Reconocimiento facial - Caso Práctico 2

Librerias necesarias

In [ ]:
```
#instalación de librerías necesarias
%pip install face-recognition
%pip install opencv-contrib-python  #Adición de módulos avanzados para ma
%pip install tabulate
```

```
Defaulting to user installation because normal site-packages is not writea
ble
Requirement already satisfied: face-recognition in /home/walmache/.local/l
ib/python3.10/site-packages (1.3.0)
Requirement already satisfied: Click>=6.0 in /usr/lib/python3/dist-package
s (from face-recognition) (8.0.3)
Requirement already satisfied: numpy in /home/walmache/.local/lib/python
3.10/site-packages (from face-recognition) (1.26.4)
Requirement already satisfied: face-recognition-models>=0.3.0 in /home/wal
mache/.local/lib/python3.10/site-packages (from face-recognition) (0.3.0)
Requirement already satisfied: Pillow in /usr/lib/python3/dist-packages (f
rom face-recognition) (9.0.1)
Requirement already satisfied: dlib>=19.7 in /usr/local/lib/python3.10/dis
t-packages/dlib-19.24.99-py3.10-linux-x86_64.egg (from face-recognition)
(19.24.99)
Note: you may need to restart the kernel to use updated packages.
Defaulting to user installation because normal site-packages is not writea
ble
Requirement already satisfied: opencv-contrib-python in /home/walmache/.lo
cal/lib/python3.10/site-packages (4.10.0.84)
Requirement already satisfied: numpy>=1.19.3 in /home/walmache/.local/lib/
python3.10/site-packages (from opencv-contrib-python) (1.26.4)
Note: you may need to restart the kernel to use updated packages.
Defaulting to user installation because normal site-packages is not writea
ble
Requirement already satisfied: tabulate in /home/walmache/.local/lib/pytho
n3.10/site-packages (0.9.0)
Note: you may need to restart the kernel to use updated packages.
```

Paso 1.- Extracción de rostros para entrenamiento posterior del modelo

In [ ]:
```
#Importar módulos necesarios
import cv2  #Manejo de imagenes
import os   #Manejo de archivos/directorios
import face_recognition        # Linreria de reconocimiento facial
from datetime import datetime   # Para el registro de fecha y hora de asi
from tabulate import tabulate   #Tabulación de resultados de aistencia

import imghdr  #Para validar si un archivo es imagen
import sys     #Manejo de comandos de S.O.
import matplotlib.pyplot as plt   #Para gráficos
```

In [ ]:
```
#Constantes a usar
RED = "\033[91m"
```

```
GREEN = "\033[92m"
YELLOW = "\033[93m"
BLUE = "\033[94m"
RESET = "\033[0m"
```

In [ ]:

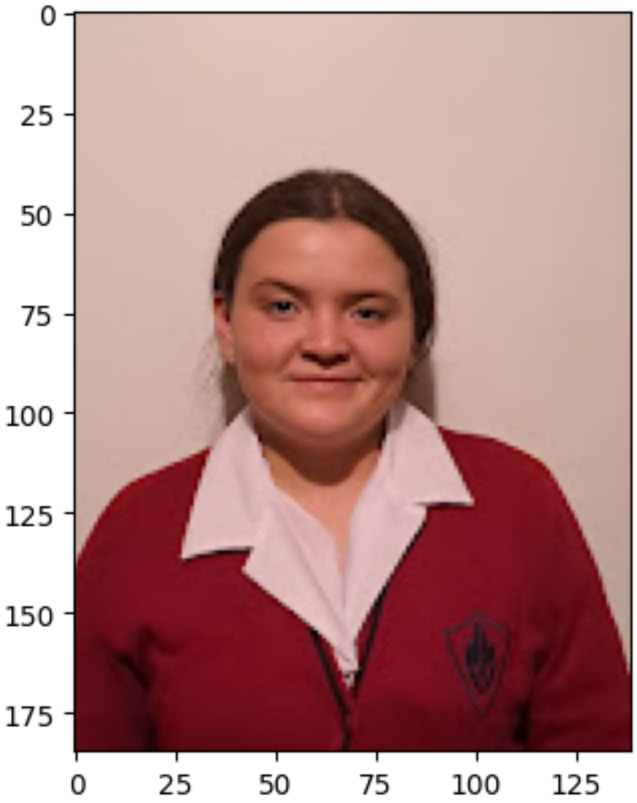
```
#Definición de funciones necesarias
#Evalua si un archivo es imagen válida
def isImage(filePath):
    return imghdr.what(filePath) is not None

#Evalua existencia de directorios
def existsDirectory(directoryPath):
    return os.path.exists(directoryPath) and os.path.isdir(directoryPath)

#Visualizasión de mensajes
def message(text, color):
    print(f"{color}{text}{RESET}")

#Registro de Asistencias
def attendanceRegister(student):
    if student!='Desconocido':
        for registro in attendance:
            # Verificar si el estudiante ya está registrado
            if registro['nombre'] == student:
                ##message(f"{student} ya está registrado.",RED)
                return
        hora_registro = datetime.now().strftime('%Y-%m-%d %H:%M:%S')
        registro = {'nombre': student, 'hora': hora_registro}
        attendance.append(registro)

def printReport():
    tabla_asistencia = [[record['nombre'], record['hora']] for record in
    message("\nRegistros de asistencia:".center(100),BLUE)
    print(tabulate(tabla_asistencia, headers=["Nombre del Estudiante", "H
```

In [ ]:

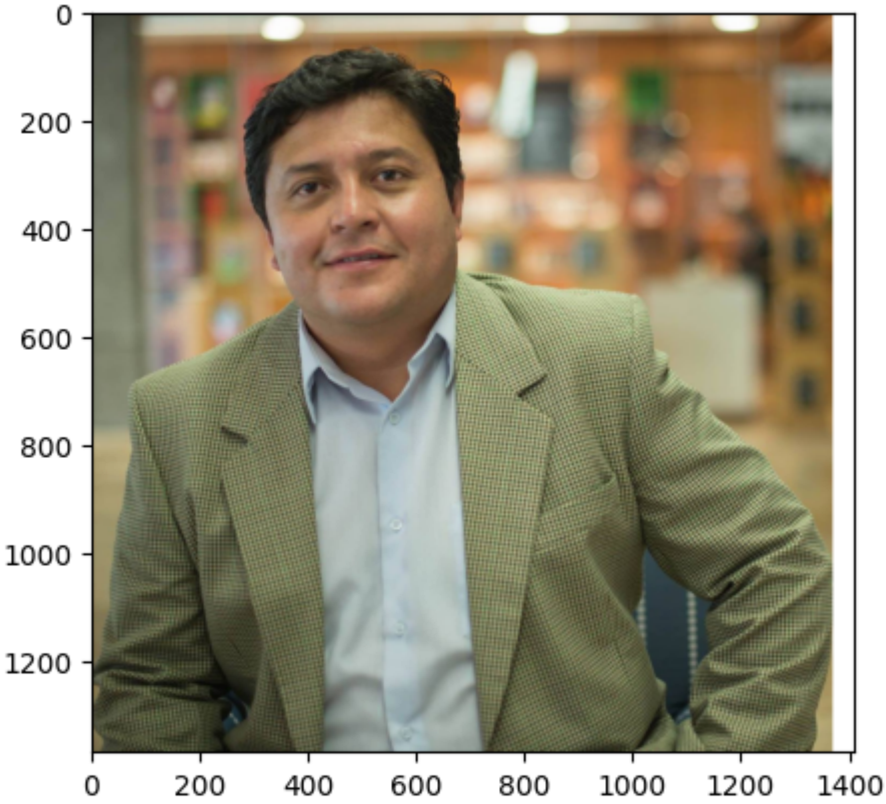
```
# Reconocimiento y alamacenamiento de rostros de imagenes aleatorias

sourceImages = "sourceImages"  #Directorio que almacena imagenes que cont
facesRepo    = "facesRepo"     #Direcorio donde se almacenaran los rostro

#Existe directorio que contiene imagenes fuente?
message("Inicio Proceso de reconocimiento de rostros en imagenes.", GREEN
if not existsDirectory(sourceImages):
    message("Repositorio de imagenes fuente no existe",RED)
    message("PROCESAMIENTO TERMINADO",RED)
    sys.exit()

#Existe directorio contenedore de rostros?
if not existsDirectory(facesRepo):
    os.makedirs(facesRepo)
    message("Se crea carpeta contenedora de rostros.", GREEN)

#Inicio delproceso
faceClassif = cv2.CascadeClassifier(cv2.data.haarcascades + "haarcascade_
i = 0

for imageName in os.listdir(sourceImages):
    message("Procesando archivo "+imageName, GREEN)
    if not isImage(sourceImages + "/" + imageName):
        message("Archivo "+imageName+ " no es imagen",RED)
    else:
        #Carga la imagen a memoria
        image = cv2.imread(sourceImages + "/" + imageName)

        #Visualizar imagen a procesar
        imgRGB = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
        plt.imshow(imgRGB)
        plt.show()

        faces = faceClassif.detectMultiScale(image, 1.1, 5)
        for (x, y, w, h) in faces:
            cv2.rectangle(image, (x, y), (x + w, y + h), (0, 255, 0), 2)
            face = image[y:y + h, x:x + w]
            face = cv2.resize(face, (150, 150))
            cv2.imwrite(facesRepo + "/" + str(i) + ".jpg", face)
            i += 1
            cv2.imshow("Rostros", face)
            cv2.waitKey(0)
        cv2.imshow("Image", image)
        cv2.waitKey(0)
    cv2.destroyAllWindows()
```

```
Inicio Proceso de reconocimiento de rostros en imagenes.
Procesando archivo foto3.jpg
```

```
Procesando archivo proyectoErick.docx
Archivo proyectoErick.docx no es imagen
Procesando archivo 238.jpg
```



```
Procesando archivo foto.png
```



```
Procesando archivo WA0007.jpg
```

Paso 2.- Reconocer Rostros en tiempo real

In [ ]:
```
#Guardar embeding nombres y registros asistencia
facesEncodings = []
facesNames = []
attendance = []
```

In [ ]:
```
#Bucle para obtener los codigos de codificacion facial de los rostros alm
for face in os.listdir(facesRepo):
    image = cv2.imread(facesRepo + "/" + face)
    image = cv2.cvtColor(image, cv2.COLOR_BGR2RGB)
    f_coding = face_recognition.face_encodings(image, known_face_location
    facesEncodings.append(f_coding)
    facesNames.append(face.split(".")[0])
message("Embeding de los rostros", GREEN)
print(facesEncodings)
message("Nombres de rostros a buscar", GREEN)
print(facesNames)

#Lectura del video
##stream = cv2.VideoCapture(0, cv2.CAP_DSHOW) backen para windows
stream = cv2.VideoCapture(0,cv2.CAP_V4L2)  #backend para captura de video

#Modelo para la detección Facial
faceClassif = cv2.CascadeClassifier(cv2.data.haarcascades + "haarcascade_

#Bucle de captura del video hasta presionar escape
while True:
    ret, frame = stream.read()

    if ret == False:   #Evaluar la lectura del frame desde el video
        message("Error al leer el video",RED)
        print(ret)
        break

    #Voltea el frame horizontalmente para efecto espejo
    frame = cv2.flip(frame, 1)
    orig = frame.copy()

    #Búsqueda de rostros en el frame
    faces = faceClassif.detectMultiScale(frame, 1.1, 5)

    #Proceso de recuadro y etiqueta de los rostros
    # Itera sobre cada rostro detectado
    for (x, y, w, h) in faces:
        # Extrae la región de interés (el rostro) del frame original
        face = orig[y:y + h, x:x + w]
        face = cv2.cvtColor(face, cv2.COLOR_BGR2RGB)

        #obtener los codigos de codificacion facial de los rostros almace
        actual_face_encoding = face_recognition.face_encodings(face, know

        #Compara y busca similitudes en los rostros
        result = face_recognition.compare_faces(facesEncodings, actual_fa

        if True in result:
            index = result.index(True)
            name = facesNames[index]
            color = (125, 220, 0)
            ##message("Registrar asistencia para "+name, GREEN)
            ###attendanceRegister(name)
        else:
            name = "Desconocido"
            color = (50, 50, 255)
        #recuadro y etiqueta del rostro detectado
        cv2.rectangle(frame, (x, y + h), (x + w, y + h + 30), color, -1)
        cv2.rectangle(frame, (x, y), (x + w, y + h), color, 2)
        cv2.putText(frame, name, (x, y + h + 25), 2, 1, (255, 255, 255),
        ##message("Registrar asistencia para "+name, GREEN)
        attendanceRegister(name)

    cv2.imshow("Frame", frame)

    k = cv2.waitKey(1) & 0xFF
    if k == 27:  #tecla escape
        break
stream.release()
cv2.destroyAllWindows()
printReport()
```

```
Embeding de los rostros
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```
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Nombres de rostros a buscar
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Registros de asistencia:
Nombre del Estudiante    Hora de Registro
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