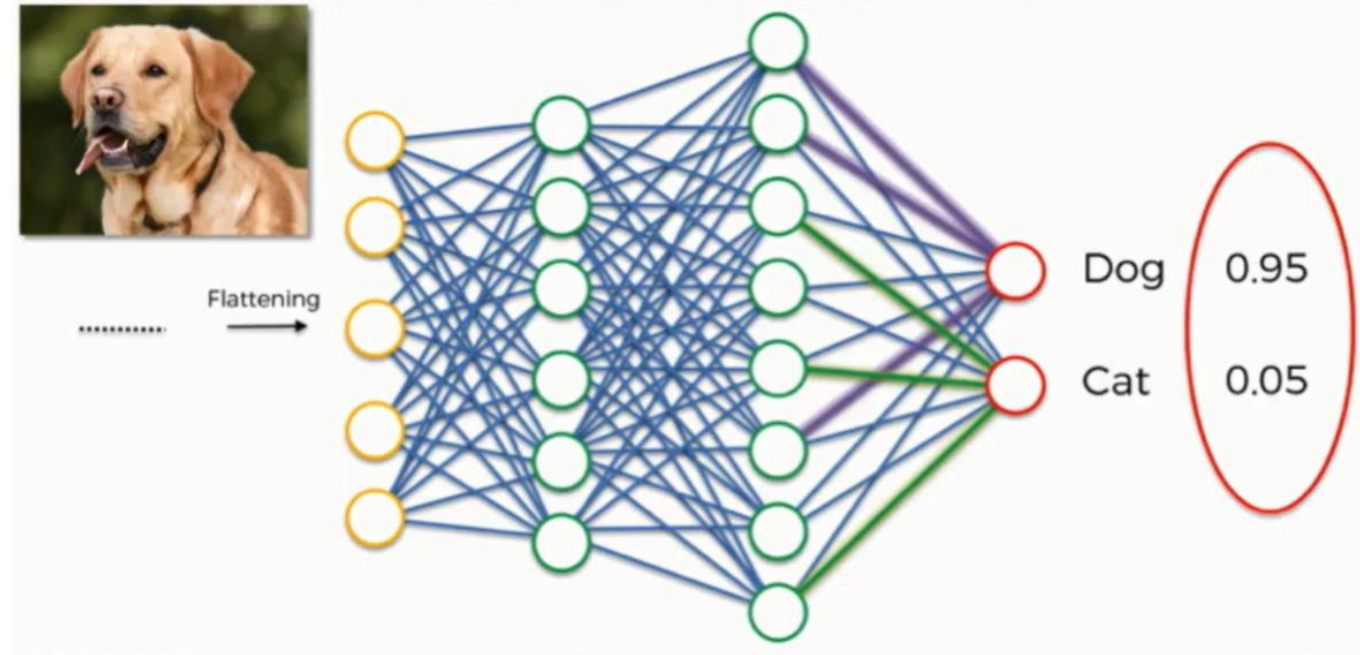
$$\hat{y} = h_{\theta}(x) = 0.95$$

Real Label

$$y = 1$$

# Fundamentals

Minimize the **deviations** between **prediction** and **real labels**



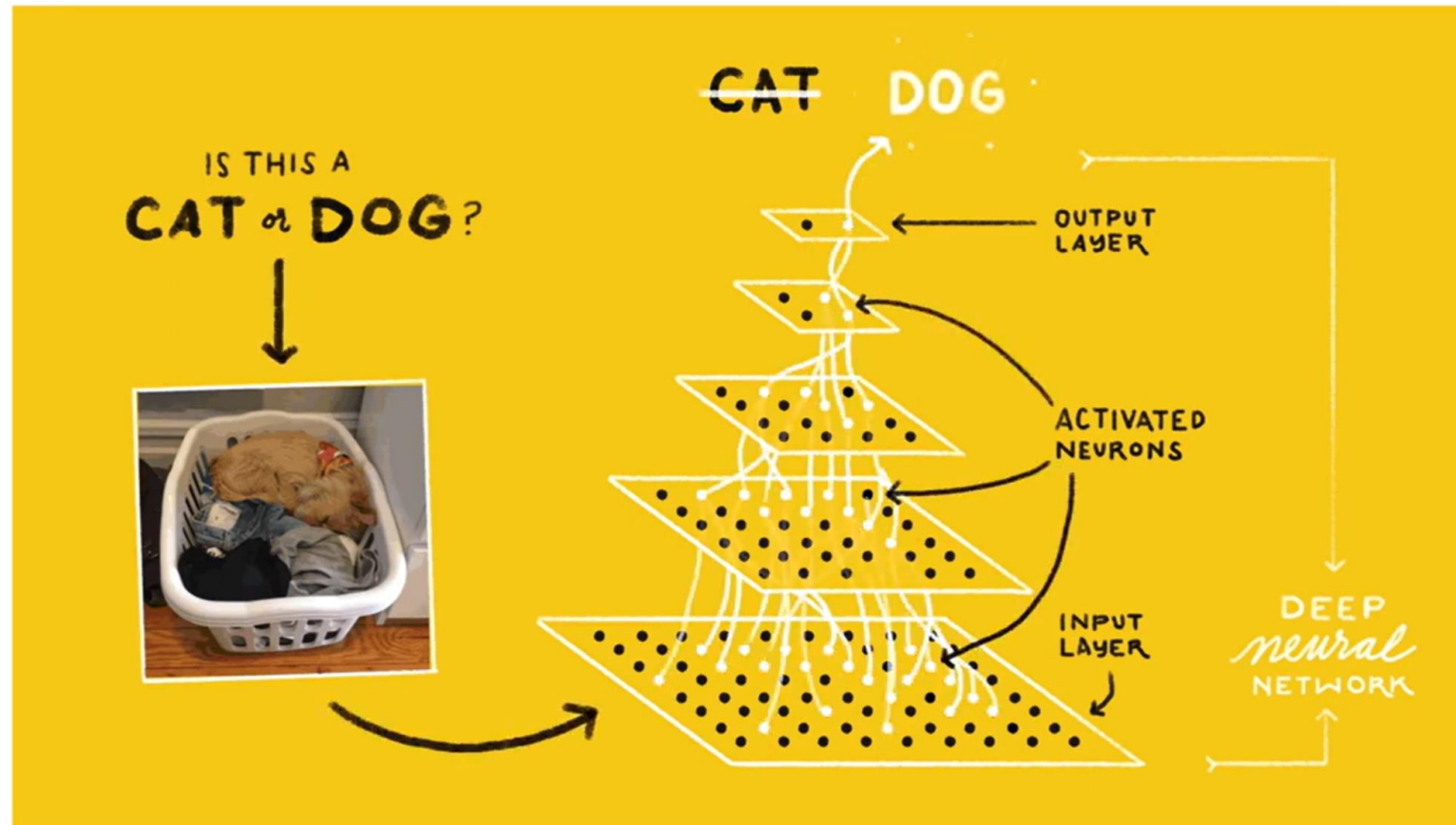
$$\hat{y} = 0.95$$

$$y = 1$$

→  $\min(y, \hat{y})$   
Minimize Loss function



# Deep Learning

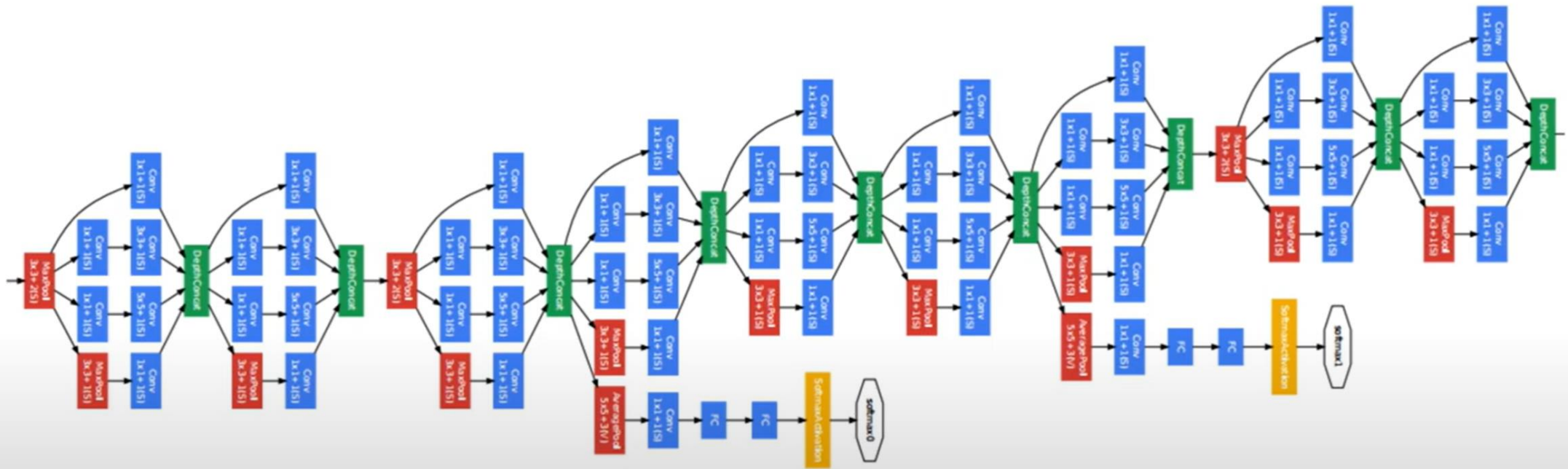




Câu hỏi đặt ra là :

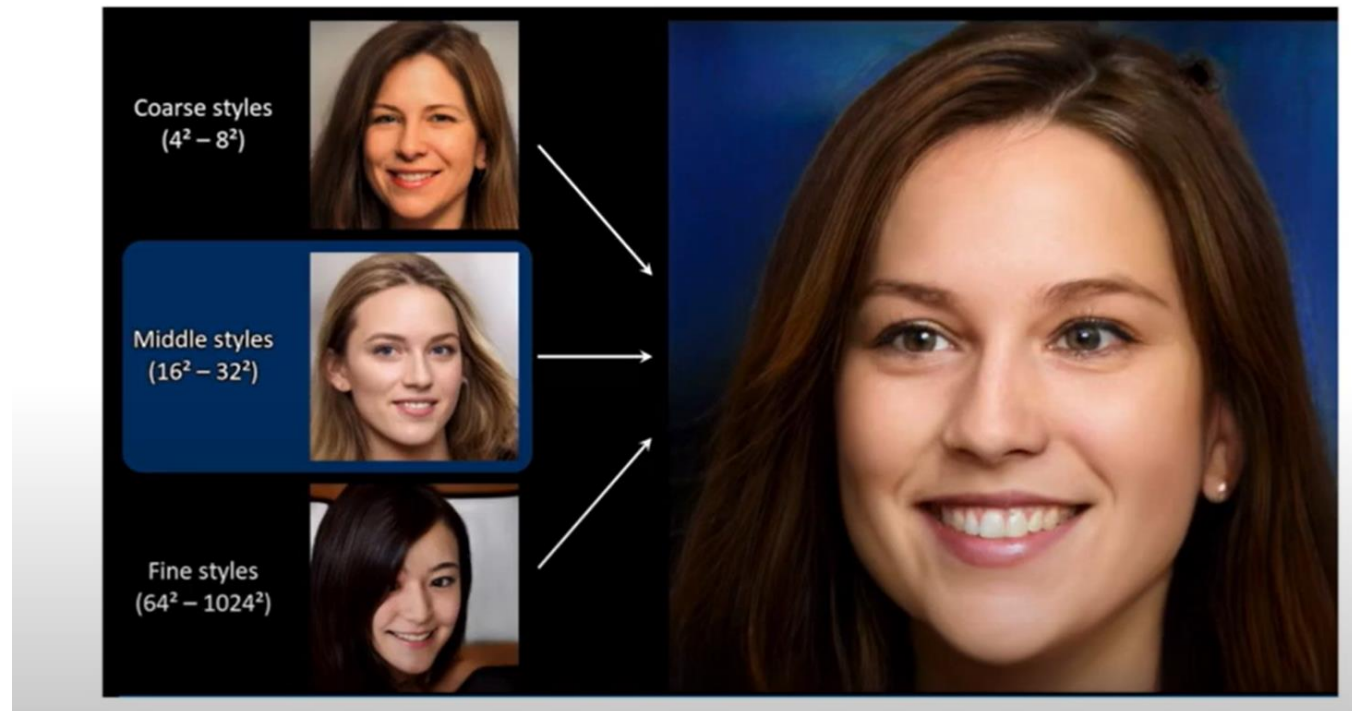
- Vậy cần bao nhiêu lớp cho đủ trong mô hình này?

# Inception Net (Google)



# Bài toán face generation

## Face Generation



<https://www.youtube.com/watch?v=kSLJriaOumA>

# Style combination



+



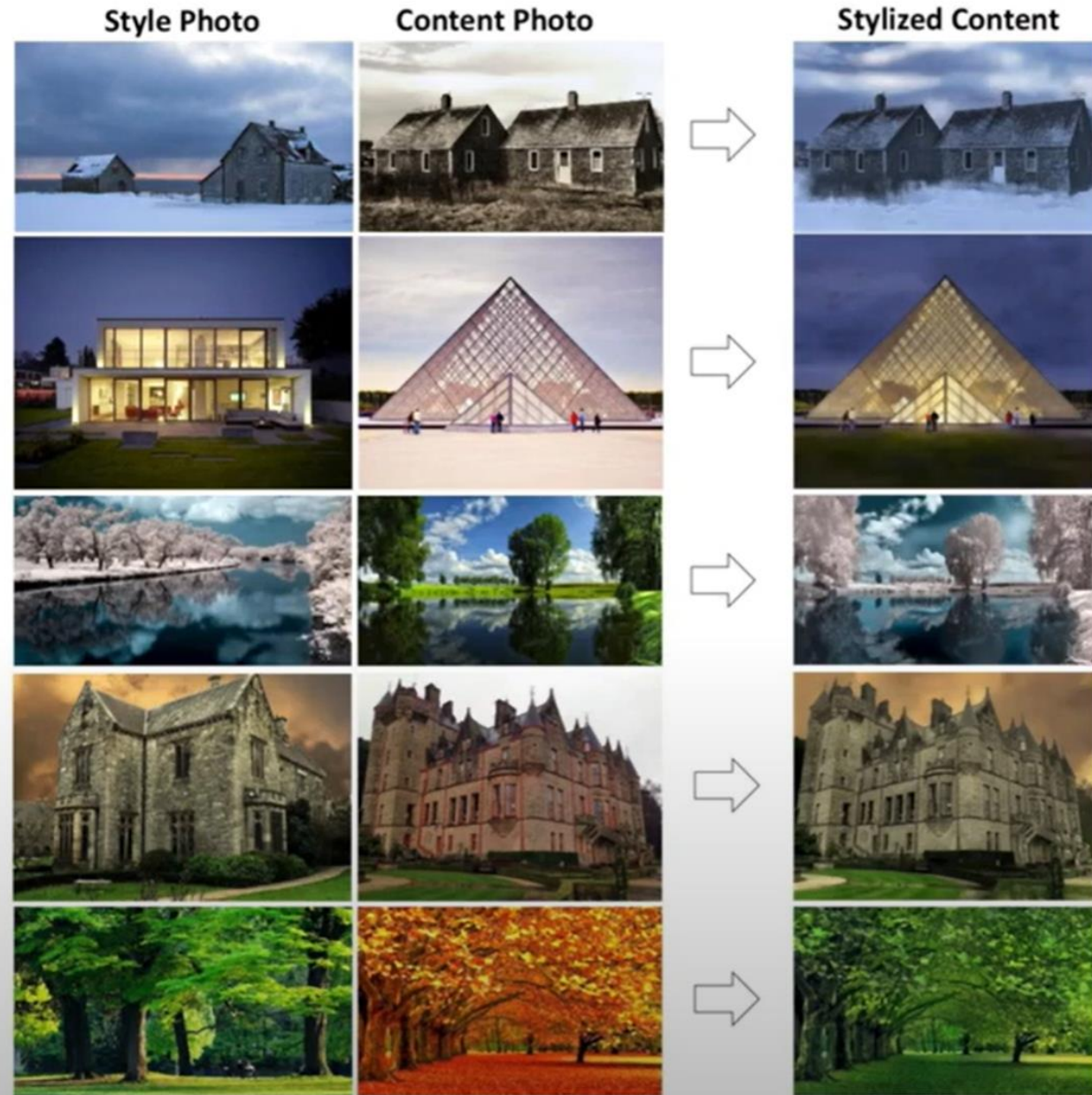
=





# Combine two pictures into one

<https://github.com/NVIDIA/FastPhotoStyle>





# Image Translation

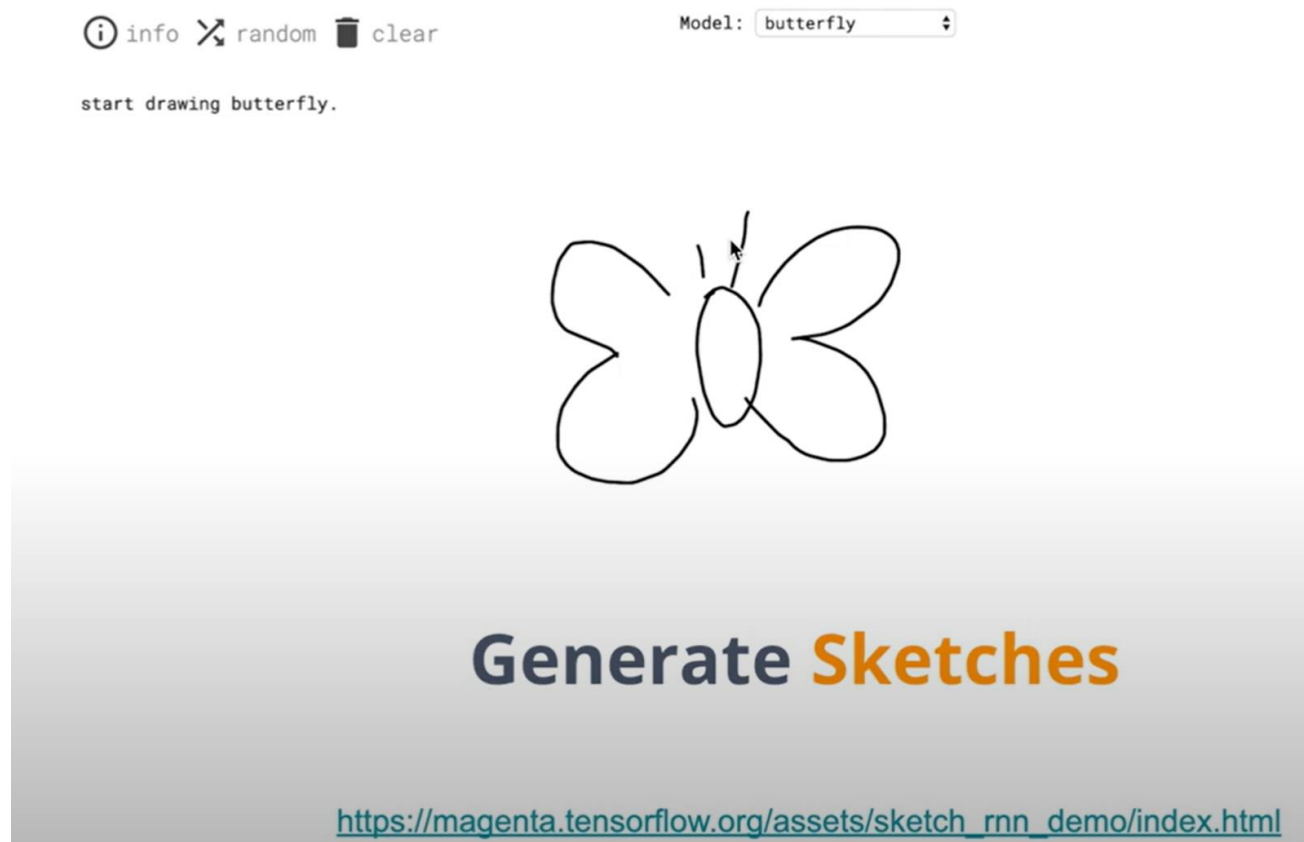


## Image/Video Translation



<https://www.youtube.com/watch?v=9reHvktowLY>

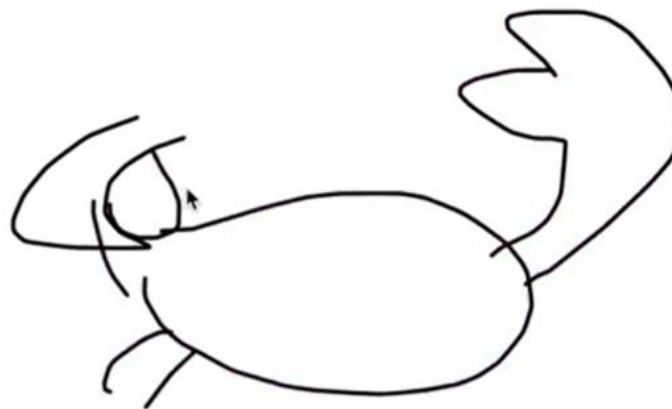
# Tạo ảnh từ nét vẽ cho trước



 info  random  clear

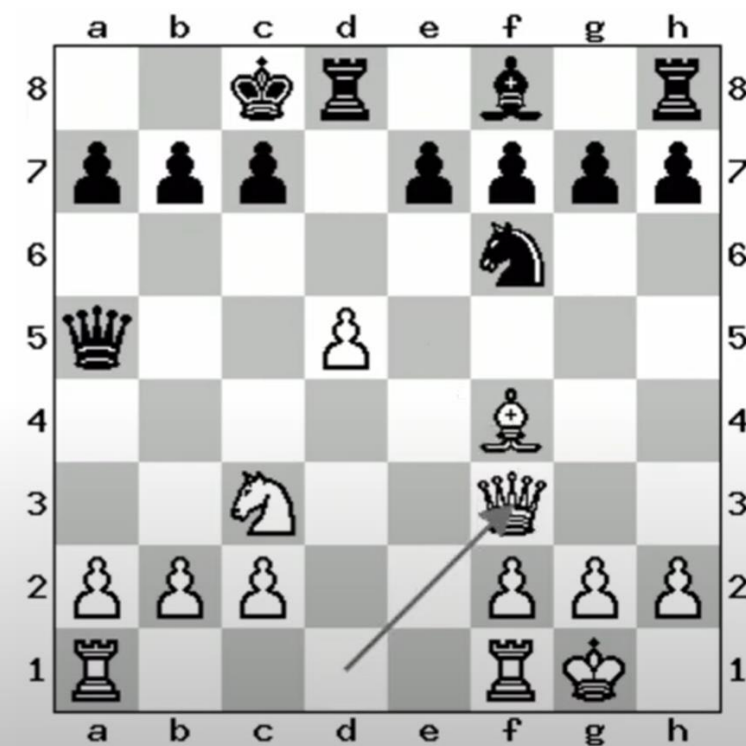
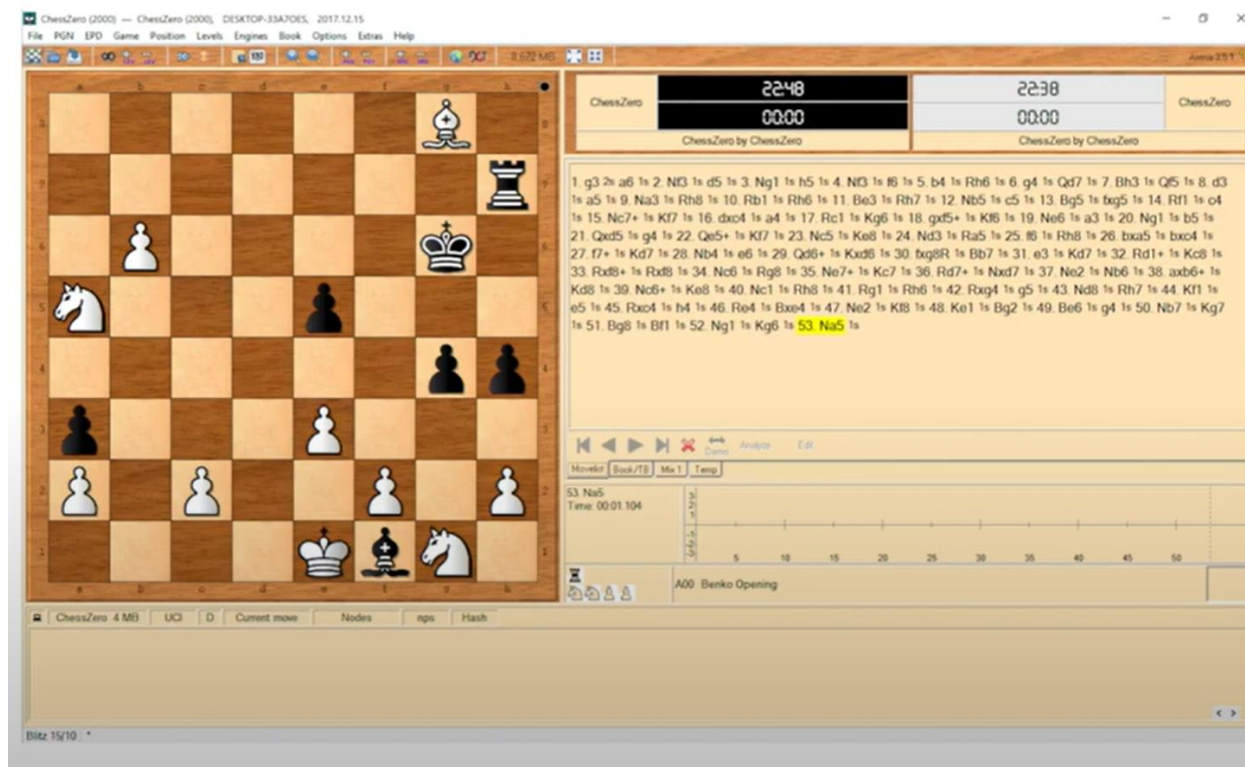
Model:

start drawing crabchair.



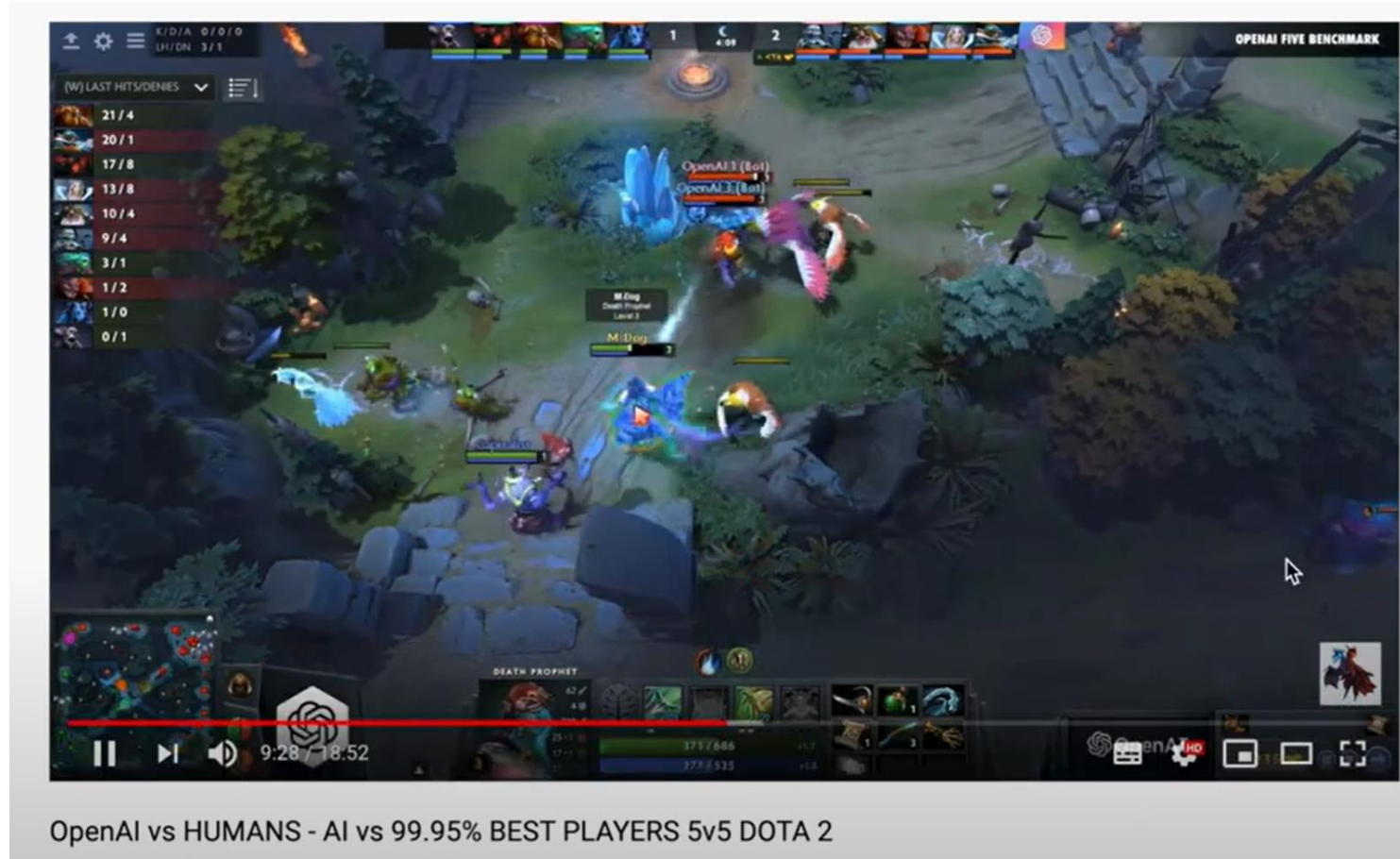
# Học tăng cường

## Alpha Zero





# OpenAI



OpenAI vs HUMANS - AI vs 99.95% BEST PLAYERS 5v5 DOTA 2

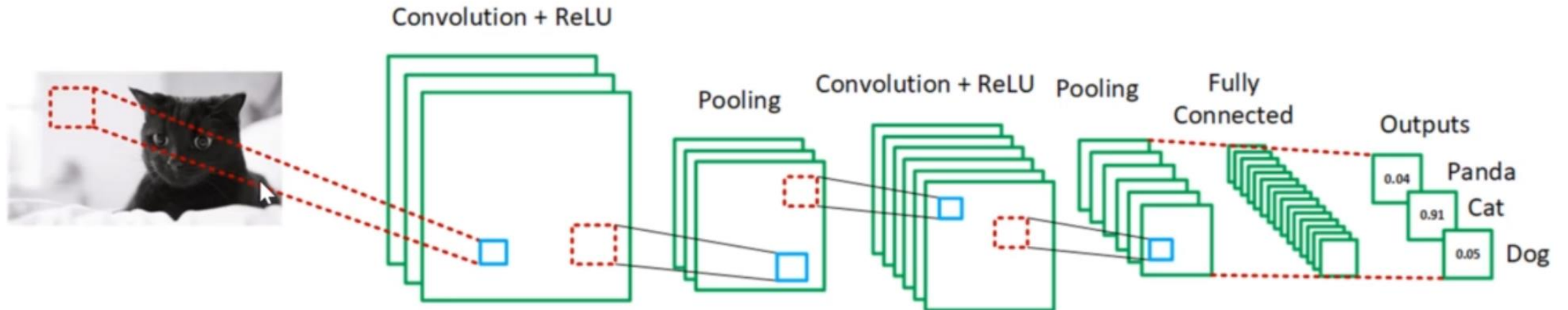


# CNN (Convolutional Neural Networks)

- Why are CNNs needed?
  - NNs chưa đáp ứng tốt với dữ liệu ảnh:
    - Cụ thể để phân loại ảnh màu  $64 \times 64$
    - Input size cho NNs cần  $64 \times 64 \times 3 = 12\,288$
    - Do đó chúng ta cần 12288 weights cho lớp input layer của NNs. Như vậy đối với ảnh  $640 \times 480$  ta cần đến 921 600 weights. Nếu thêm hidden layer cho mạng NNs thì ta thấy việc tăng lên nhanh chóng các weights như vậy sẽ dẫn đến việc training dữ liệu sẽ tốn rất nhiều thời gian.

# CNNs

## Introducing CNNs



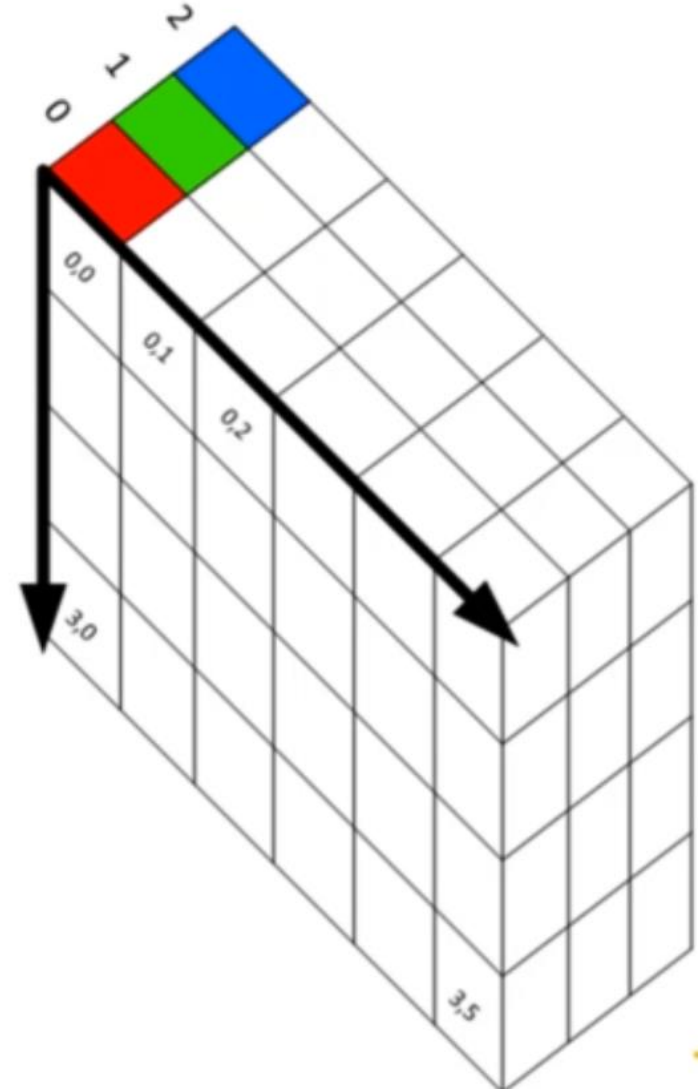
# Why of 3D layers?

- Cho phép chúng ta dùng Convolutions để học các đặc trưng ảnh
- Chúng ta dùng ít weight hơn nhiều so với NNs => Thời gian training cũng nhanh hơn.

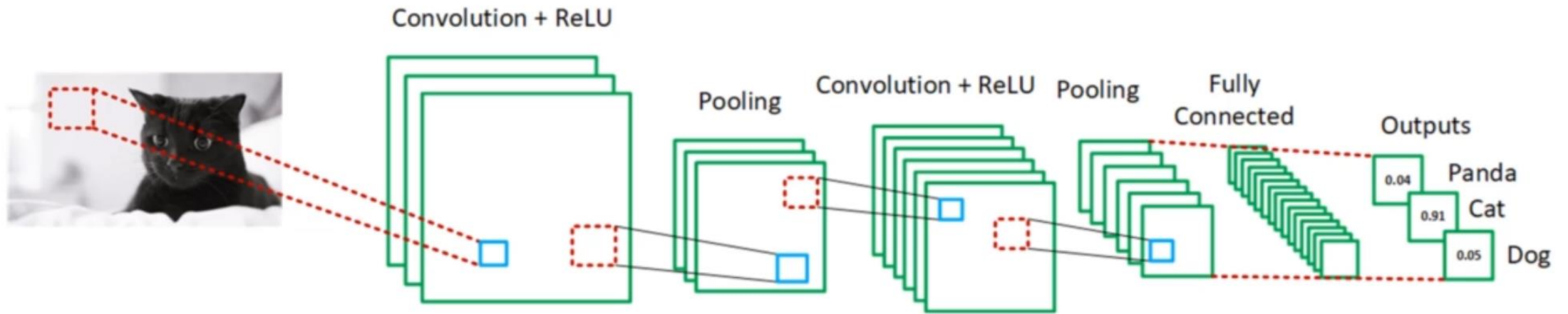
# CNN's use a 3D Volume Arrangement for it's Neurons



- Because our input data is an image, we can constrain or design our Neural Network to better suit this type of data
- Thus, we arrange our layers in 3 Dimensions. Why 3?
- Because of image data consists of:
  1. Height
  2. Width
  3. Depth (RGB) our colors components



# CNNs Layers



- Input
- Convolution Layer
- ReLU Layer
- Pool Layer
- Fully Connected Layer