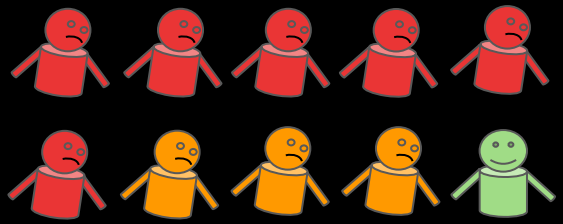
# [BodyPose] ACEAI 2019/20

# Motivation



**60% - 90%** of people will suffer from **low back disorders** at some point in their life (1)

(1) European Agency for Safety and Health at Work

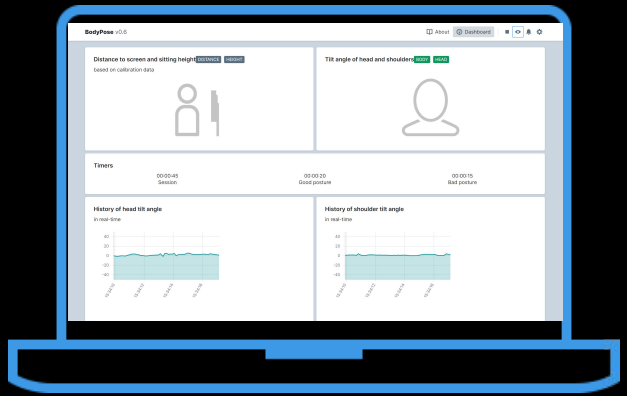
BodyPose - is a Webapp

that **improves body posture** habits
at workplace

# Components

**Rule-based system**
for evaluating body posture

**PoseNet Model**
for observing body posture via webcam




**Feedback**
Good/Bad pose

**Statistics**
containing evaluation of body posture over time

# PoseNet

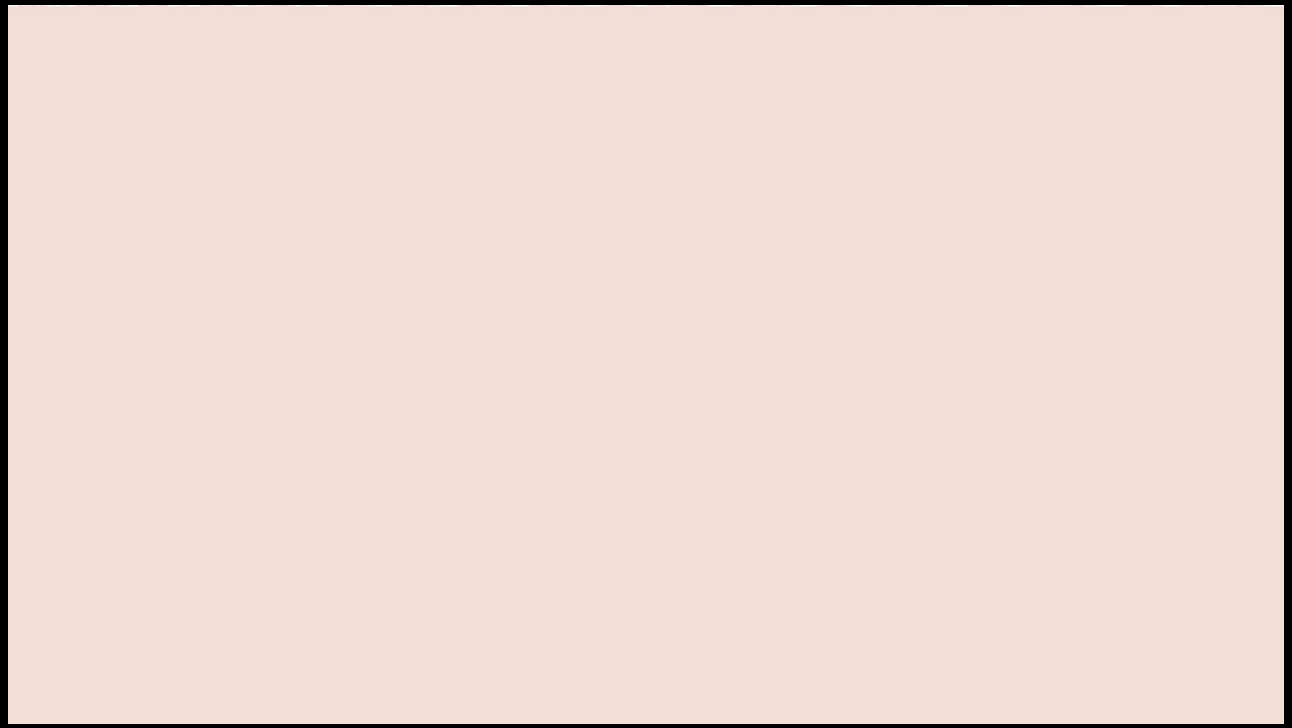
Pose estimation:

- computer vision techniques that detect human figures in images & videos
- to determine, for example, where someone's elbow shows up in an image

At a high level, pose estimation happens in 2 phases:

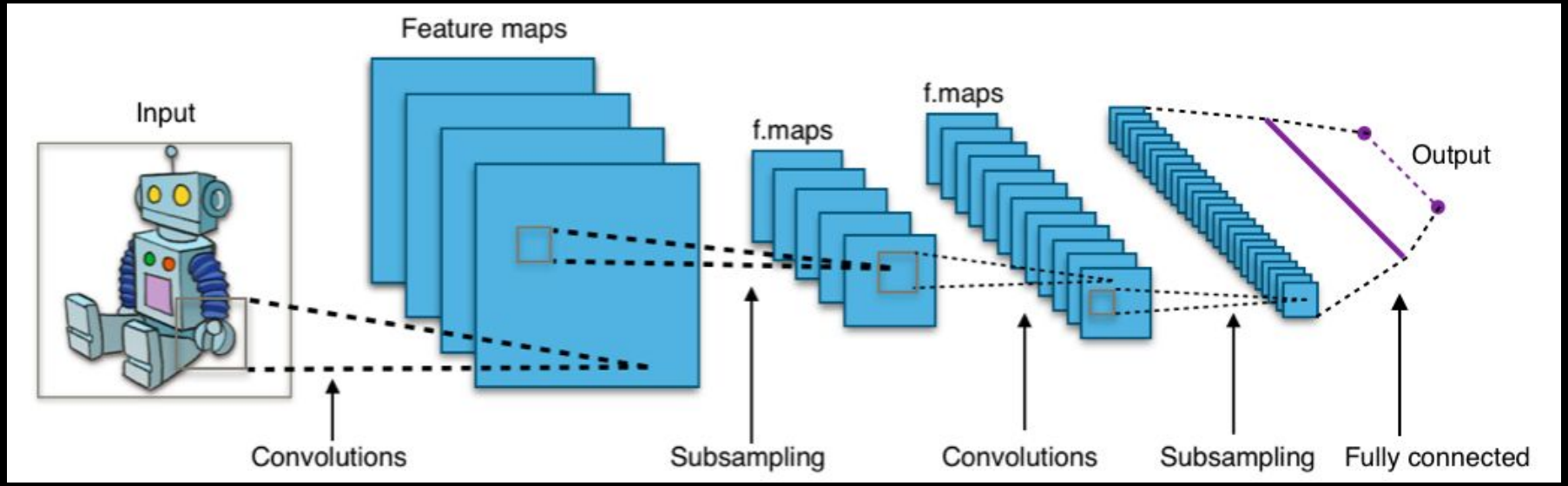
1. A (color) input image is fed through a convolutional neural network
2. A pose decoding algorithm is used to decode *poses*, *pose confidence scores*, *keypoint positions*, and *keypoint confidence scores* from the model outputs

# Convolutional Neural Networks



Source: https://becominghuman.ai/building-an-image-classifier-using-deep-learning-in-python-totally-from-a-beginners-perspective-be8dbaf22dd8

# Convolutional Neural Networks



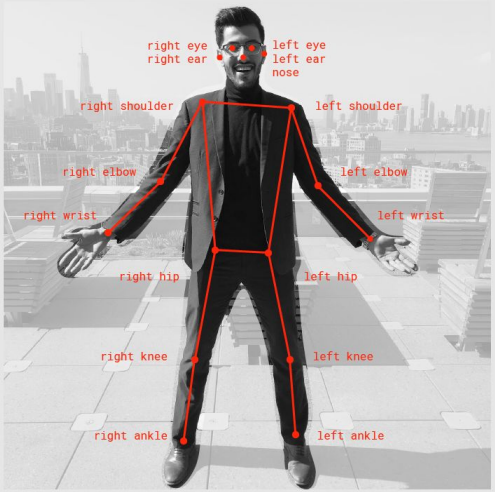

Source: https://www.chessprogramming.org/Neural_Networks

# PoseNet: Pose Detection

**Input Image** from webcam

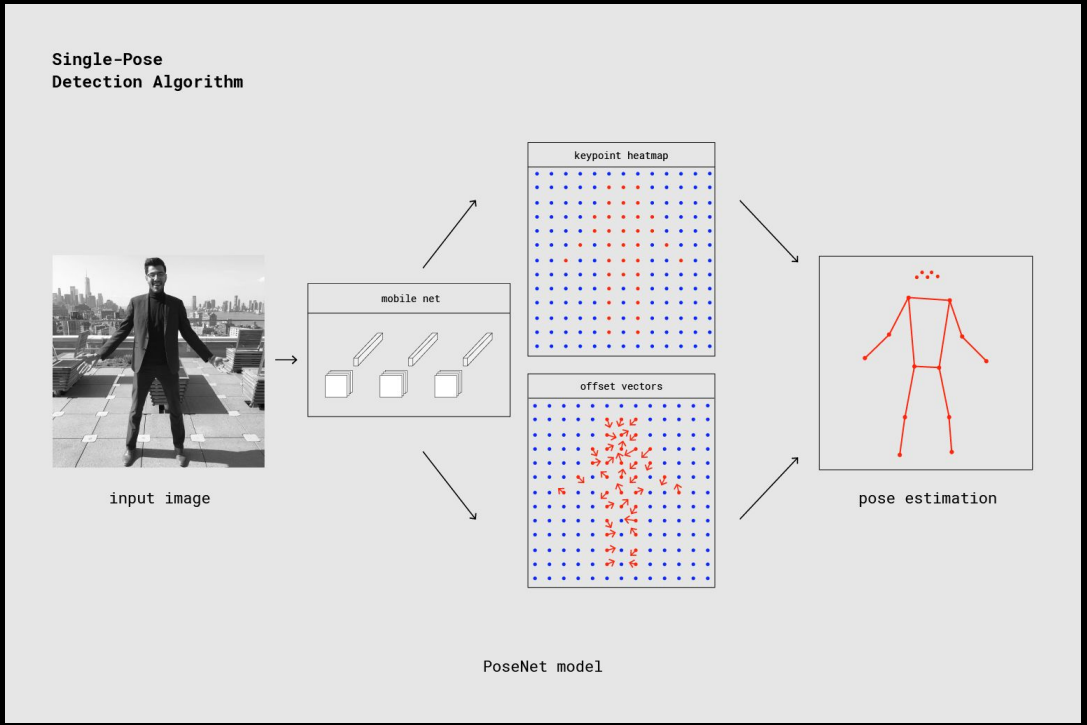
**PoseNet Model**

**17 Pose Keypoints Returned by PoseNet**




Source: https://medium.com/tensorflow/real-time-human-pose-estimation-in-the-browser-with-tensorflow-js-7dd0bc881cd5

# PoseNet: Pose detection

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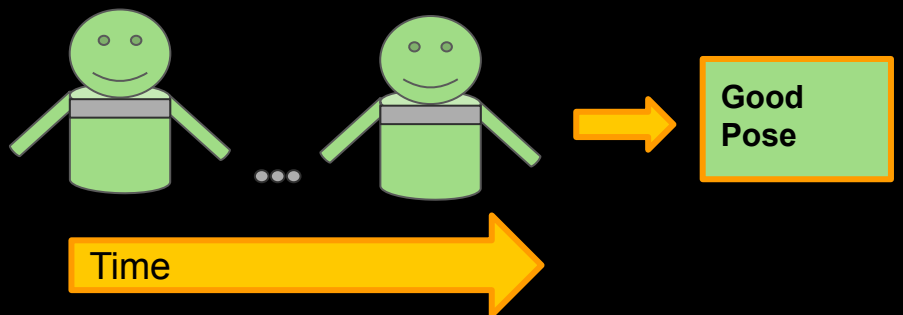
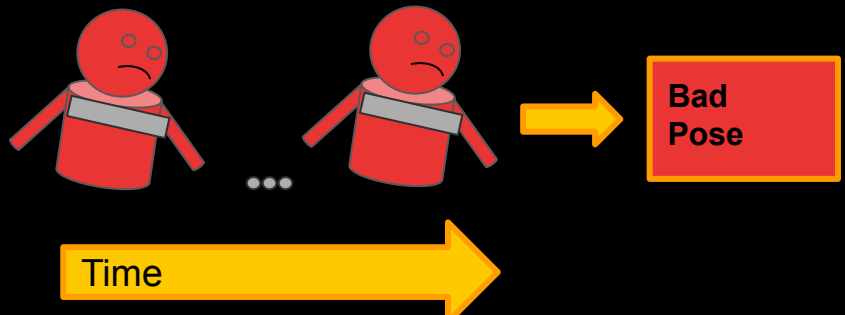
# PoseNet: Pose & Keypoint Confidence

Source: https://medium.com/tensorflow/real-time-human-pose-estimation-in-the-browser-with-tensorflow-js-7dd0bc881cd5

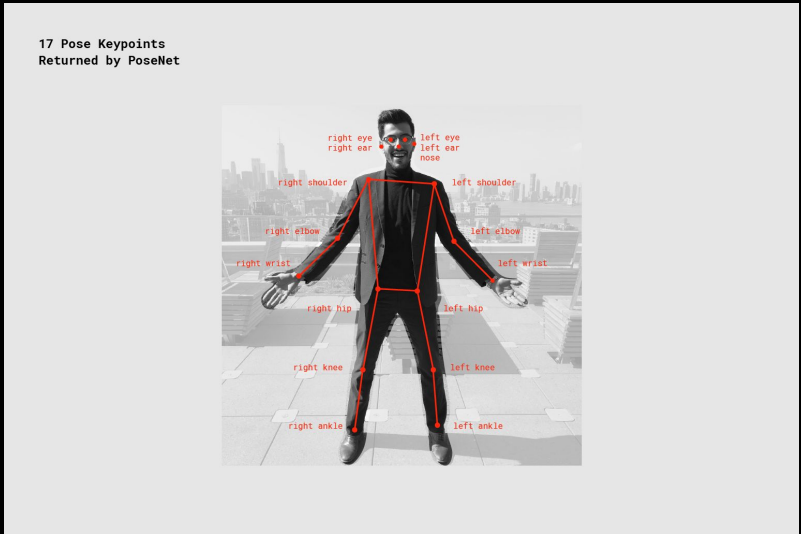
# BodyPose: Rule-based system & Feedback

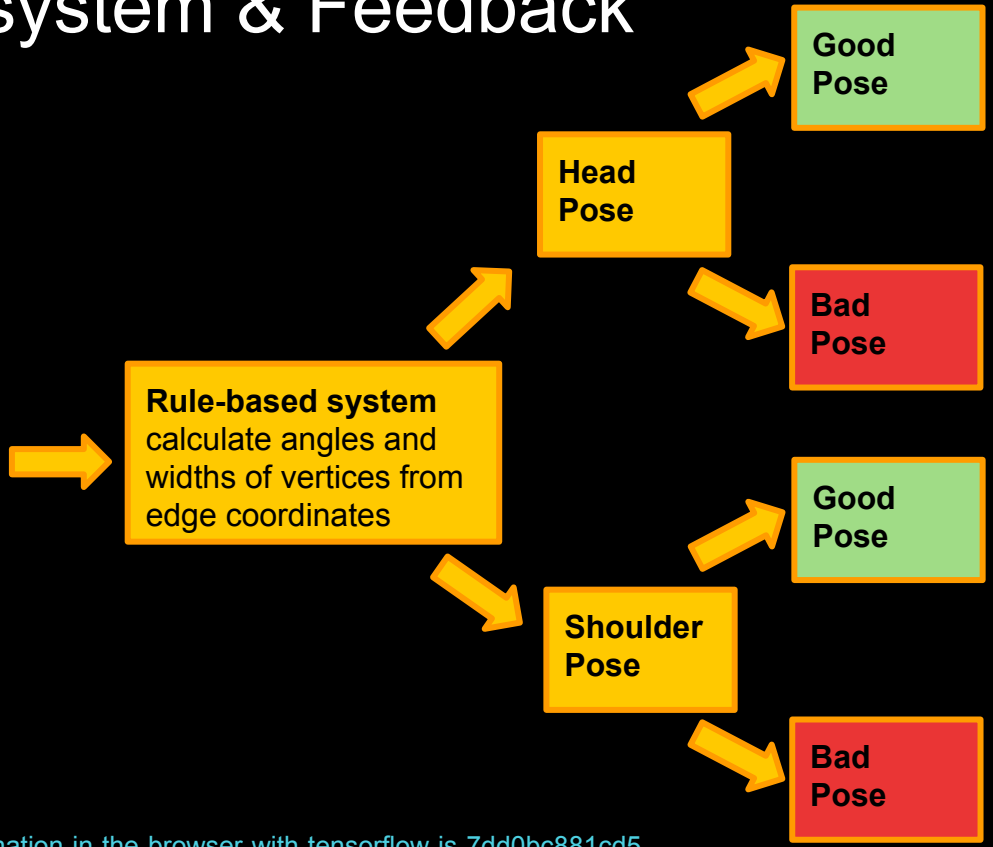
- uses PoseNet output to detect good/bad posture regarding head & shoulders
- output used to determine the angle at which head & shoulder poses are tilted
- configurable threshold values determine whether a given angle represents a good or bad pose
- If bad pose is held for a (configurable) amount of time, corresponding feedback will be given to the user



# BodyPose: Rule-based system & Feedback

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# BodyPose: Statistics

- Logging of User Session time
- User receives statistical feedback regarding pose habits:
  - How long did I sit in front of the computer?
  - How long did I maintain a good pose?
  - How long did I sit with a bad pose?