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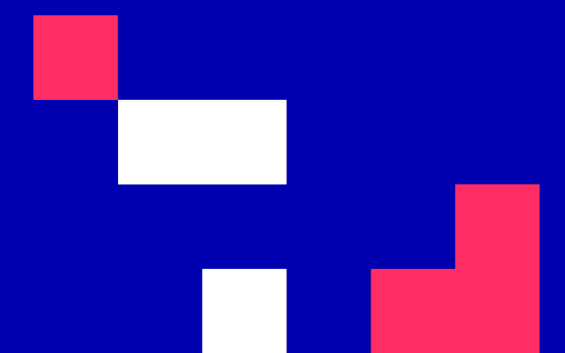
Master programmes in Artificial  
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University of Cyprus

# HUMAN-CENTERED INTELLIGENT USER INTERFACES - MAI648

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**LAB 6**

# Emotion Recognition

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## Introduction and Laboratory Description

- **Emotion recognition** is the process of identifying human emotion. People vary widely in their accuracy at recognizing the emotions of others. Use of technology to help people with emotion recognition is a relatively nascent research area. Generally, the technology works best if it uses multiple modalities in context [Wikipedia].

## Introduction and Laboratory Description

- To date, the most work has been conducted on automating the recognition of facial expressions from video, spoken expressions from audio, written expressions from text, and physiology as measured by wearables [Wikipedia].

## Introduction and Laboratory Description

- Based on recent market analyses, *“the global emotion detection and recognition market size is projected to grow from USD 23.6 billion in 2022 to USD 43.3 billion by 2027” [Markets and Markets].*
- Several API-based software exist that use facial detection and semantic analysis aiming to detect human emotions (happiness, sadness, excitement) through image analysis in picture and videos.

## Introduction and Laboratory Description

- In this laboratory you will familiarize yourself with using existing state-of-the-art Application Programming Interfaces (API) and online services aiming to recognize human emotions through image analysis.



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# Main Procedure for Emotion Recognition

- Process an image or video
- A mechanism is detecting faces within the image/video
- Then the mechanism classifies human emotion through face expression analysis based on machine learning algorithms

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## Using State-of-the-Art Libraries for Emotion Detection through Image Analysis

### Deepface

- DeepFace library is a lightweight face recognition and facial attribute analysis (age, gender, emotion and race) library for Python
- <https://github.com/serengil/deepface>
- *License: serengil/deepface is licensed under the MIT License. A short and simple permissive license with conditions only requiring preservation of copyright and license notices. Licensed works, modifications, and larger works may be distributed under different terms and without source code.*



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# Deepface

- It is a hybrid face recognition framework wrapping state-of-the-art models: VGG-Face, Google FaceNet, OpenFace, Facebook DeepFace, DeepID, ArcFace, Dlib and SFace.
- Experiments show that human beings have 97.53% accuracy on facial recognition tasks whereas those models already reached and passed that accuracy level.

# How to use the DeepFace Library

- pip3 install deepface

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# Deepface

- Face Embeddings
- Facial Attribute Analysis
  
- Also, Facial Recognition and Verification

# Face Embeddings

- Face recognition models represent facial images as multi-dimensional vectors.
- Those embedding vectors may need to be stored
- Examples?

## Face Embeddings

- `embedding = DeepFace.represent(img_path = "img.jpg")`
- Function that returns an array as output



# Facial Attribute Analysis

- Deepface may analyze and predict the following attributes based on the face illustrated in an image
  - Age
  - Gender
  - Facial expression
    - angry, fear, neutral, sad, disgust, happy and surprise
  - Race
    - asian, white, middle eastern, indian, latino and black

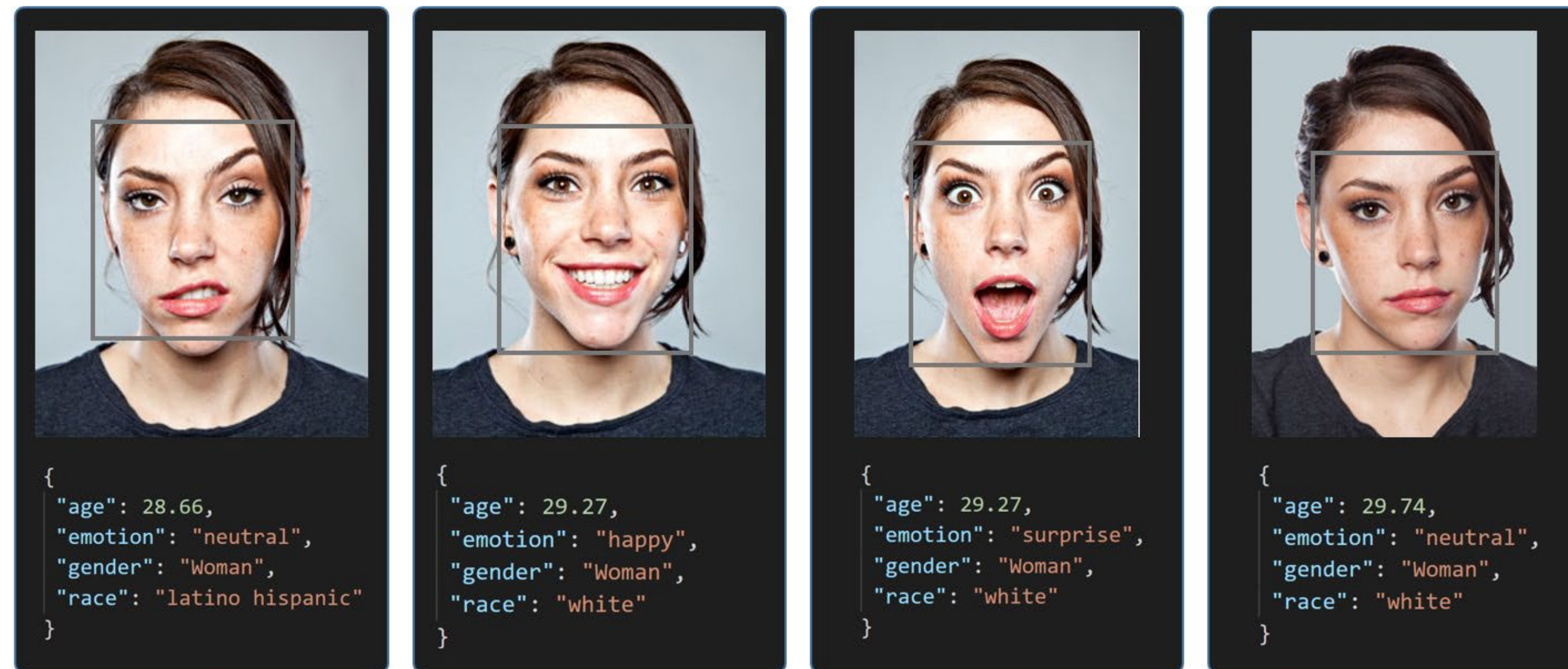
Source: <https://github.com/serengil/deepface>

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## Example code

- `from deepface import DeepFace`
- `obj = DeepFace.analyze(img_path = "image.jpg", actions = ['gender'])`
- `print(obj)`

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Source: <https://github.com/serengil/deepface>

## Real Time Analysis

- Deepface runs for real time videos
- Stream function access the webcam and apply both face recognition and facial attribute analysis
- The function starts to analyze a frame if it can focus a face sequentially 5 frames. Then, it shows results 5 seconds.



# Real Time Analysis

- `DeepFace.stream(db_path = "C:/User/Sefik/Desktop/database")`



## Additional Readings

- Microsoft's cognitive services for recognizing human emotions using the Face API
- Follow the main steps reported in
  - <https://learn.microsoft.com/en-us/xamarin/xamarin-forms/data-cloud/azure-cognitive-services/emotion-recognition>
- Accordingly, the Face API can perform emotion detection to detect a variety of human emotions like anger, fear, happiness, neutral, surprise, etc. through facial expression analysis.

## Sources

- <https://github.com/serengil/deepface>

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**Thank you.**