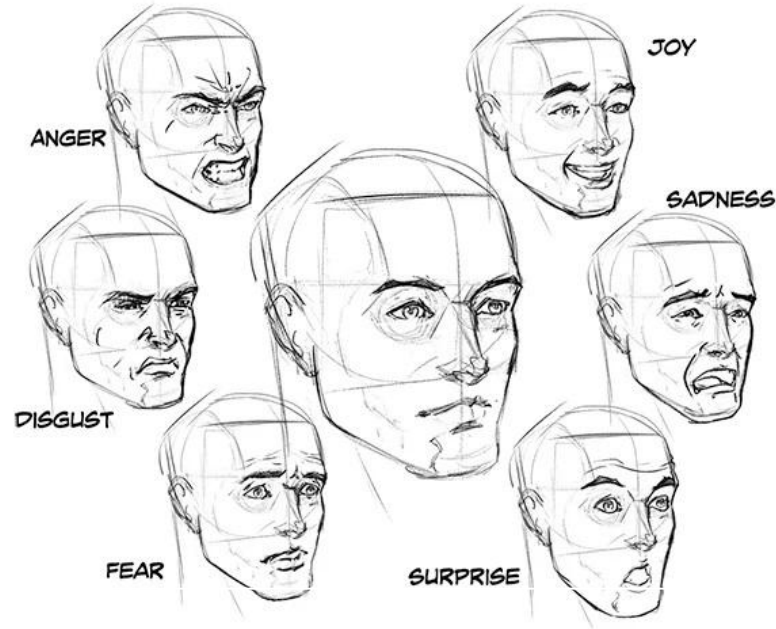


# Facial Expression Recognition(FER)



**Presented by :**  
**Future Co.**  
**18 April 2023**

A conceptual image showing two dark silhouettes of hands reaching up from the bottom corners, holding a large, metallic-looking word "FUTURE" in the center. The background is a bright, cloudy sky with a sunburst effect behind the word.

# FUTURE

## **Future Co. Members:**

- **Terry**
- **Jane**
- **Eric**
- **Nato**
- **Mary**

# Facial Emotion Recognition (FER)

- The technology that analyses facial expressions from both static images and videos in order to reveal information on one's emotional state.
- Machine Learning/Deep Learning
- Model : Convolutional Neural Network (Cnn)



# Why Facial Emotion Recognition?

- According to a market research report by Markets and Markets, the Emotion recognition market size is projected
- to grow from USD 19.5 billion in 2020 to USD 37.1 billion by 2026, at a Compound Annual Growth Rate (CAGR) of 11.3%.



# Use Cases of Facial Expression Recognition

- **Market research**
  - moment-by-moment facial expressions and emotions (facial coding) automatically vs verbal Surveys
- **Safe and personalized cars**
  - Drivers Facial Expression
- **Virtual Assistances**
  - Siri
  - Alexa
- **Video games testing**
  - Gamers real time FER
- **Law enforcement, surveillance, and monitoring**
- **Children Safety and surveillance**
  - Schools
  - Daycares
- **Marketing, advertising, media, entertainment, and PR(Public Relations)**
  - Retail
  - Malls
- **More in-depth interviews**
  - HR



# Overview

**Project Goal:** Create Machine Learning Model to analyze people's faces (pictures) to see how a person is feeling.

**Use of the model:** To assist service providers' customer satisfaction analyses. Which can be used in childcare centers or retail shops to analyze if overall customers leaving the facility satisfied or not.

**Data source:** Kaggle.com

(<https://www.kaggle.com/datasets/debanga/facial-expression-recognition-challenge?select=fer2013.tar>)

# About Dataset

- Dataset has 48x48 pixel greyscale images of faces. With 7 different categories with set of 28709 examples (0=Angry, 1=Disgust, 2=Fear, 3=Happy, 4=Sad, 5=Surprise, 6=Neutral). Which reduced to detect only **"Happy"** or **"Sad"**.
- The dataset was prepared by Pierre-Luc Carrier and Aaron Courville.
- The model is able to scan the people's faces in 48x48 pixel images and read how the person is feeling at that moment ("Happy" or "Sad").

# Overview of Models

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## Model 1

65/65 - 1s - loss: 0.5456 - accuracy: 0.9595 - 1s/epoch - 17ms/step  
Loss: 0.5456086993217468, Accuracy: 0.9595121741294861

## Model 2

65/65 - 4s - loss: 0.7153 - accuracy: 0.5854 - 4s/epoch - 68ms/step  
Loss: 0.7153261303901672, Accuracy: 0.5853658318519592

## Model 3

65/65 - 2s - loss: 0.4645 - accuracy: 0.7707 - 2s/epoch - 35ms/step  
Loss: 0.46449288725852966, Accuracy: 0.7707316875457764



# Testing The Models

## Model A

1/1 [=====] - 0s 125ms/step

Prediction:  $[[1.000000e+00 \ 2.374486e-14]]$

Image Emotion is: Happy

## Model B

1/1 [=====] - 0s 135ms/step

Prediction:  $[[0.82696974 \ 0.17303026]]$

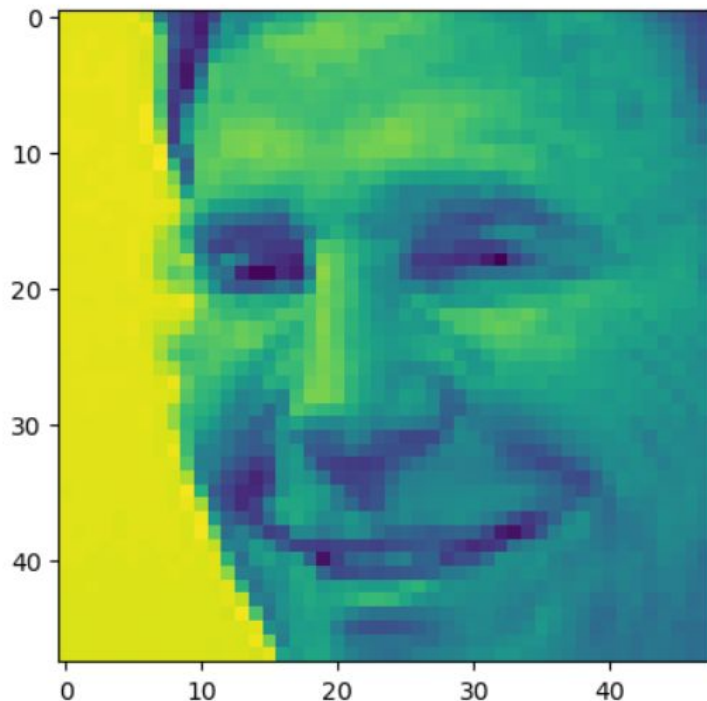
Image Emotion is: Happy

## Model C

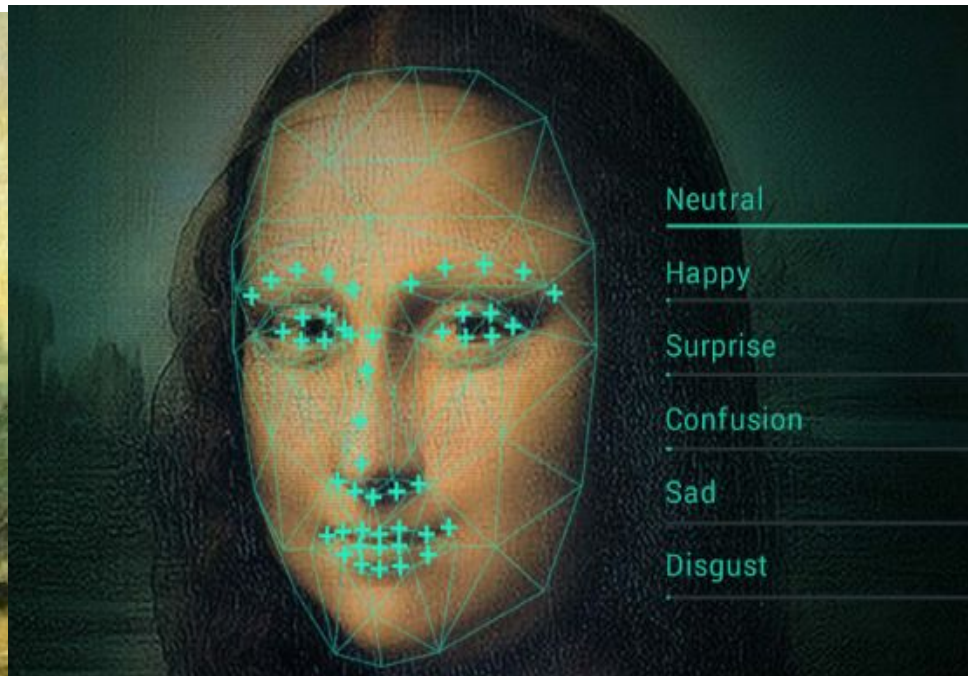
1/1 [=====] - 0s 148ms/step

Prediction:  $[[0.96389186 \ 0.03610811]]$

Image Emotion is: Happy



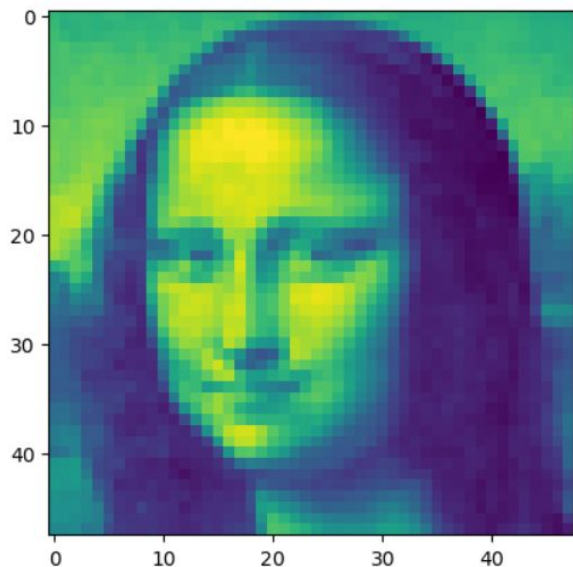
# Is Mona Lisa “Happy” or “Sad”?



# Is Mona Lisa “Happy” or “Sad”?

Model A

Prediction:  $[[4.6123390e-05 \ 9.9995387e-01]]$



Using Images outside our Dataset

Building an image scaler to pre-process and predict an image from the internet

# Conclusion

- Model can perform with more accuracy if it is trained with more data
- Accuracy rate can be increased using more complex models
- Model can use AWS (cloud services) to be more accessible and robust
- Overall service industry organizations can benefit from the model for analysing customer satisfaction
- Limitation: The person's facial expression could be different depending on unique type. The model is running only based on the dataset. The team members are not experts in facial or emotions.

# References

- **Data source:** Kaggle.com
  - (<https://www.kaggle.com/datasets/debanga/facial-expression-recognition-challenge?select=fer2013.tar>)
- **Real-time emotion recognition:** Potential use cases and challenges ,Article
  - <https://indiaai.gov.in/article/real-time-emotion-recognition-potential-use-cases-and-challenges>



**Thank  
You!!!**