觀看demo影片請至此Google Slide連結：
https://docs.google.com/presentation/d/18tbOYns4UEkLUS1ZbMMBw7pcEAwChCk4RAc-Db6z-Dg/edit?usp=sharing

# 欸! 坐好——
# 錯誤坐姿偵測系統


卷積神經網路與電腦視覺
第8組 宋志謙 田恆一
楊凱旭 唐成儀

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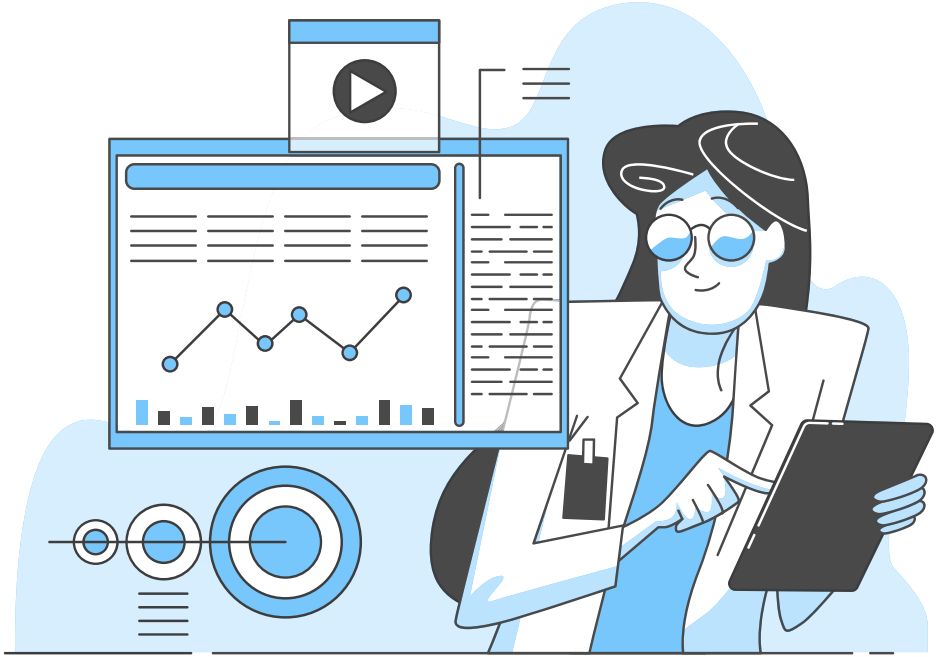


# 01

# Motivation

# Sitting Posture

**7.3 Hours**

成人每日坐姿時間

**6 Millions**

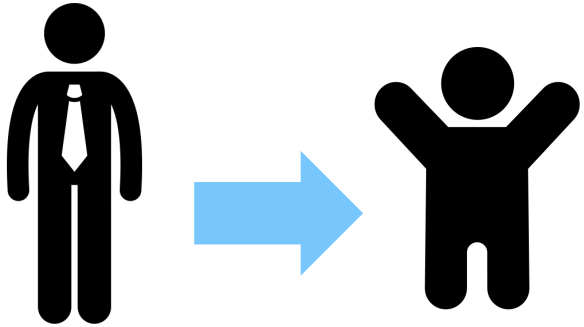
因骨骼肌肉痠痛就醫

**70%**

肌肉痠痛原因為長期坐姿不良

# Impact of Wrong Posture

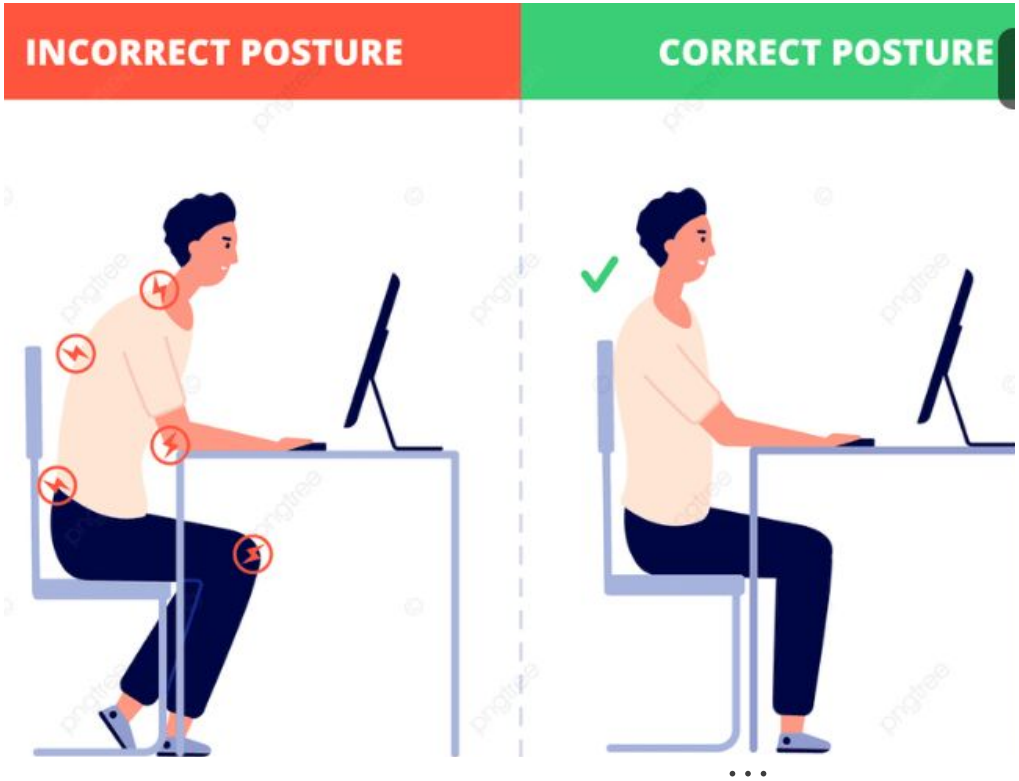
7x Pressure
140kg/d



Average Age
3X -> 20↓

# Our Solutions:

## Wrong Posture Detect System



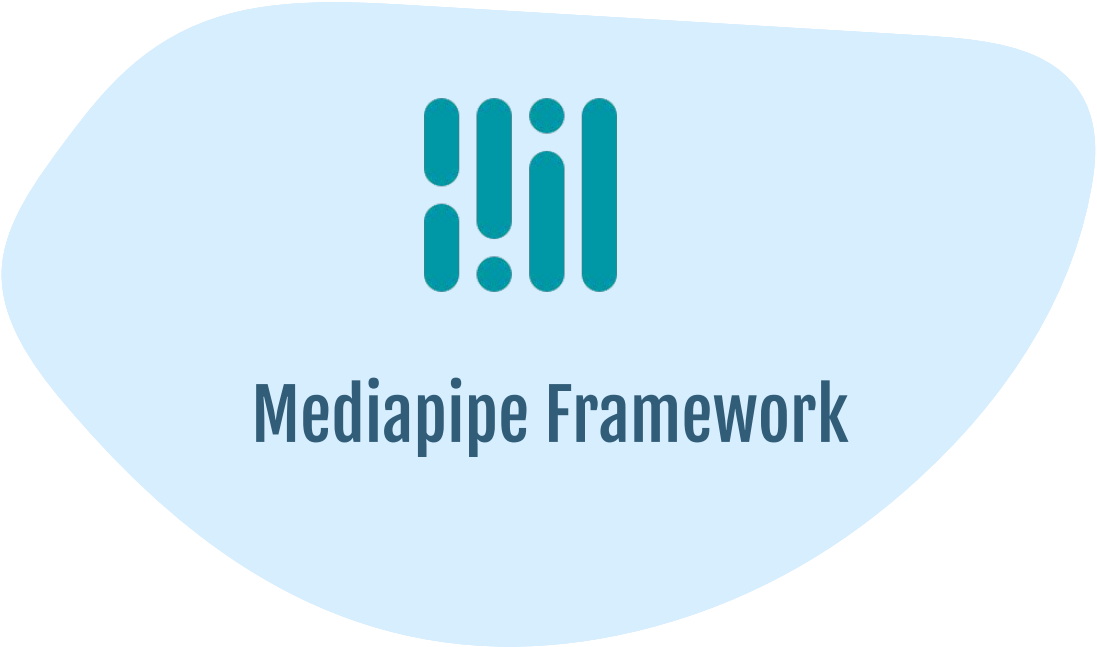

- 耳、肩、臀垂直
- 膝蓋90度
- 腰板服貼於椅背

## Pose Detected

## Model Identify

# 02

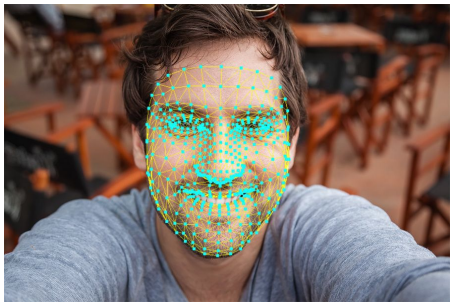
# Training Dataset



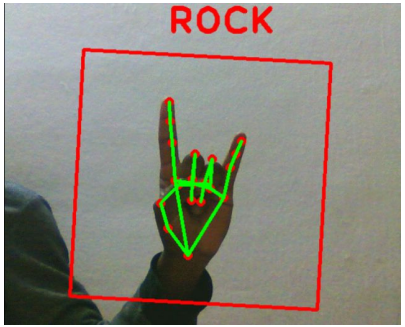
# Mediapipe Framework

# Mediapipe

## Face Mesh

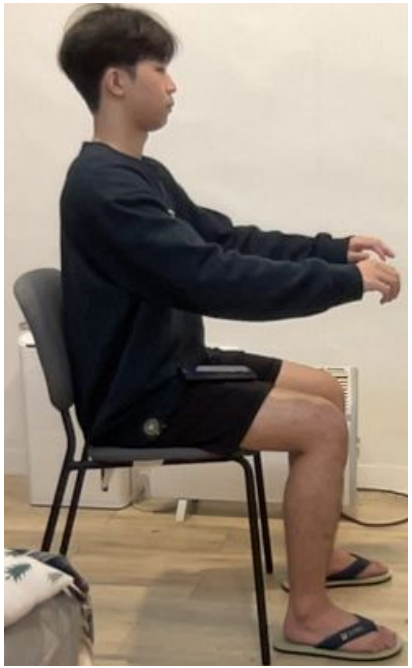


## Hand Track



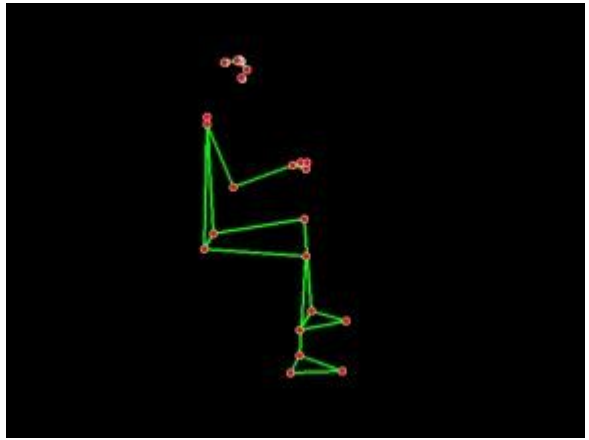

## Pose Landmark

# Collect Data



Original Data

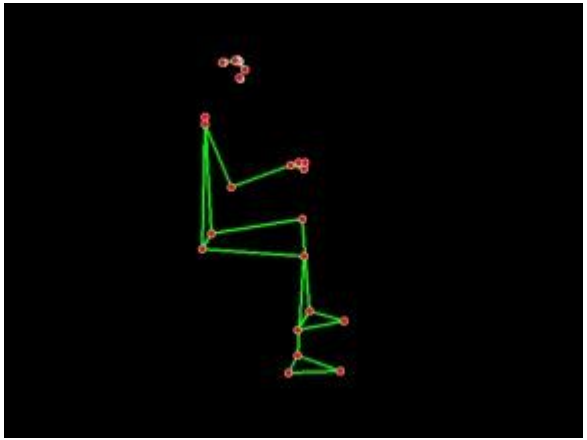
Mediapipe



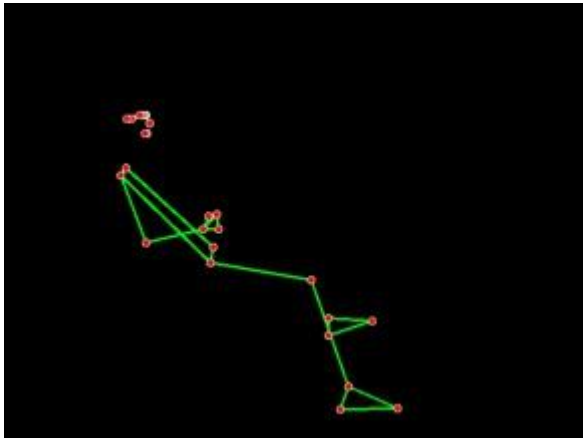
Train Data

# Training Dataset

Correct:235



Incorrect:218

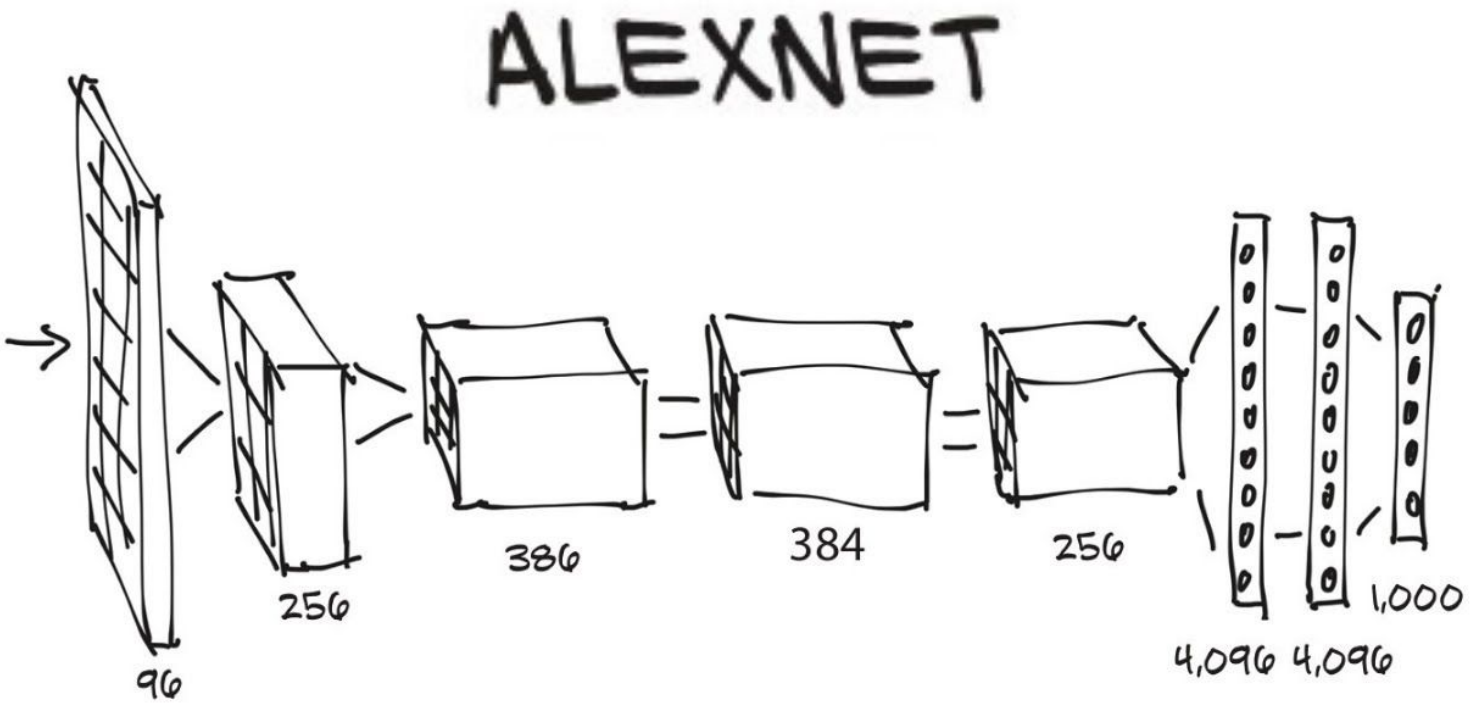


# 03

# Model Training

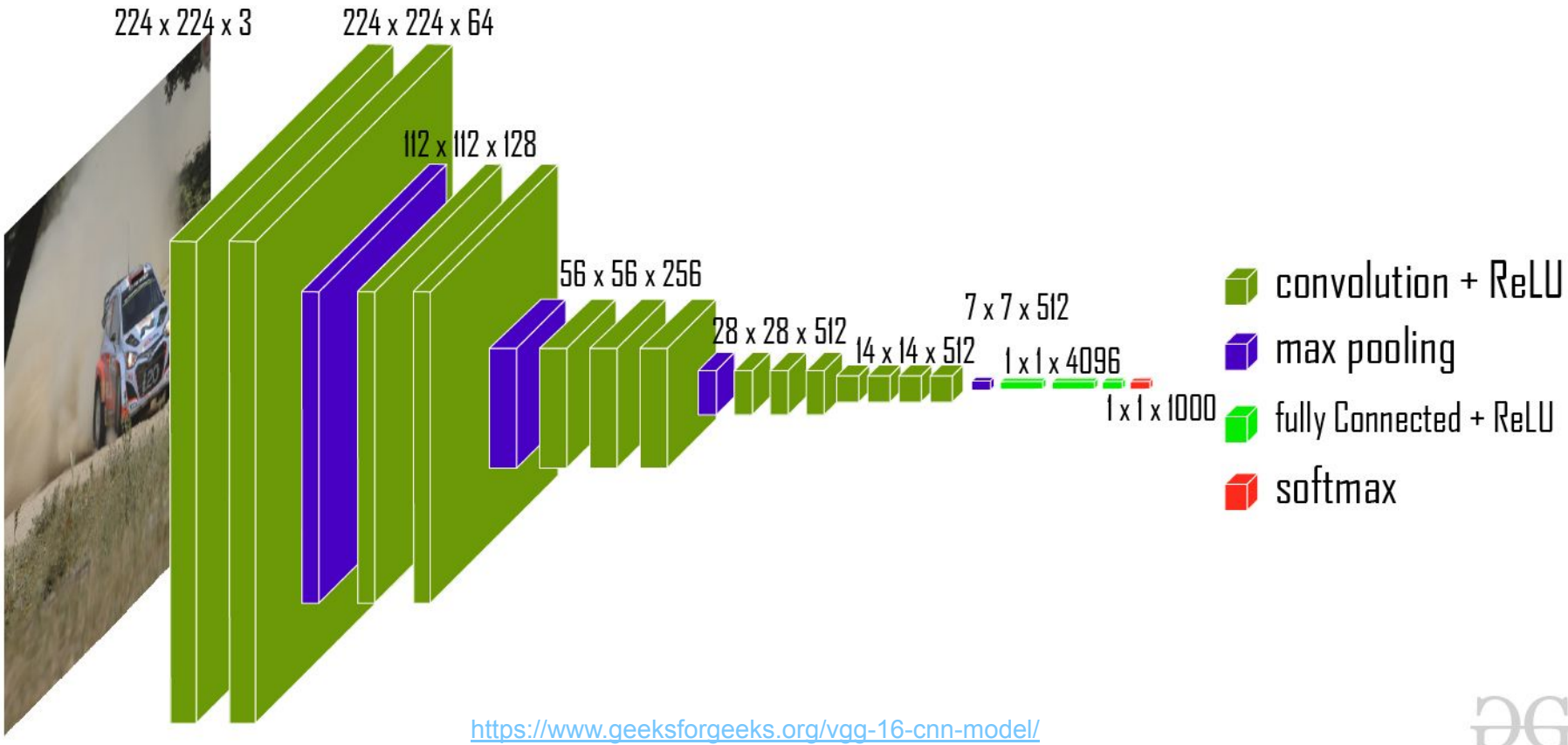
# Model Comparison Table

| | Accuracy | Layers | ILSVRC |
|---|---|---|---|
| AlexNet | 0.9222 | 8 | 2012 |
| VGGNet16 | 0.9778 | 16 | 2014 2th |
| ResNet50 | 0.8778 | 50 | 2015 |



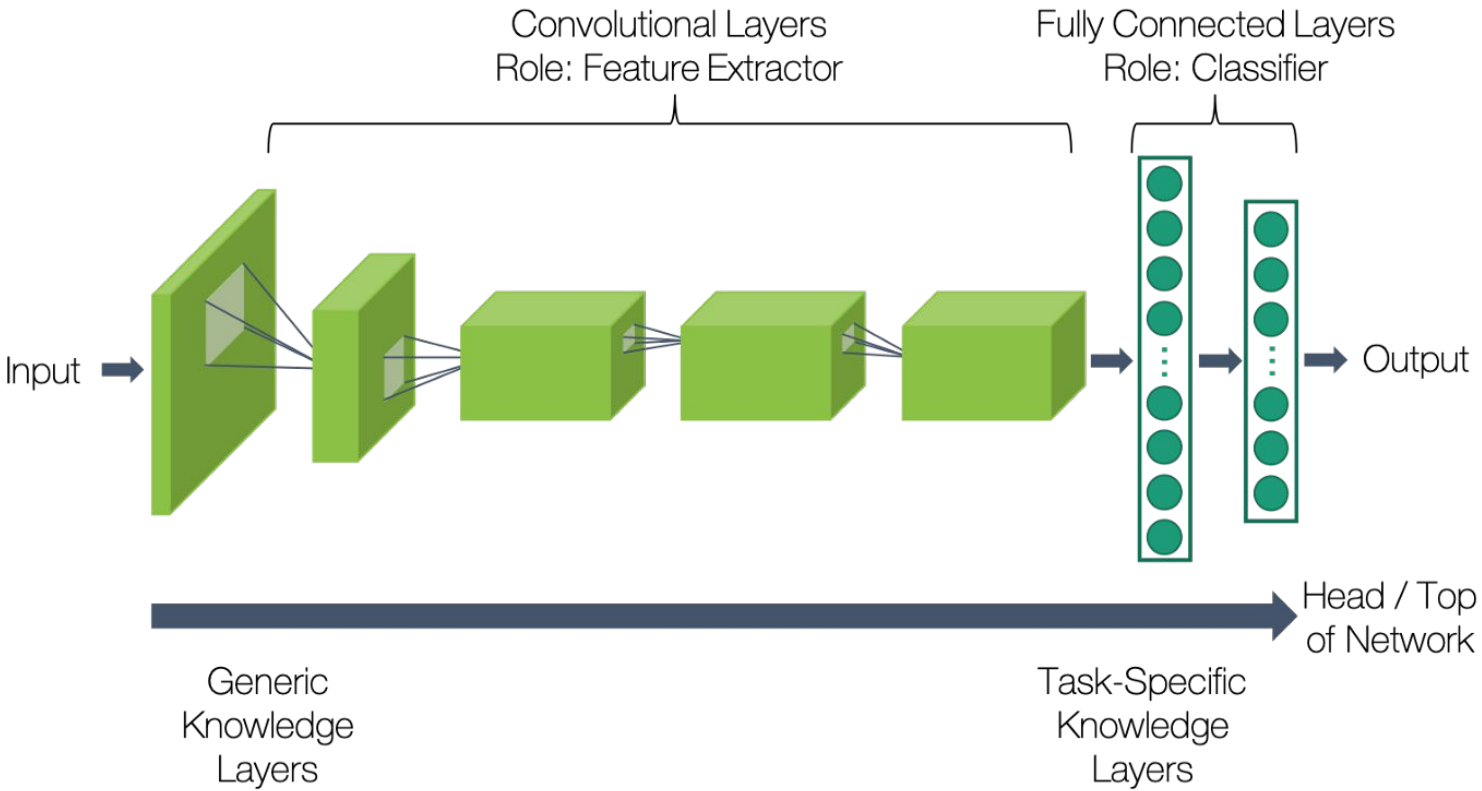

https://www.youtube.com/watch?v=ZUc0Mib5DeI

# VGGNet-16



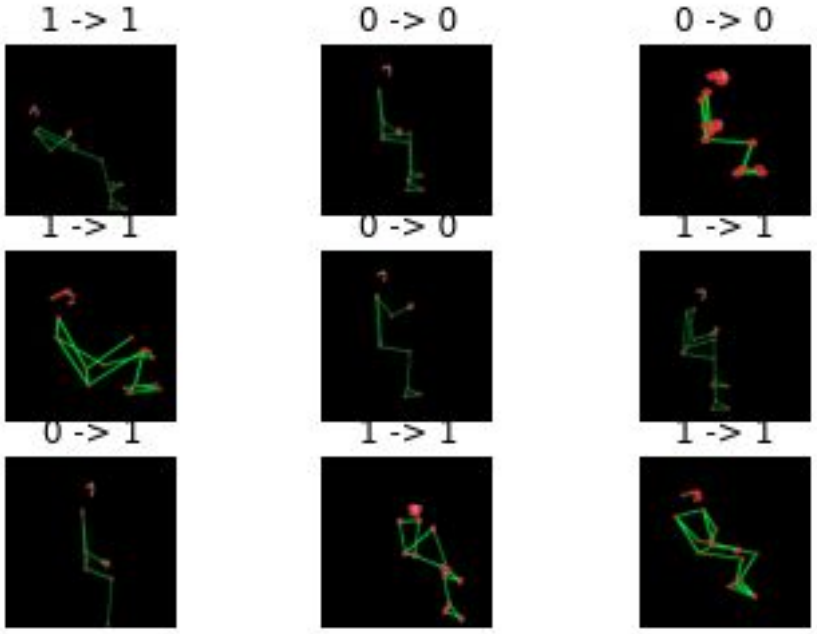

https://www.geeksforgeeks.org/vgg-16-cnn-model/

# ResNet-50 (Residual Network)




https://medium.com/analytics-vidhya/how-to-train-your-resnet-the-jindo-dog-50551117381d

# Model Prediction Results




| | Accuracy | Layers | ILSVRC |
|---|---|---|---|
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| VGGNet16 | 0.9778 | 16 | 2014 2th |
| ResNet50 | 0.8778 | 50 | 2015 |

# 04

# Result & Demo

# 欸！坐好！ 系統流程

每秒擷取1個frame

1

將frame透過Mediapipe
轉化成僅有骨架的圖像

2

將骨架圖片丟入訓練好
的model做預測
（0=正確;1=錯誤）

3

Model判斷坐姿,
若連續三秒都是錯誤的坐姿
-> 語音警告:「咳咳！坐好！」

4

EXPLORER

CNN

- Sit_Well_AlexNet
- Sit_Well_ResNet
- main.ipynb
- Warning.mp3

main.ipynb

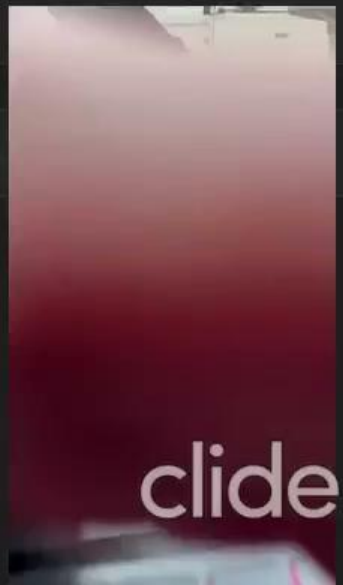
main.ipynb > empty cell

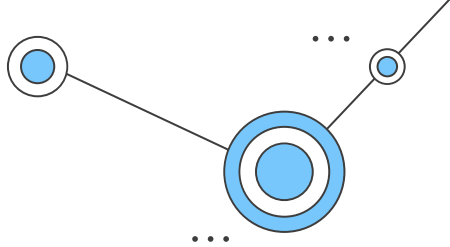
+ Code + Markdown | Interrupt | Clear Outputs of All Cells | Go To | Restart | Variables | Outline ...

```
                if count > 2:
                    playsound('Warning.mp3')
            else:
                count=0


            cv2.imshow('OpenCV Feed', image)

            key = cv2.waitKey(1000) & 0xFF
            if key == ord('q') or key == 6:
                break

        cap.release()
        cv2.destroyAllWindows()
```

[11] 2.2s

[ ]





# Thanks for your listening!