Emotion Recognition – Computer Vision Project

Problem Statement

Human emotions are complex and often difficult to interpret automatically. In today's digital world, understanding emotions can help improve user interaction, mental health assessment, and automated systems. The challenge is to detect and classify emotions accurately from human faces in real time, regardless of lighting, pose, or facial variations.

Abstract

Emotion recognition is a computer vision and artificial intelligence technique used to identify human emotions from facial expressions in images or videos. This project aims to design a system that can automatically detect faces and classify their emotional states such as happiness, sadness, anger, surprise, disgust, fear, and neutrality. The proposed system employs Convolutional Neural Networks (CNNs) and transfer learning using pre-trained models like VGG16 or Mobile Net. By processing facial features and analysing expression patterns, the model predicts the corresponding emotion label in real time. Applications include healthcare, e-learning feedback, customer service, and human–computer interaction. The project demonstrates how deep learning enables machines to understand human emotions, bridging the gap between technology and human empathy.

Proposed Solution

The proposed solution uses Python with OpenCV and TensorFlow/Keras to build a deep learning model for emotion detection. The process begins by collecting facial expression datasets such as FER-2013, CK+, or JAFFE. Images are pre-processed (resized, normalized, and augmented) to improve model robustness. A CNN or transfer learning model is trained to classify emotions into predefined categories. Real-time emotion detection is achieved by integrating OpenCV for face detection and feeding cropped faces to the trained network. The model outputs an emotion label, which is displayed on the screen with bounding boxes. Evaluation metrics such as accuracy, confusion matrix, and F1 score are used to validate performance.

Expected Outcome

The system will successfully identify human emotions from facial expressions in static images or live webcam feeds. Each detected face will display an emotion label in real time. The model will achieve high accuracy across different datasets and lighting conditions. This project demonstrates the potential of AI in emotional intelligence, enhancing interaction between humans and machines through adaptive and responsive systems.

GitHub link:- https://github.com/manojmarakala/Emotion-Recognition