

# HOW FACIAL RECOGNITION WORKS





# WHAT IS FACIAL RECOGNITION?

- Facial recognition is a way of uniquely identifying or verifying a person
- A facial recognition system uses biometrics to map facial features from a photograph, video, or other means of sensors.
- It compares the information with a database of known faces to find a match.



# HOW DOES IT WORK?



- Let's tackle this problem one step at a time. For each step, we'll learn about a different machine learning algorithm.
- Finding all the Faces in a frame
- Face Analysis
- Converting An Image to Data
- Finding a Match

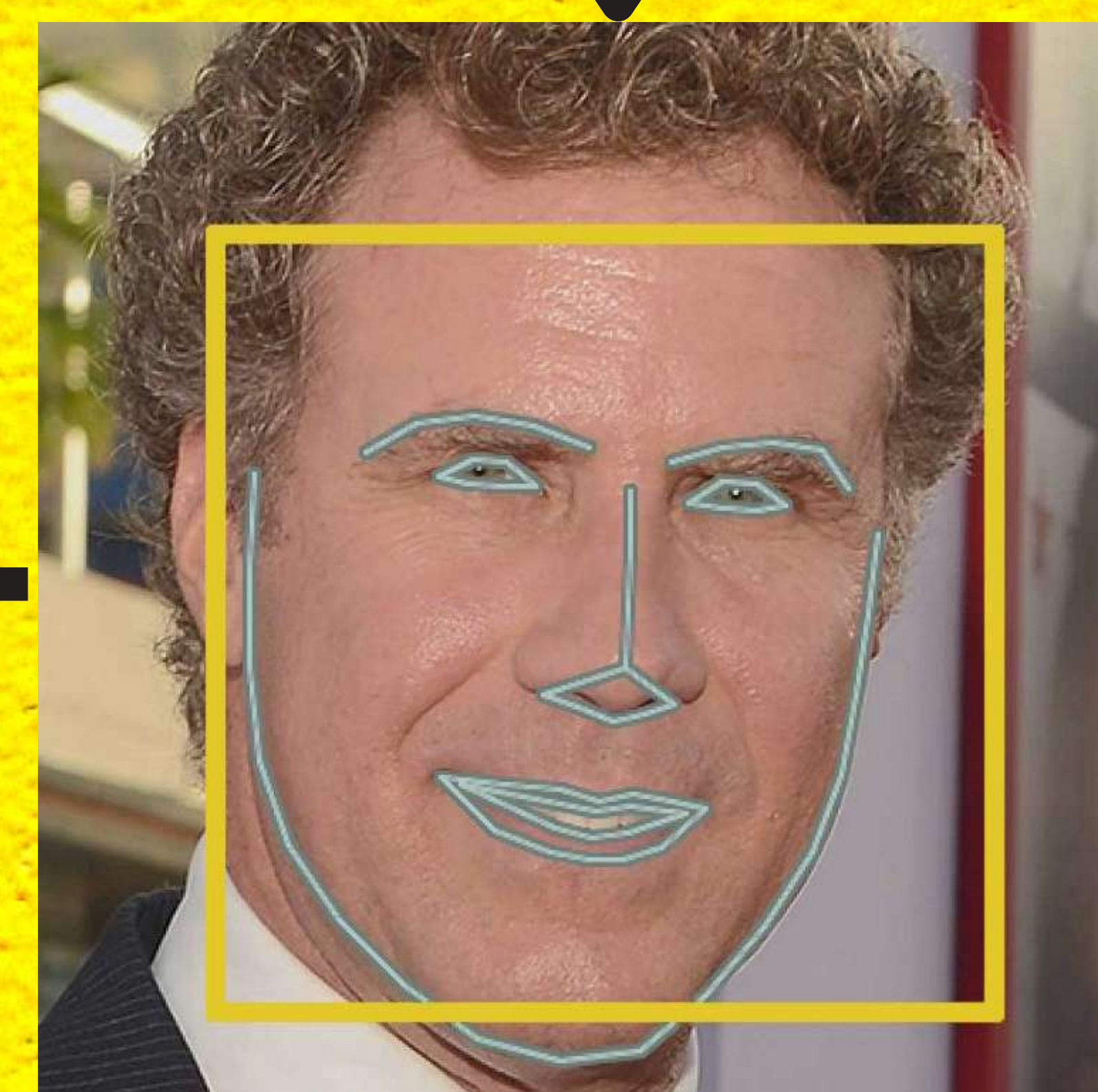




Input image



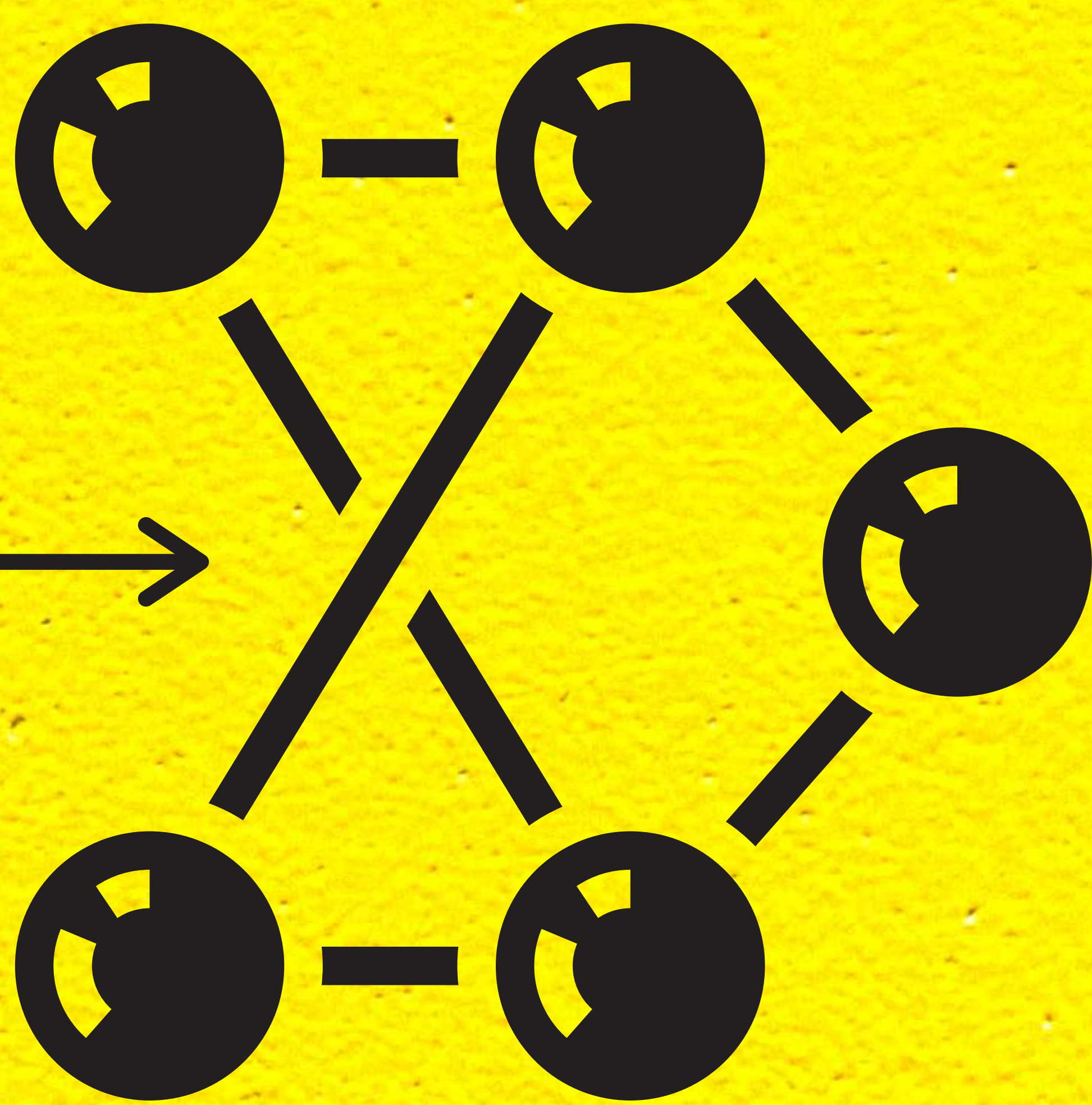
Detect face



Analyse face



Isolate face



Generate embeddings

Do what ever you  
want with the  
embeddings

# PROJECT FLOW

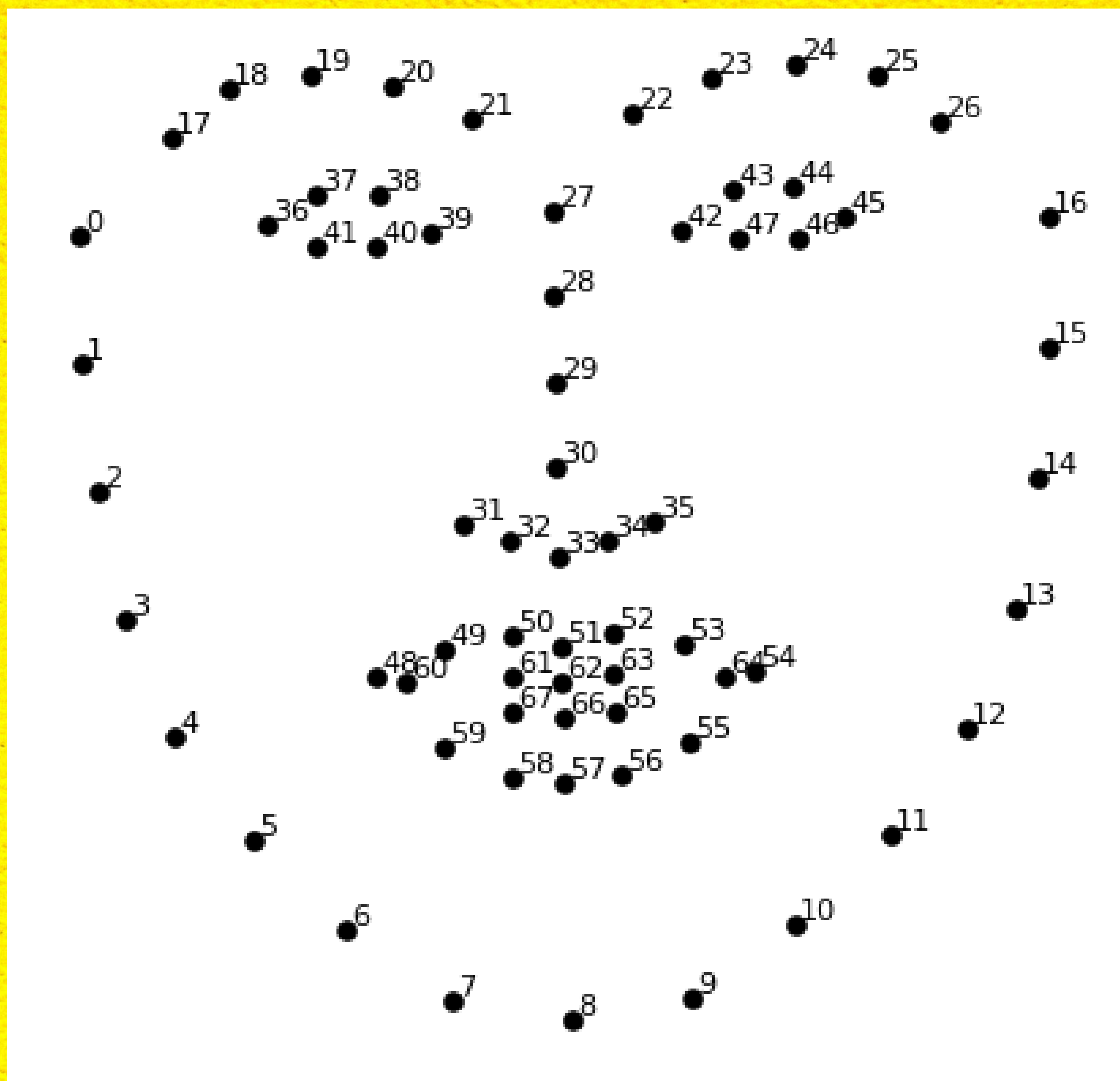




## FINDING ALL THE FACES IN A FRAME

- We will be using a method called Histogram of Oriented Gradients — or just HOG for short to identify faces in the image.
- Our goal is to figure out how dark the current pixel is compared to the pixels directly surrounding it. Then we want to draw an arrow showing in which direction the image is getting
- We repeat it for every pixel in the image. To find faces in this HOG image, all we have to do is find the part of our image that looks the most similar to a known HOG pattern

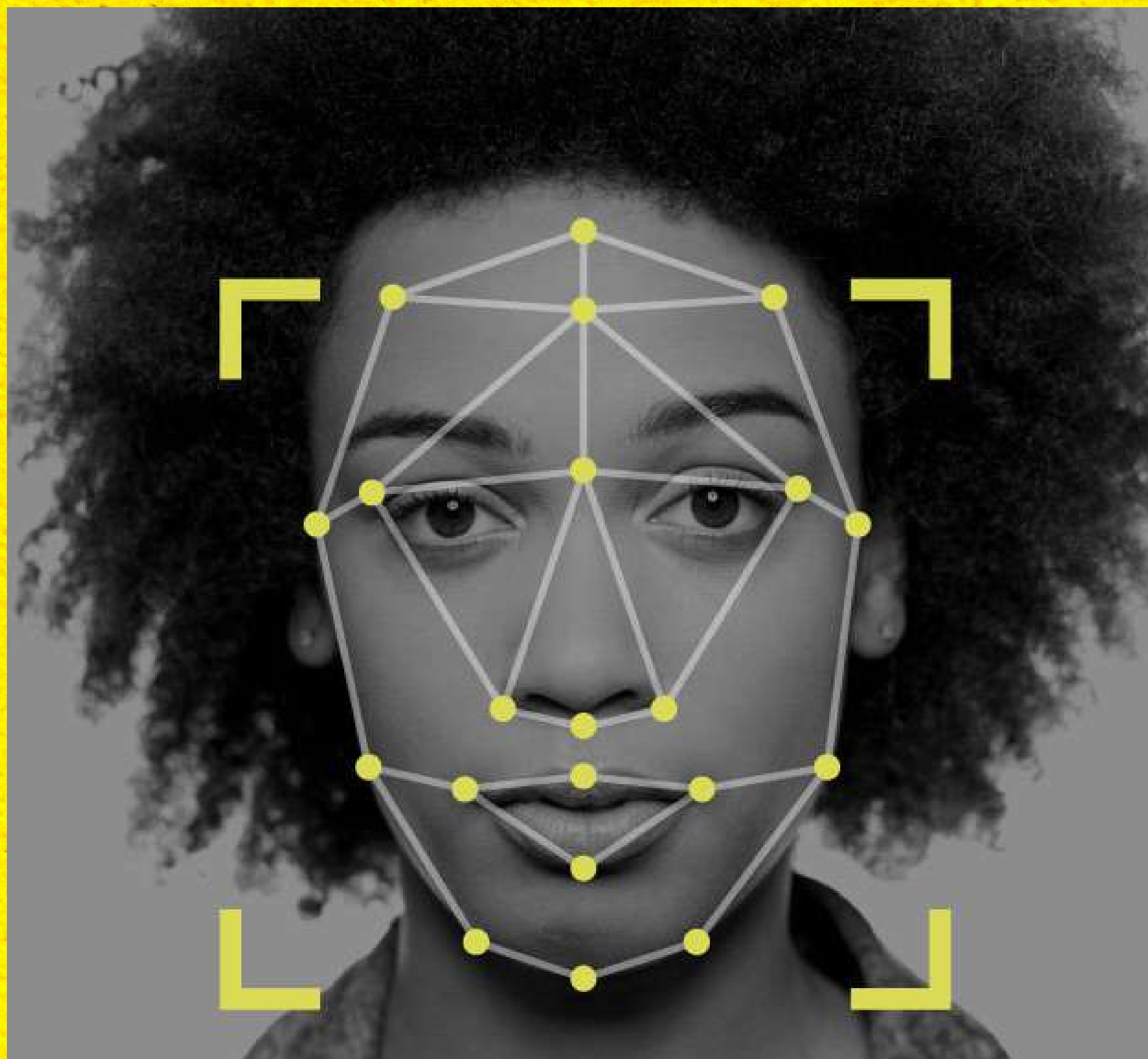
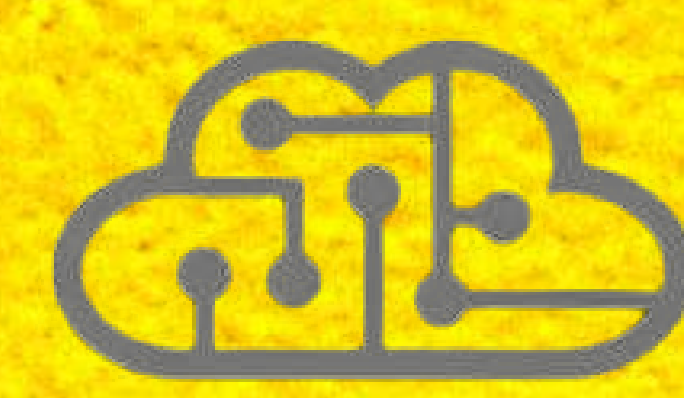




# FACE ANALYSIS

- Computer will face a problem when the face is oriented a bit. To solve this we will try to warp each picture so that the eyes and lips are always in the sample place in the image.
- To do this, we are going to use an algorithm called face landmark estimation.
- The basic idea is we will come up with 68 specific points (called landmarks) that exist on every face.





128 dimension  
(embedding)

## CONVERTING AN IMAGE TO DATA

- We will train a Deep Convolutional Neural Network to generate 128 measurements (embedding) for each face and uses a triplet loss function to test how accurate the neural net classifies a face.
- We use 3 images - 2 images of same person and one image of totally different person to verify the model performance.
- After repeating this step millions of times for millions of images of thousands of different people, the neural network learns to reliably generate 128 measurements for each person





## FINDING A MATCH

- This last step is actually the easiest step in the whole process. All we have to do is find the person in our database of known people who has the closest measurements to our test image.
- You can do that by using any basic machine learning classification algorithm.





# APPLICATIONS OF GPT - 3

- PREVENT RETAIL CRIME

- UNLOCK PHONES

- SMARTER ADVERTISING

- DIAGNOSE DISEASES

- PROTECT LAW ENFORCEMENT

- HELP THE BLIND

- FIND MISSING PERSONS

- MANY MORE....



# RESOURCES

CLICK THE LINKS TO GET RESOURCES

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- [Find all resources here](#)