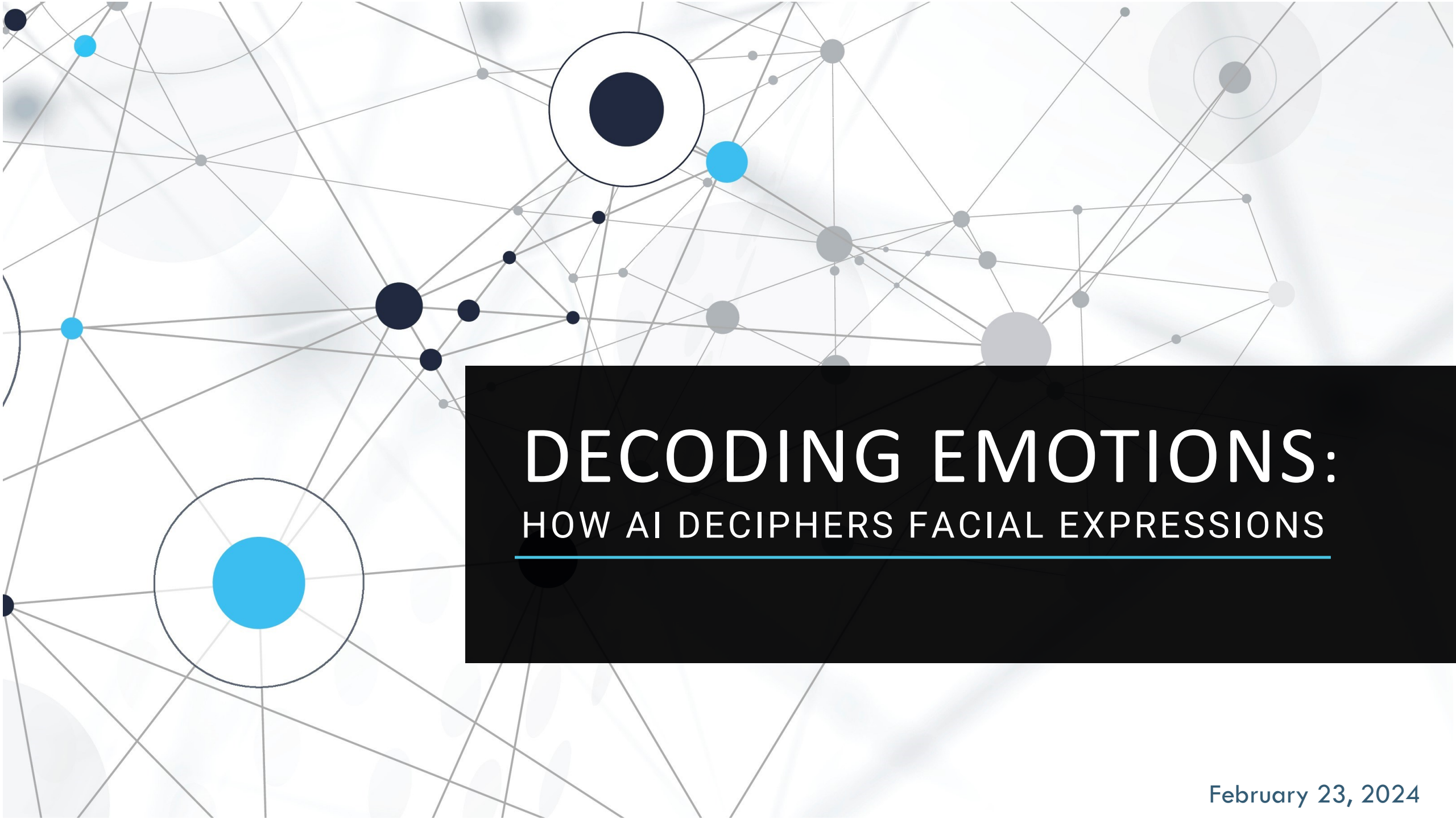


DECODING EMOTIONS:

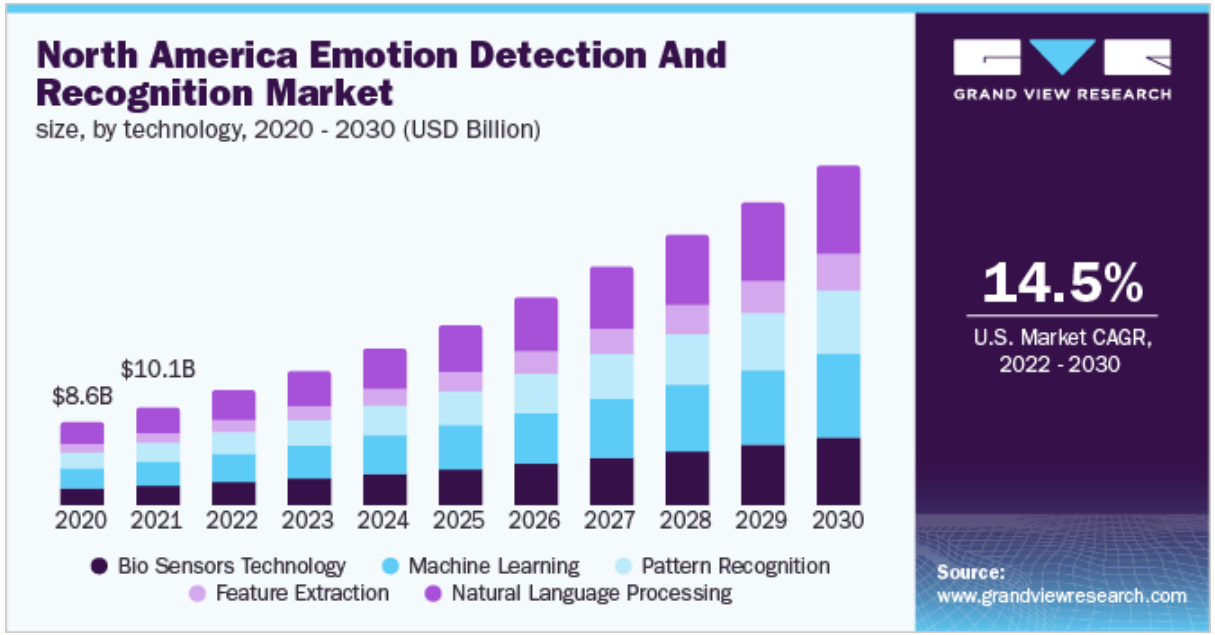
HOW AI DECIPHERS FACIAL EXPRESSIONS

February 23, 2024

INTRODUCTION

Emotions are what make us human.

Emotion recognition software uses artificial intelligence (AI) and machine learning to interpret human emotions from text, voice, facial expressions, and other non-verbal cues.



The global Emotion AI market generated **$1.8 billion in 2022** and is projected to reach **$13.8 billion by 2032.**

https://www.grandviewresearch.com/industry-analysis/emotion-detection-recognition-market-report

INTRODUCTION

Facial Emotion recognition

Entertainment	Healthcare	Automotive	Marketing	On-line meetings
• Face filters • Virtual make up • Emotion-aware Gaming	• Telemedicine • Patient Monitoring • Autism Spectrum Therapy	• Real-time driver monitoring • In-car personalization	• Test emotions in ads for targeted marketing • Evaluate user experience with digital interfaces	• Track people engagement • Analyse emotions during hiring interviews

MorphCast Advanced Facial Emotion Recognition · smart eye · IMOTIONS · viso.ai · Noldus

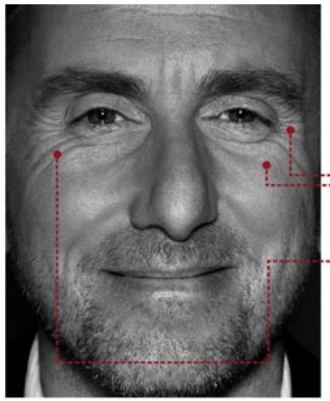
imentiv ai · KAIROS · Visage Technologies · SKY BIOMETRY · Face++ · NVISO · Affectiva a smart eye company

Questions

- How good is AI in facial emotion recognition?
- What factors affect the algorithm performance?
- What emotions can be detected?

READING HUMAN EMOTIONS FROM FACIAL EXPRESSIONS

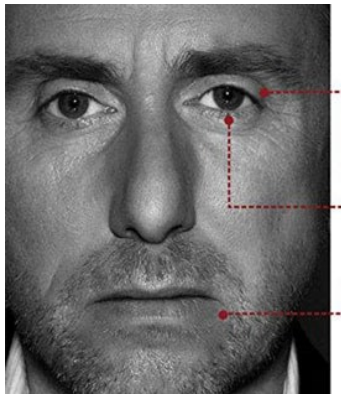
Universal facial expressions that we all use, even across cultural divides (research by Dr. Paul Ekman)



happiness

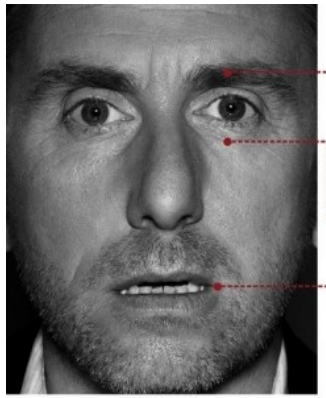
A real smile always includes:

1. crow's feet wrinkles
2. pushed up cheeks
3. movement from muscle that orbits the eye



sadness

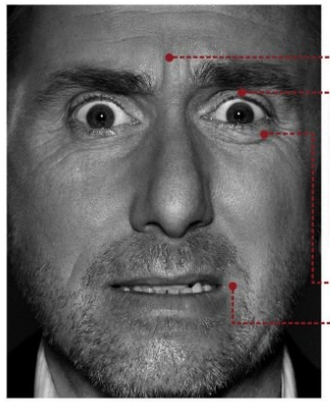
1. drooping upper eyelids
2. losing focus in eyes
3. slight pulling down of lip corners



surprise

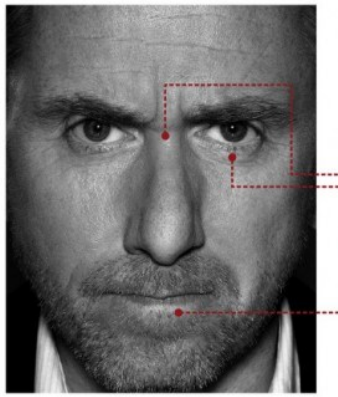
Lasts for only one second:

1. eyebrows raised
2. eyes widened
3. mouth open



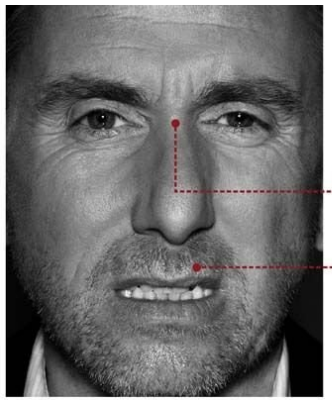
fear

1. eyebrows raised and pulled together
2. raised upper eyelids
3. tensed lower eyelids
4. lips slightly stretched horizontally back to ears



anger

1. eyebrows down and together
2. eyes glare
3. narrowing of the lips



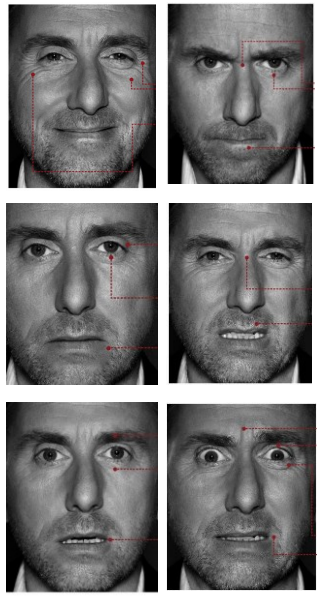
disgust

1. nose wrinkling
2. upper lip raised

https://www.paulekman.com/

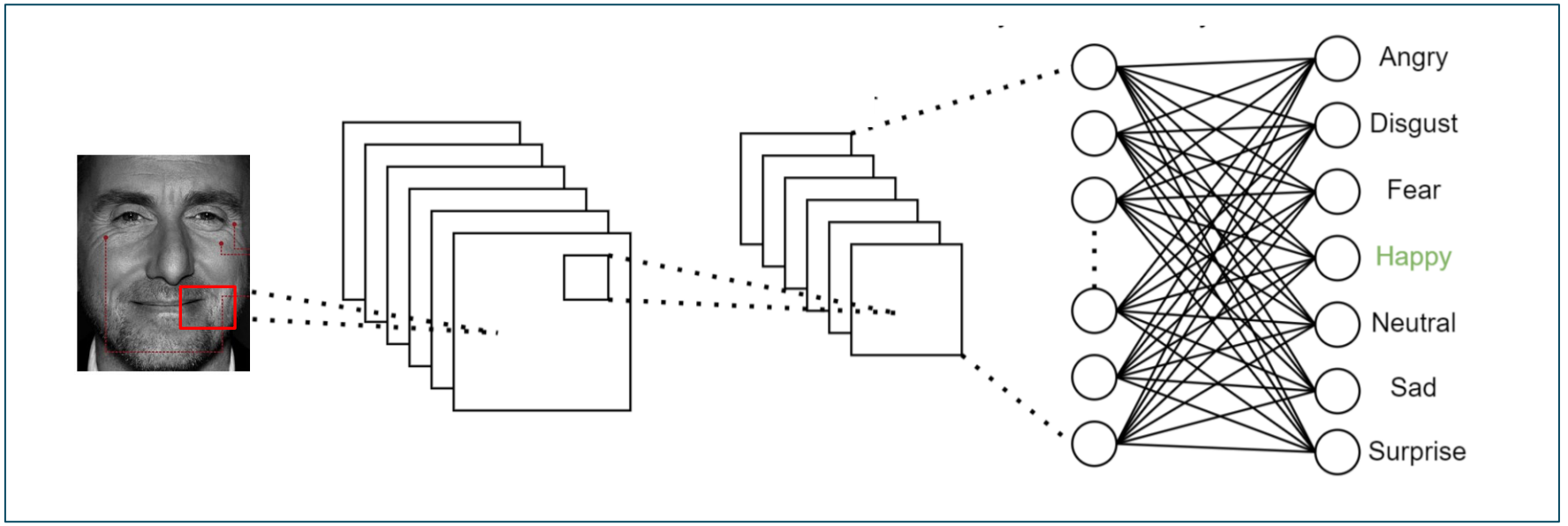
KEY INGREDIENTS IN FACIAL EXPRESSIONS RECOGNITION

Images of faces



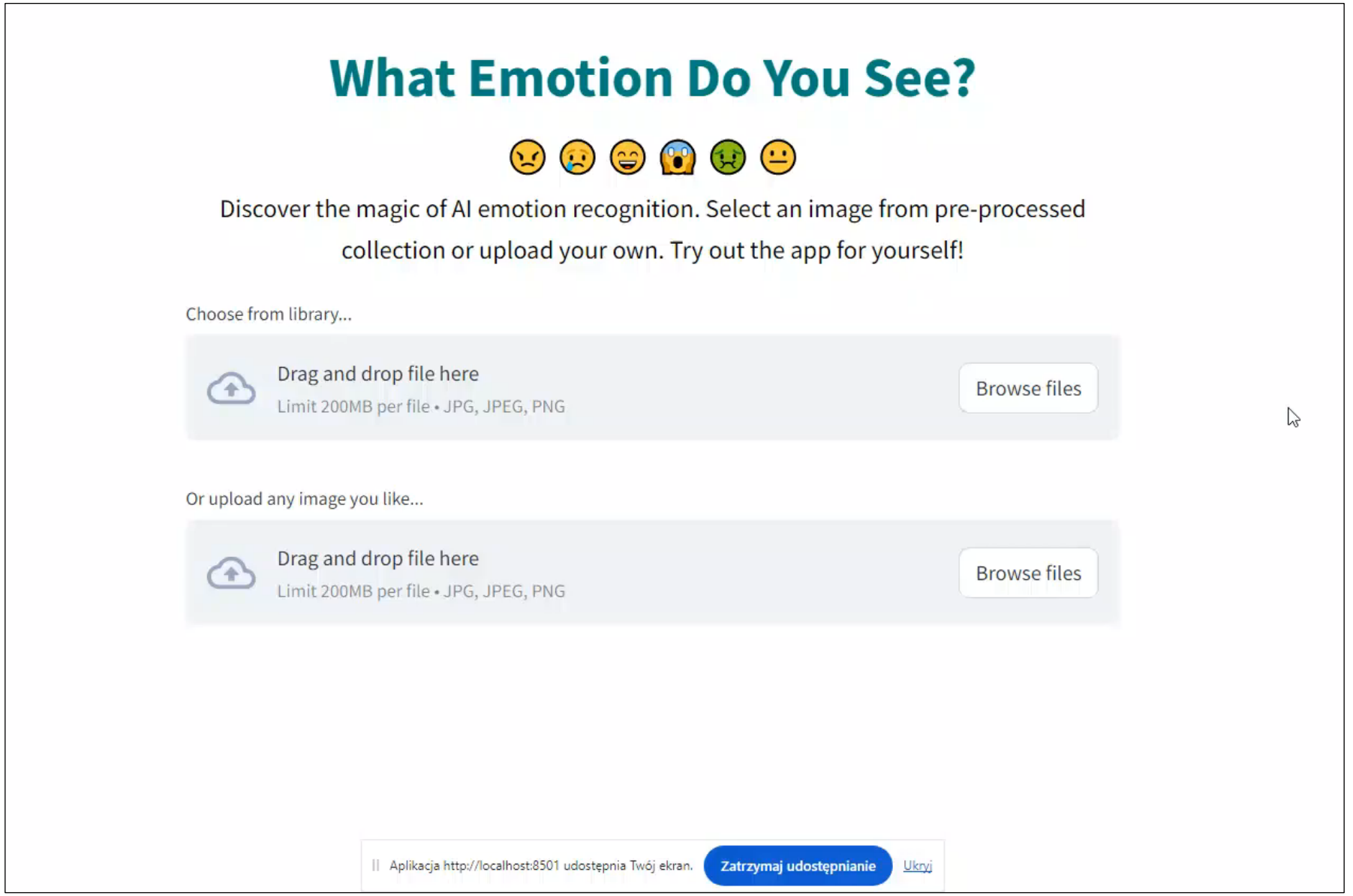
...a lot of them

Model



Learning Process with Convolutional Neural Network (not easy...)

HTTP://LOCALHOST:8501/#WHAT-EMOTION-DO-YOU-SEE



IS AI GOOD AT RECOGNIZING HUMAN EMOTIONS?

Loaded image	Extracted face	Emotion
		My Model: angry DeepFace: angry

Loaded image	Extracted face	Emotion
Original Image		My Model: angry DeepFace: happy

IS AI GOOD AT RECOGNIZING HUMAN EMOTIONS?

Loaded image | Extracted face | Emotion

Extracted Face

My Model: angry

DeepFace: surprise

Loaded image | Extracted face | Emotion

Original Image

My Model: angry

DeepFace: happy

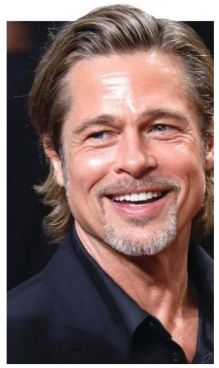
Loaded image | Extracted face | Emotion

Original Image

My Model: angry

DeepFace: surprise

Loaded image | Extracted face | Emotion



Extracted Face

My Model: angry

DeepFace: happy

Loaded image | Extracted face | Emotion

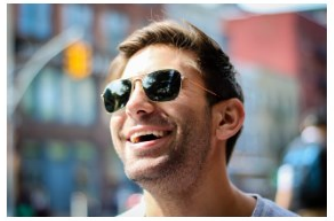
Extracted Face

My Model: angry

DeepFace: happy

IS AI GOOD AT RECOGNIZING HUMAN EMOTIONS?

Loaded image | Extracted face | Emotion

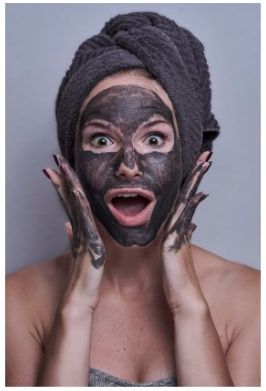


Original Image

My Model: angry

DeepFace: fear

Loaded image | Extracted face | Emotion



Extracted Face

My Model: angry

DeepFace: Oops, face not detected...

Loaded image | Extracted face | Emotion

Original Image

My Model: angry

DeepFace: neutral

IS AI GOOD AT RECOGNIZING HUMAN EMOTIONS?

Loaded image	Oops, face not detected...	Emotion
		DeepFace: Oops, face not detected...

Loaded image	Oops, face not detected...	Emotion
		DeepFace: Oops, face not detected...

SUMMARY

- AI emotion recognition **works with videos**, not just images!
- Creating an effective model from scratch is a demanding process, requiring time and resources.
- **Data quality and quantity matter.**
- **Algorithms can fail** to detect faces or predict emotions accurately.
- **Limited number of emotions** can be recognized (for the moment).

The big question – do we really want our every emotion on display?