Emotion Recognition using Deep Learning

Web Application Development
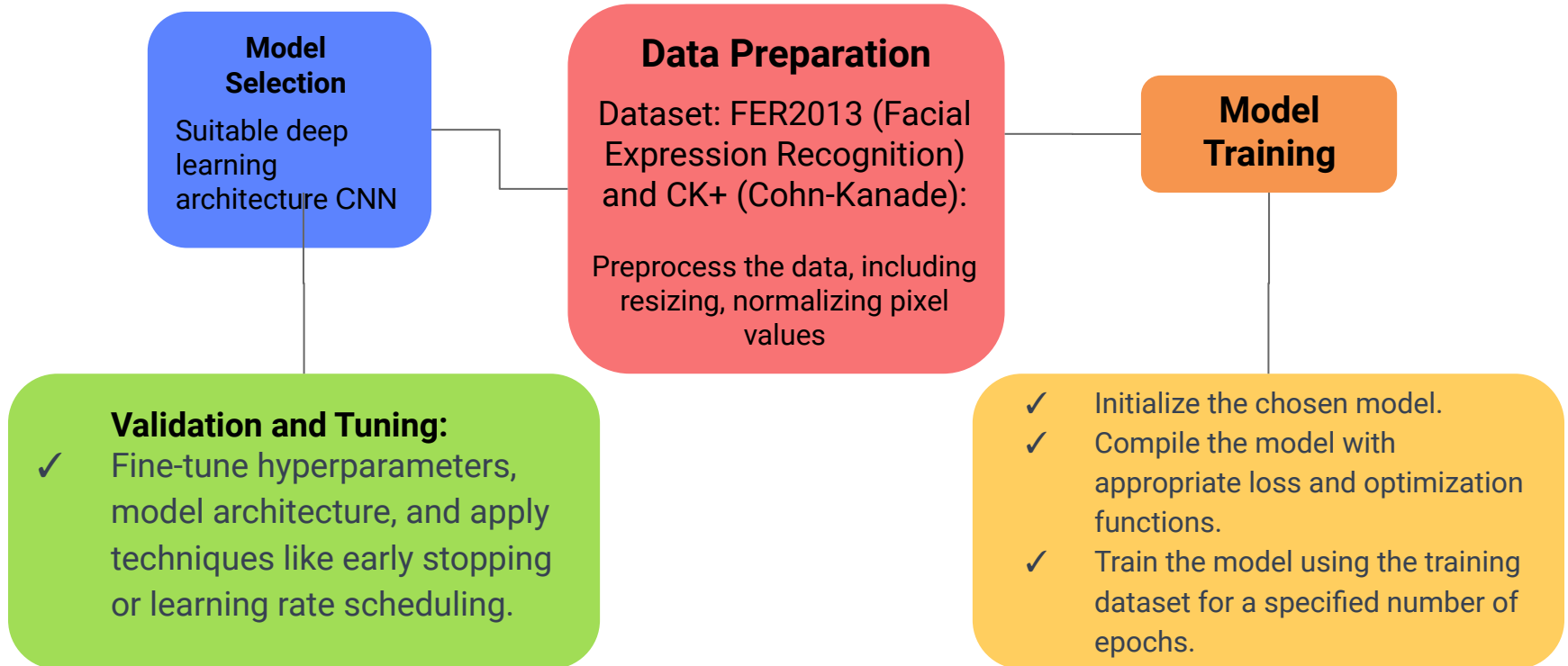
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The Datasets:

FER2013 (Facial Expression Recognition 2013):
- FER2013 is one of the most widely used datasets for emotion recognition. It contains over 35,000 grayscale images of faces categorized into seven different emotions: anger, disgust, fear, happiness, sadness, surprise, and neutral.
- This dataset is a good starting point for research and experimentation due to its size and availability.

CK+ (Cohn-Kanade):
- CK+ is a dataset specifically designed for facial expression analysis. It includes over 500 image sequences of subjects displaying various facial expressions. It's often used for more detailed studies.
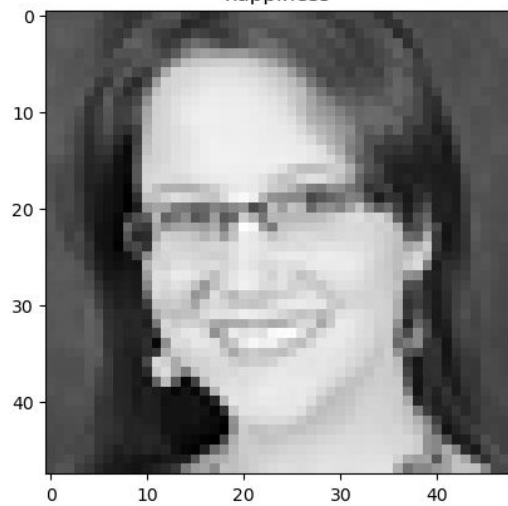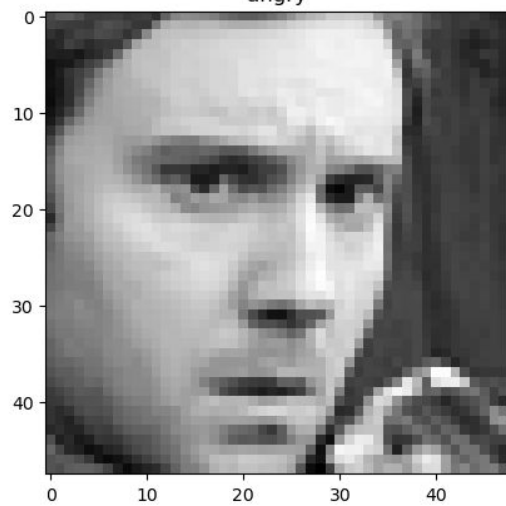
The Process:

Model Selection

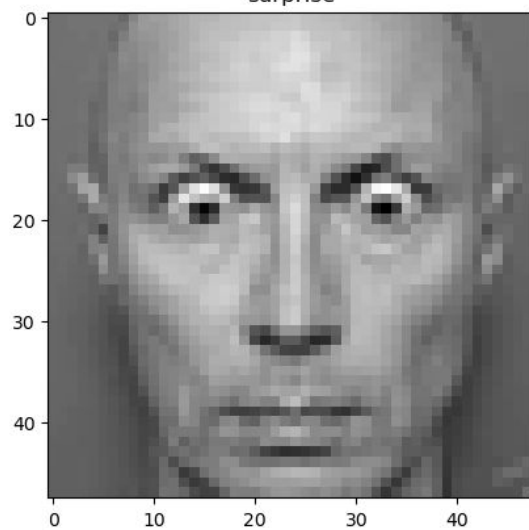Suitable deep learning architecture CNN

Data Preparation

Dataset: FER2013 (Facial Expression Recognition) and CK+ (Cohn-Kanade):

Preprocess the data, including resizing, normalizing pixel values

Model Training

Validation and Tuning:
✓ Fine-tune hyperparameters, model architecture, and apply techniques like early stopping or learning rate scheduling.

✓ Initialize the chosen model.
✓ Compile the model with appropriate loss and optimization functions.
✓ Train the model using the training dataset for a specified number of epochs.

A PICTURE IS WORTH A THOUSAND WORDS

Emotional Breakdown

Anger | 01

Surprise | 02

Disgust | 03

Emotions

Sadness | 04

Happy | 05
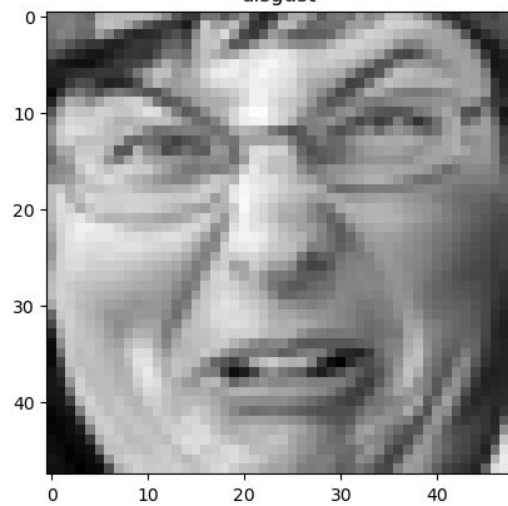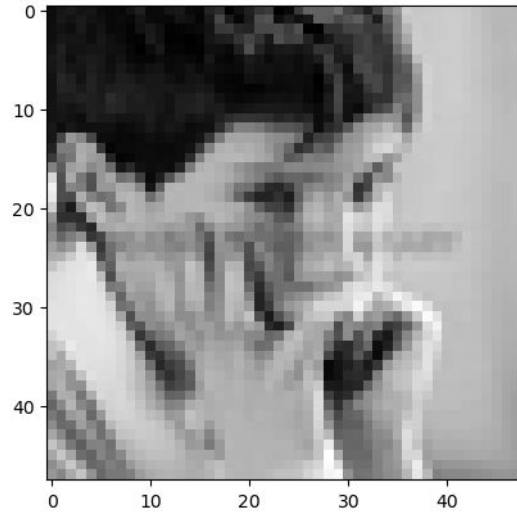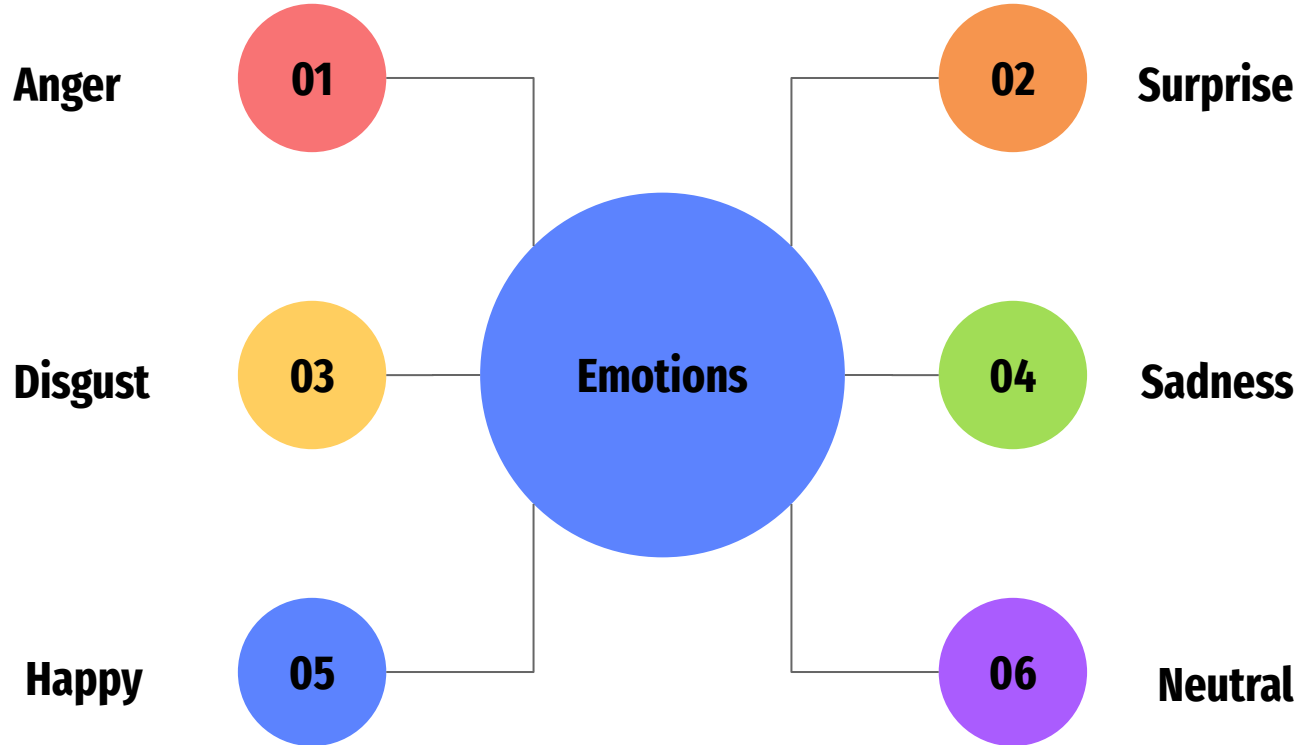
Neutral | 06
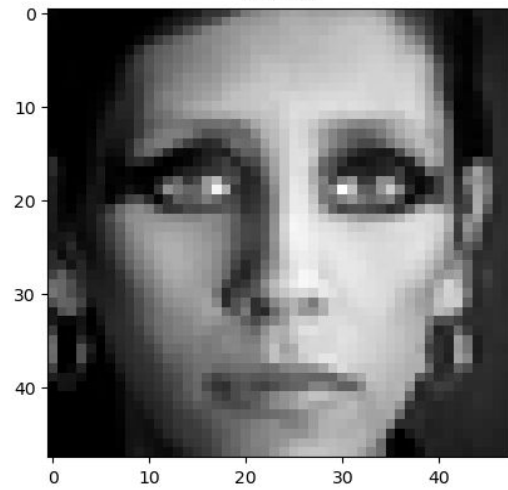
Emotional Intelligence Infographics

58 %

FER2013 dataset

With Convolutional layers: Flatten, Dense etc.

84 %

CK+ dataset

layers.Conv2D MaxPooling2D Flatten, Dense

55 %

FER2013 dataset

val_accuracy: 0.5341

Algorithm: **CK+ dataset, CNN, optimizer='adam', activation='softmax'**

Quick Dive Into Metrics	
Loss (Training vs. Validation):	• Training Loss: 0.5304 • Validation Loss: 0.5220
Accuracy (Training vs. Validation):	• Training Accuracy: 0.8418 (84.18%) • Validation Accuracy: 0.8311 (83.11%)
Overall Analysis	• The model's performance appears to be quite good. • It has learned from the training data and is generalizing well to the validation data. • The small difference between training and validation metrics indicates that the model is not suffering from significant overfitting or underfitting.

Demonstration

Emotion Scores:

angry: 0.005386296194046736

disgust: 0.013322117738425732

fear: 0.11439087241888046

happy: 0.258876234292984

sad: 0.010991943068802357

surprise: 0.15653066337108612
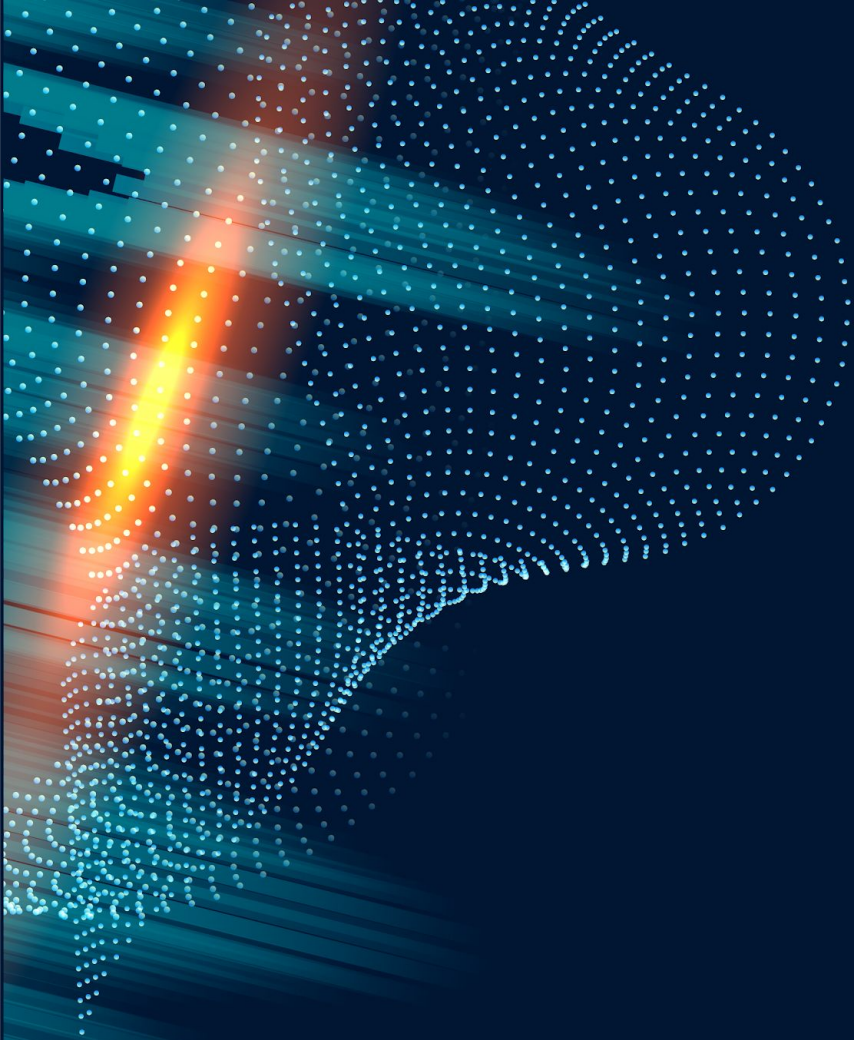
neutral: 0.35665422677993774

dominant emotion: It Depends

Real World Application!

1. **Virtual Meetings**:
   a. **Emotion Analysis in Virtual Meetings**: During virtual meetings, the program can help analyze participants' emotions in real-time. This information can be valuable for gauging engagement and adjusting the meeting's content accordingly.
   b. **Face Detection for Participant Highlighting**: You can use face detection to highlight the active speaker's face or participants' faces, improving the visual experience for attendees.
2. **Education**:
   a. **Student Engagement**: In online education, gauge students' engagement and understanding by analyzing their facial expressions.
   b. **Attention Tracking**: Monitor student attentiveness during virtual classes or lectures.
3. **Healthcare**:
   a. **Remote Patient Monitoring**: In telehealth, analyze patients' emotions and vital signs for remote diagnosis and treatment
4. **Market Research**:
   a. **Consumer Sentiment Analysis**: Analyze facial expressions in focus groups or product testing to gauge consumer sentiment toward products or advertisements.
5. **Gaming**:
   - **Game Interaction**: Create games that adapt based on the player's emotions, making the gaming experience more immersive

Pie Chart

THANK YOU!