SMART LOW-LIGHT IMAGE ENHANCEMENT FOR EMOTION DETECTION

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OBJECTIVE

The main objective of the facial expression intelligence project is to develop a system that can accurately detect and recognize human emotions from facial expressions.

1. Emotion recognition for mental health diagnosis and monitoring.

2. Sentiment analysis for market research and customer feedback.

3. Emotion-based personalization for advertising and entertainment.

4. Emotion detection for security and surveillance purposes.

ABSTRACT

- This project is focused on developing an facial expression intelligence system able to detect and read human emotions from facial expressions.
- Our designed system is capable of identifying and classifying emotions, such as happiness, sadness, anger, surprise, among others, using computer vision techniques and machine learning tools with a high accuracy rating.
- Our approach fuses convolutional neural networks with transfer learning for state-of-the-art performance on publicly available datasets of emotion detection. The system will be very useful in several industries and domains by enhancing the emotional intelligence and empathy of human-machine interaction.

INTRODUCTION

- Emotion detection plays a crucial role in various applications, including human-computer interaction, security, healthcare, and social robotics. Accurately detecting emotions can improve user experience, enhance communication, and provide critical insights into human behavior.

- Images captured in low-light environments often suffer from poor visibility, noise, and color distortions. These challenges make it difficult for traditional emotion detection algorithms to perform accurately, as the quality of facial features is significantly degraded.

- By integrating smart low-light image enhancement with emotion detection systems, it becomes possible to maintain high accuracy in various lighting conditions. Enhanced images provide clearer facial features, which are critical for distinguishing subtle emotional expressions.

- Effective low-light enhancement for emotion detection has significant implications for real-world applications, such as night-time surveillance, virtual reality, and assistive technologies for the visually impaired. This research contributes to building more robust and adaptable emotion detection systems that perform reliably under challenging lighting conditions.

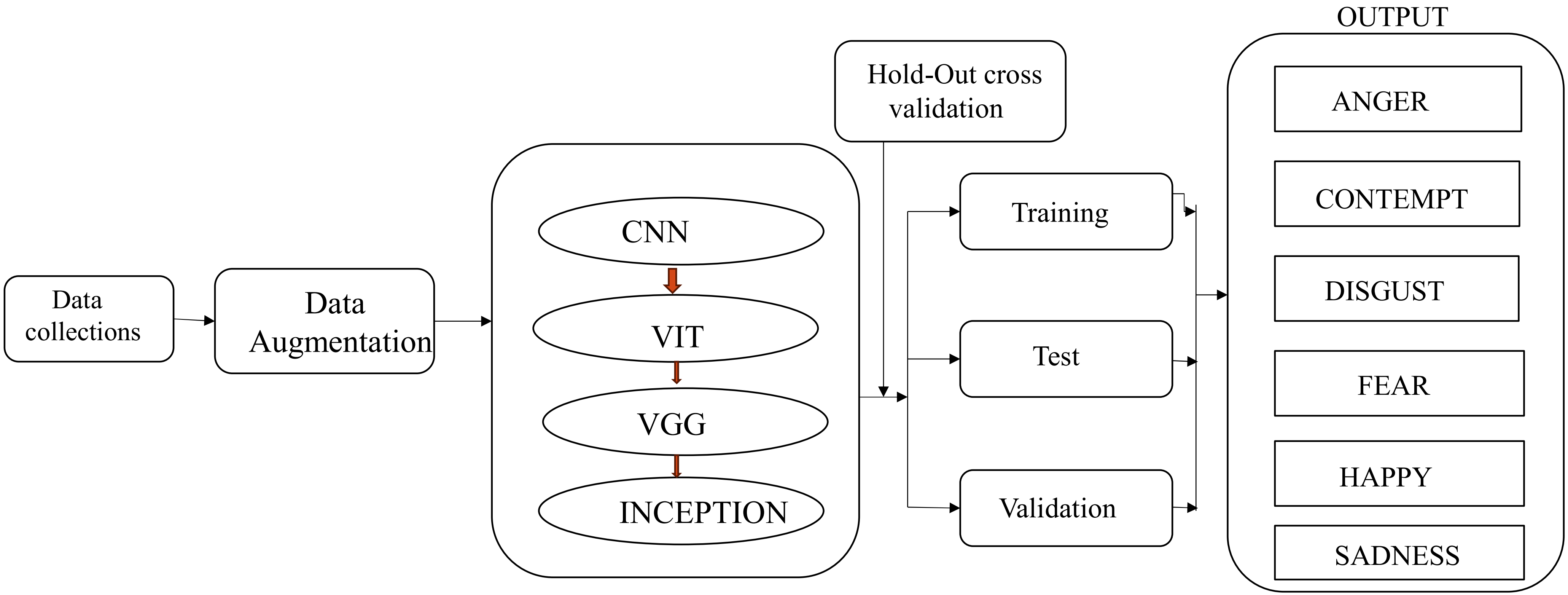
LITERATURE SURVEY

Sno	Authors	Journal & Year	Title of the paper	Methodology	Merits	De-Merits
1	yihua fan, dong liang, yiping chen	Nanjing,china in 2022	low-facenet: face recognition – driven low-light image enhancement	To enhance low-light images for face recognition, first improve image visibility using techniques such as histogram equalization. Then, preprocess the enhanced images (resize and normalize) and extract facial embeddings using a model like FaceNet or VGG-Face	1.Enhances low-light images to boost face recognition accuracy 2.Focuses on facial features essential for recognition, making it effective in real-world applications 3.Suppresses noise and artifacts, preserving key facial features	1.Performance depends heavily on the diversity and quality of training data. 2.Requires significant processing power and memory 3.Specialized for face recognition, not general low-light enhancement
2	Nisha Raichur, Nidhi Lonakadi, Priyanka Mural	International Journal of Engineering and Technology, vol.9, no. 3S, July 2017.	Detection of Stress Using Image Processing and Machine Learning Techniques	In this work a real-time non-intrusive videos are captured, which detects the emotional status of a person by analysing the facial expression	1.Allows for stress detection without physical sensors, relying 2.only on images Reduces the need for manual observation, enabling automated stress detection	1.Stress detection accuracy can vary depending on image quality and environmental factors 2.Requires sophisticated algorithms and processing power, which can be resource-intensive..

Sno	Authors	Journal & Year	Title of the paper	Methodology	Merits	De-Merits
3	D. K. Yashaswini, Sachin S. Bhat, Y. S. Sahana, M S. Shama Adiga, Shashank G. Dhanya	International Journal of Research in Engineering, Science and Management Volume-2, Issue-8, August-2019	Stress Detection using Deep Learning and IoT	Deep Learning (DL) method is used where real-time images are captured, which detects the emotional status of a person by analyzing the facial expression and Internet of Things (IoT) is used to inform the patients about his/her stress condition.	1.Enables continuous stress detection through IoT devices, providing timely insights. 2.Deep learning models can achieve high accuracy by analyzing complex patterns in data.	1.Collecting and processing sensitive data through IoT devices raises significant privacy issues. 2.Requires large amounts of diverse data to train models effectively, which may not always be available
4	MS.N.Pavani,Associate Professor,P.Supriya, A.SiriChandana, B.Trinetra, S.V.N.S.S.Supriya.	UGC Care Group I Journal ISSN : 2347-7180 Vol-08 Issue-14 No. 02: 2021	Stress detection using image processing and machine learning.	The main motive of our project is to detect stress in the IT professionals using theatrical Machine learning and Image processing techniques	1.Detects stress using only visual data, avoiding the need for physical sensors. 2.Automates stress detection, reducing the need for human observation 3.Provides real-time stress detection, useful in dynamic environments	1.Performance can be affected by image quality, lighting, and environmental factors 2.Use of cameras for stress detection may raise privacy concerns. 3.Model accuracy may suffer if the training data is biased or not diverse

Sno	Authors	Journal & Year	Title of the paper	Methodology	Merits	De-Merits
5	Zhijian Luo, Jiahui Tang, Yueen Hou, Zihan Huang and Yanzeng Gao	School of Computer, Jiaying University, Meizhou, R. P. China, 514015 ,27-07-2023	Unsupervised Low Light Image Enhancement via SNR-Aware Swin Transformer	Low-light image enhancement aims at improving brightness and contrast, and further reducing noise that corrupts the visual quality	1.Eliminates the need for labeled data, making it versatile for various datasets. 2.Improves image quality by focusing on Signal-to-Noise Ratio, enhancing details in low-light conditions.	1.The Swin Transformer architecture is resource-intensive, requiring substantial computational power. 2.Unsupervised methods can be difficult to train and fine-tune effectively
6	shakil0304003	20-09-2010	Human Emotion Detection From image	Human emotion detection from images involves preprocessing and resizing the image, detecting the face, extracting facial features using a deep learning model, and classifying the detected emotions using a specialized emotion classification model.	1.Detects emotions from images without physical interaction, using only visual data. 2.Capable of providing real-time emotion detection, useful in dynamic applications.	1.Emotion detection accuracy can vary based on image quality, lighting, and facial expressions. 2.Use of images for emotion detection can raise significant privacy and ethical concerns.

BLOCK DIAGRAM



EXISTING SYSTEM

- Utilizes traditional methods like histogram equalization or gamma correction to brighten images, often leading to noise and loss of detail.
- Struggles with accuracy in low-light conditions, as important facial features may be obscured.
- Requires manual tuning of parameters, which can be time-consuming and less effective for real-time applications.
- Often operates as a separate process from emotion detection, leading to less efficient workflows.

PROPOSED SYSTEM

- Employs machine learning or deep learning techniques specifically tailored for emotion detection, enhancing key facial features without introducing noise.
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- Integrates image enhancement with emotion detection in a single pipeline, enabling real-time, end-to-end processing.
- Dynamically adjusts enhancement parameters based on the specific requirements of emotion detection, improving overall accuracy.

PROBLEM STATEMENT

- Emotion detection systems suffer performance drops in low-light conditions due to poor image quality (noise, low contrast, and facial detail loss).
- Current image enhancement techniques are not optimized for emotion detection and provide inadequate results in low-light images.
- Develop a smart image enhancement framework specifically tailored to improve emotion detection in low-light conditions
- Enhance image visibility and preserve crucial facial features critical for accurate emotion recognition
- Ensure high accuracy and reliability of emotion recognition systems across varying lighting conditions.
- Bridge the gap between low-light image quality and the requirements for effective emotion recognition systems.

SOFTWARE USED

- Primary Software for Emotion Detection: DeepFace is the key software library in your code for performing emotion analysis.
- Supporting Libraries: cv2, mediapipe, and numpy are included for potential use in image handling and processing but aren't directly utilized in the shown code.
- VLS CODE

ALGORITHMS:

- Face Detection: MTCNNE motion
- Recognition Model: FER (CNN-based model)
- Classification Method: Softmax classifier to determine the emotion label.

APPLICATIONS

- Human-Computer Interaction (HCI)
- Enhancing user experiences based on emotional feedback.-
- Customer Service
- Analyzing customer satisfaction and reactions in real-time
- Mental Health Monitoring
- Detecting signs of distress or negative emotions.

METHODOLOGY

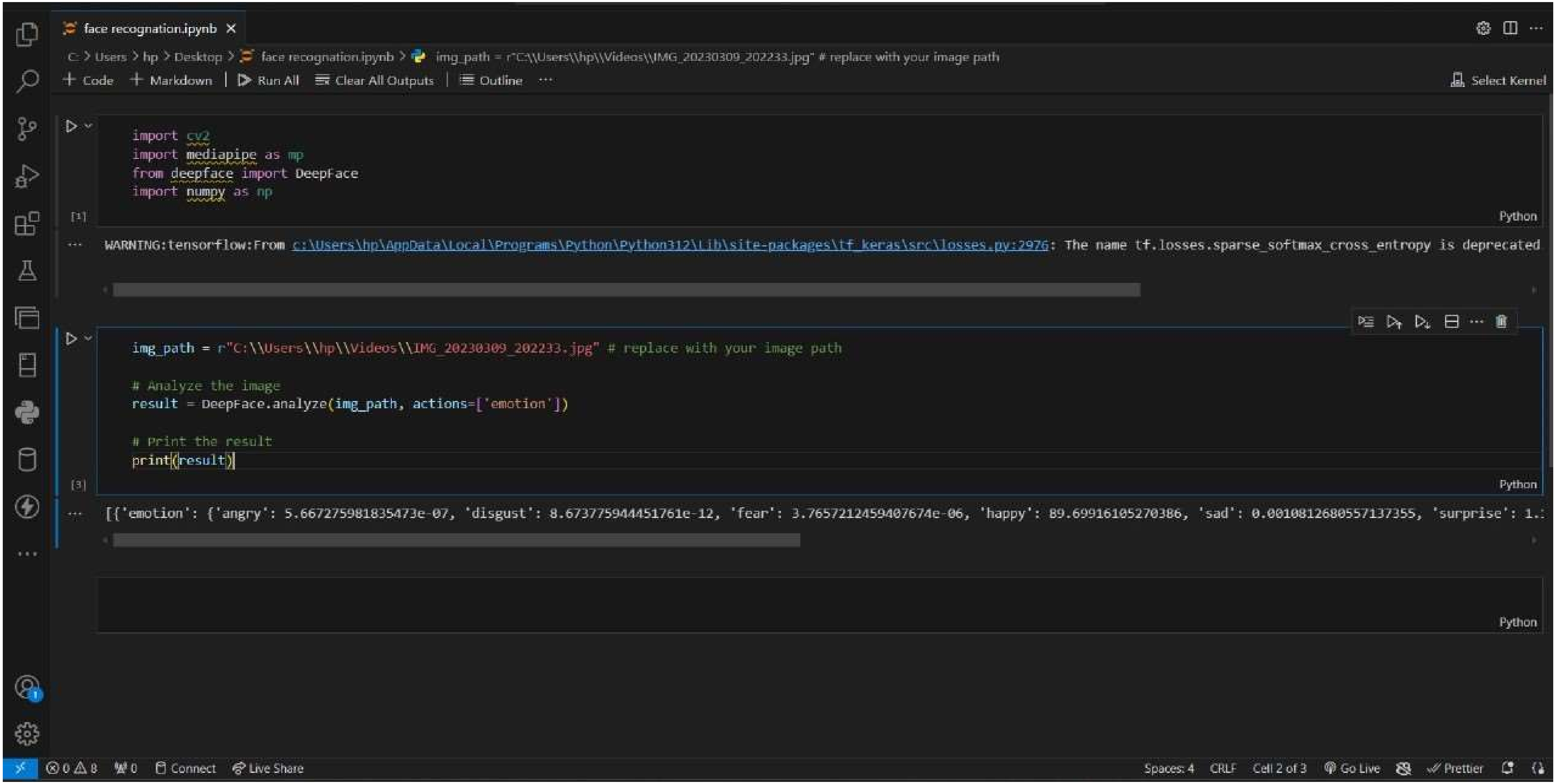
1. Facial Landmark Detection: Detect key facial features to enable accurate expression analysis.

2. Feature Extraction & Emotion Classification: Extract facial features and classify emotions using machine learning.

3. Real-Time Processing: Ensure the system operates in real-time for seamless user interaction.

4. Privacy & Security: Implement measures to safeguard user data and ensure privacy compliance.

- aims to provide accurate and real-time emotion detection.


face recognation.ipynb
C: > Users > hp > Desktop > face recognation.ipynb > img_path = r"C:\\Users\\hp\\Videos\\IMG_20230309_202233.jpg" # replace with your image path
+ Code + Markdown | Run All Clear All Outputs | Outline ...
Select Kernel
import cv2
import mediapipe as mp
from deepface import DeepFace
import numpy as np
[1]
Python
WARNING:tensorflow:From c:\Users\hp\AppData\Local\Programs\Python\Python312\Lib\site-packages\tf_keras\src\losses.py:2976: The name tf.losses.sparse_softmax_cross_entropy is deprecated
img_path = r"C:\\Users\\hp\\Videos\\IMG_20230309_202233.jpg" # replace with your image path
# Analyze the image
result = DeepFace.analyze(img_path, actions=['emotion'])
# Print the result
print(result)
[3]
Python
[{'emotion': {'angry': 5.667275981835473e-07, 'disgust': 8.673775944451761e-12, 'fear': 3.7657212459407674e-06, 'happy': 89.69916105270386, 'sad': 0.0010812680557137355, 'surprise': 1.
Python
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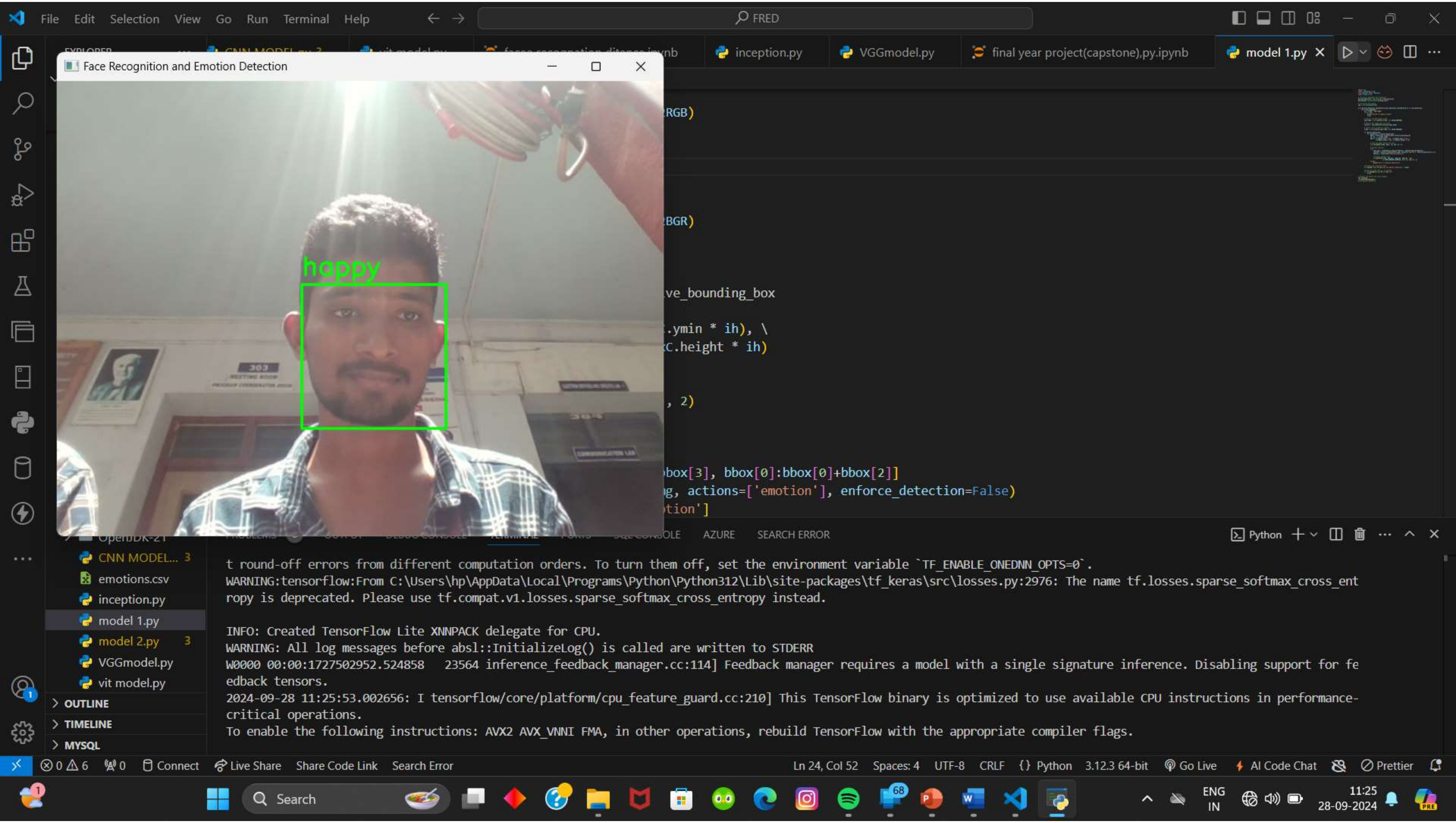
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inception.py
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model 1.py
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happy
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emotions.csv
inception.py
model 1.py
model 2.py 3
VGGmodel.py
vit model.py
OUTLINE
TIMELINE
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SEARCH ERROR
Python
t round-off errors from different computation orders. To turn them off, set the environment variable `TF_ENABLE_ONEDNN_OPTS=0`.
WARNING:tensorflow:From C:\Users\hp\AppData\Local\Programs\Python\Python312\Lib\site-packages\tf_keras\src\losses.py:2976: The name tf.losses.sparse_softmax_cross_entropy is deprecated. Please use tf.compat.v1.losses.sparse_softmax_cross_entropy instead.
INFO: Created TensorFlow Lite XNNPACK delegate for CPU.
WARNING: All log messages before absl::InitializeLog() is called are written to STDERR
W0000 00:00:1727502952.524858 23564 inference_feedback_manager.cc:114] Feedback manager requires a model with a single signature inference. Disabling support for feedback tensors.
2024-09-28 11:25:53.002656: I tensorflow/core/platform/cpu_feature_guard.cc:210] This TensorFlow binary is optimized to use available CPU instructions in performance-critical operations.
To enable the following instructions: AVX2 AVX_VNNI FMA, in other operations, rebuild TensorFlow with the appropriate compiler flags.
Connect
Live Share
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Search Error
Ln 24, Col 52
Spaces: 4
UTF-8
CRLF
Python
3.12.3 64-bit
Go Live
AI Code Chat
Prettier
Search
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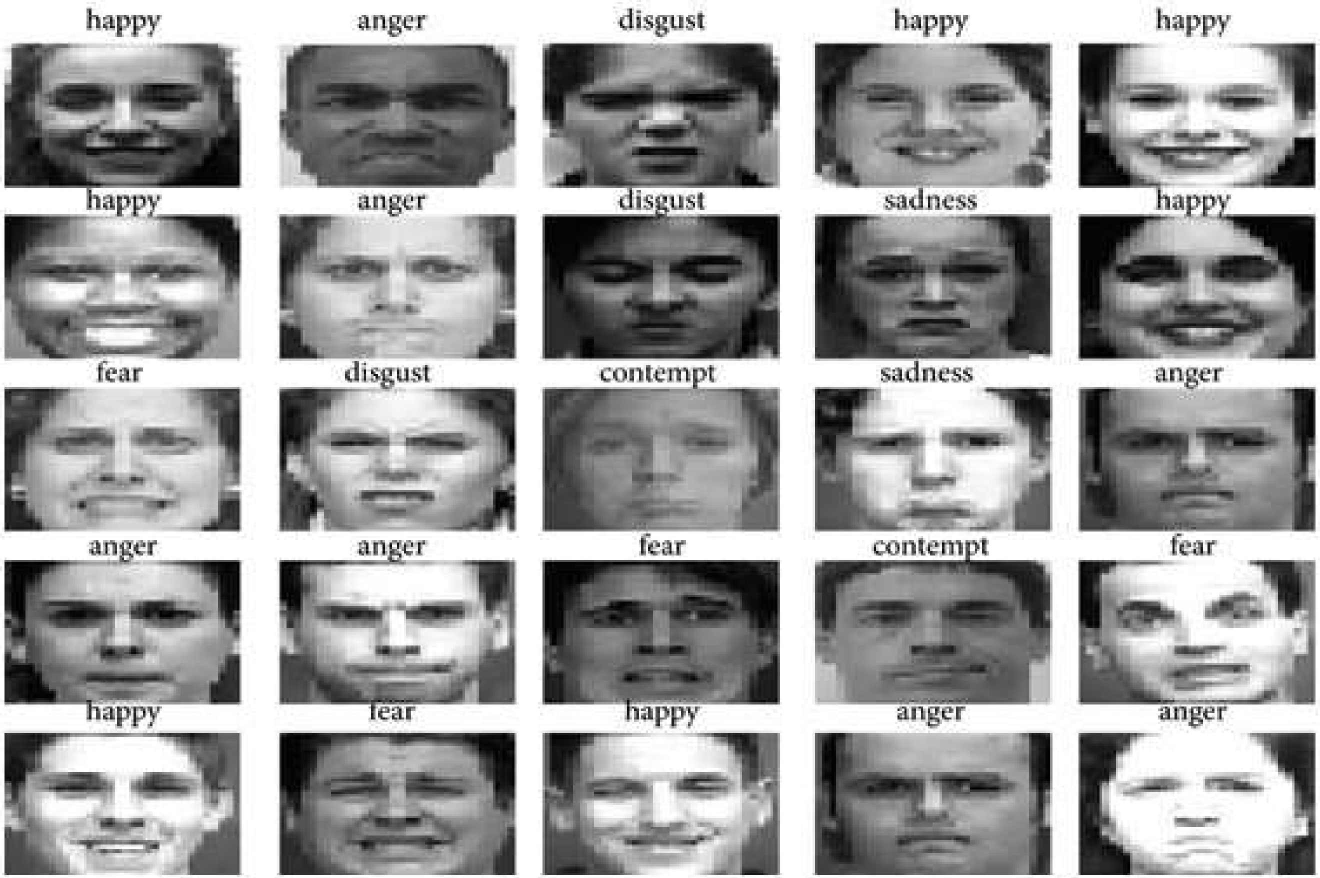
FACIAL EXPRESSIONS



CONCLUSION

This facial expression recognition system that accurately detects emotions like happiness, sadness, and anger. It uses AI and machine learning to analyze facial features and classify emotions. The technology has many potential applications and can be improved further to enhance real-time performance and address individual variations.

”Smart Low-Light Image Enhancement for Emotion Detection" is a project that aims to develop an AI-powered system to enhance low-light images and improve emotion detection accuracy. The system uses advanced image processing techniques to enhance facial features and illumination, allowing for more accurate emotion recognition. By improving image quality, the system enables more reliable emotion detection in various applications, including healthcare, security, and human-computer interaction.

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