Real-Time Emotion Detection Using Deep Learning

Introduction & Objective

Real-time facial emotion detection via webcam

This project focuses on developing a system capable of identifying human emotions from facial expressions in real time using a webcam.

Applications in e-learning, healthcare, virtual assistants

The technology has diverse applications, enhancing user experience and providing valuable insights in various fields.

🎯 Objectives:

- Classify emotions from facial expressions
- Deliver real-time visual feedback
- Hands-on deployment experience using DL models

Tools & Technologies

Languages & IDEs

Python, VS Code

Libraries

OpenCV, TensorFlow, Keras, NumPy

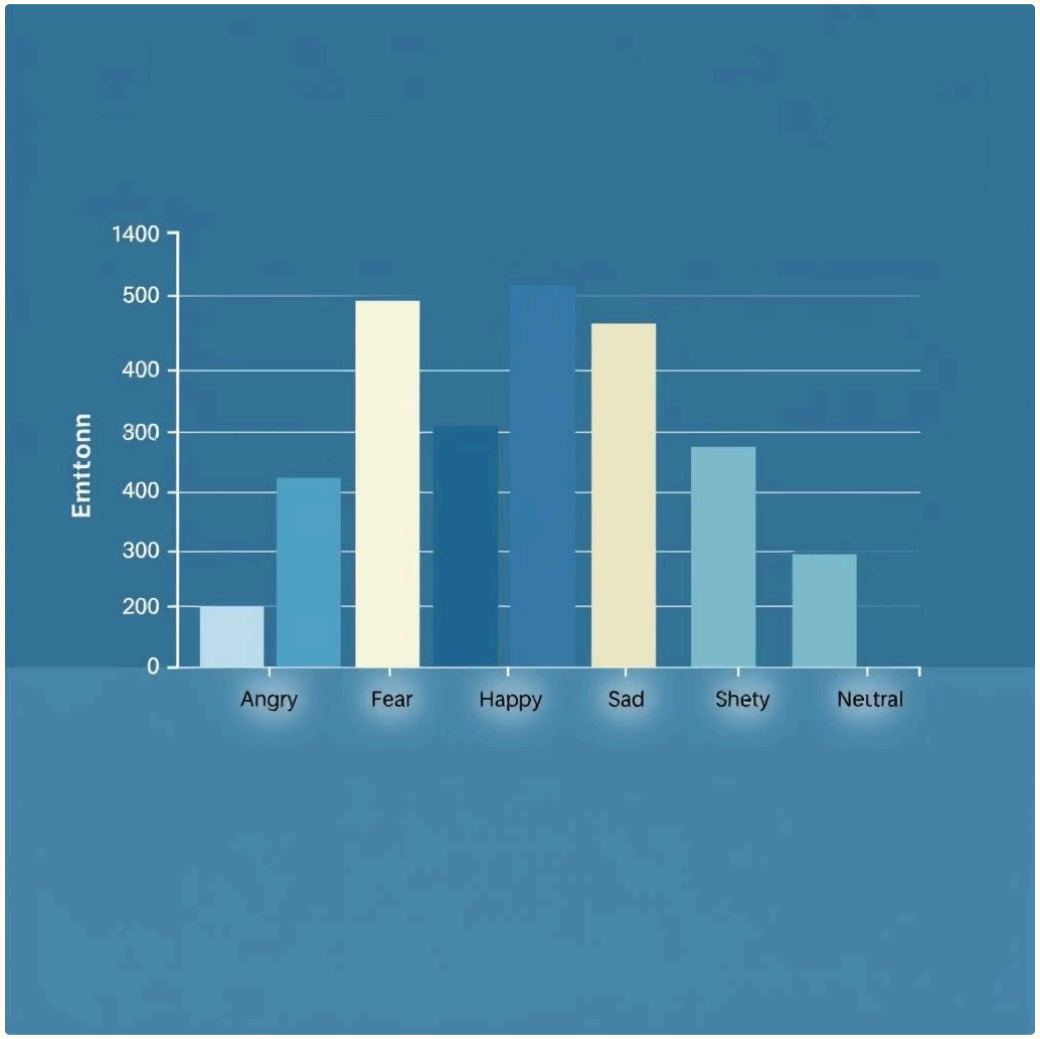
Detection

Haar Cascade Classifier

Model

Pre-trained CNN (.h5 format)

Dataset Used



📊 FER-2013 Dataset (Kaggle)

- ~35,000 grayscale images (48x48)
- Emotion Classes: Angry, Disgust, Fear, Happy, Sad, Surprise, Neutral
- Preprocessing: Normalization, resizing

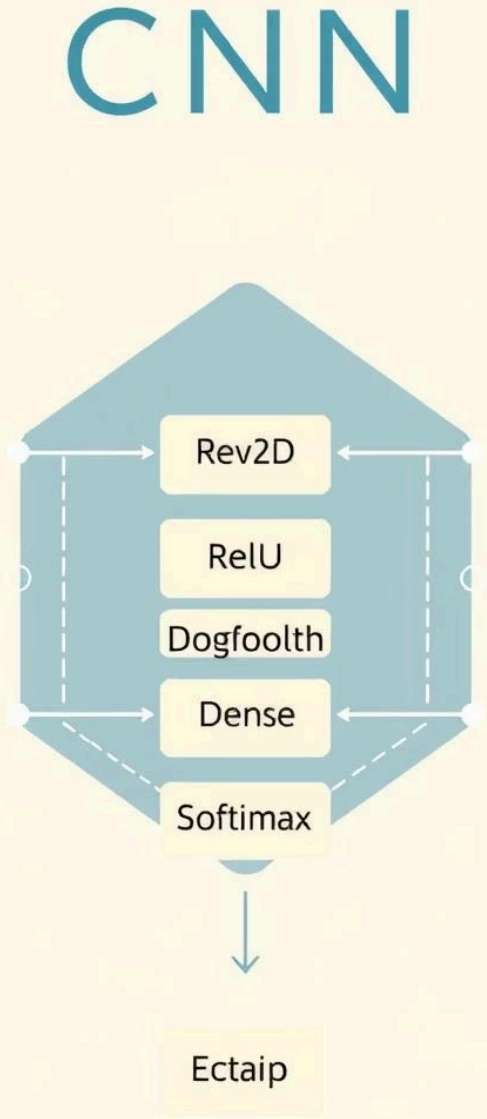
Model Architecture

🔸 CNN Layers:

- Conv2D → ReLU → MaxPooling → Dropout
- Fully connected Dense layers
- Softmax output (7 emotions)

🧪 Loss: Categorical Crossentropy

⚙️ Optimizer: Adam



Workflow

Capture webcam feed

Detect face (Haar Cascade)

Preprocess: grayscale, resize 48x48

Predict using CNN

Display emotion with bounding box on live feed

Implementation Demo

🖥️ Live Preview:

- Real-time face detection
- Labelled emotion (e.g., "Happy")
- Console Output: Prediction Array

📌 Example:

Prediction: [0.02, 0.03, 0.00, 0.90, 0.01, 0.02, 0.02]

Result: Happy 😄

Challenges & Solutions

🚧 Issues Faced:

- Missing/corrupt model file
- Poor lighting affected face detection
- Accuracy imbalance due to dataset

🛠️ Fixes:

- Re-downloaded model
- Tuned Haar parameters
- Considered data augmentation

Results & Future Scope

✅ Results:

65-70%

Accuracy

(FER-2013)

~10

Real-time speed

FPS

🚀 Future Enhancements:

- Use LSTM for time-based emotion shift
- Web app deployment via Flask/Streamlit
- Group emotion detection & chatbot integration

Thank You 🙏

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