Project Report: Emotion Detection Using AI

# Project Title

Emotion Detection Using AI and Deep Learning

# Objective

To develop a real-time system capable of detecting human emotions from facial expressions using a webcam, leveraging deep learning and computer vision techniques.

# Tools & Technologies Used

- Programming Language: Python

- Libraries: TensorFlow, Keras, OpenCV, NumPy

- Pretrained Model: Mini-XCEPTION (trained on FER-2013 dataset)

- IDE/Platform: Anaconda, Jupyter Notebook / Command Line Interface

# Methodology

1. Load a pre-trained Convolutional Neural Network (CNN) model trained on the FER-2013 emotion dataset.

2. Capture video frames in real-time using OpenCV.

3. Detect faces in each frame using Haar cascade classifier.

4. Preprocess the face (resize to 48x48, grayscale normalization).

5. Predict the emotion using the CNN model.

6. Display the result on the video feed with bounding boxes and emotion labels.

# Emotion Categories Detected

- Angry

- Disgusted

- Fearful

- Happy

- Neutral

- Sad

- Surprised

# Applications

- Customer feedback analysis

- Smart surveillance systems

- Mental health monitoring

- Human-computer interaction

- E-learning behavior assessment

# Output Screenshots

(Screenshots showing webcam with detected emotions should be pasted here)

# Conclusion

The project successfully demonstrates how AI and deep learning can be integrated to identify human emotions in real-time. This showcases the power of computer vision and neural networks in creating smart, interactive applications.

# Future Enhancements

- Train a custom model on larger and more diverse datasets.

- Improve accuracy by using advanced face detection (e.g., MTCNN or Dlib).

- Add voice sentiment analysis for multimodal emotion recognition.

- Deploy the application as a web or mobile app.

# Team / Developer

Digvijoy Ranjan

B.Tech in Computer Science and Engineering

# Screenshots and Demo Video (optional)

Add real-time working demo screenshots or video links here.