Here is a presentation outline based on my report and code for the **FER-2013 (Facial Expression Recognition)** project:

**Slide 1: Project Title**

**FER-2013: Facial Expression Recognition**  
**Name**: Kumail Abbas  
**Roll Number**: GLT-DSAI-048  
**Module**: Computer Vision

**Slide 2: Project Overview**

* **Objective**: Build a Convolutional Neural Network (CNN) to classify human emotions from grayscale facial images.
* **Classes**: Angry, Disgust, Fear, Happy, Sad, Surprise, Neutral
* **Key Metrics**: Accuracy, Precision, Recall, F1-Score

**Slide 3: Problem Statement & Importance**

* **Problem**: Accurate emotion recognition from facial expressions is crucial for improving AI-human interaction.
* **Importance**: Applications in healthcare, education, surveillance, and entertainment.
* AI systems can adapt based on detected emotions, offering more intuitive and empathetic user experiences.

**Slide 4: Dataset & Preprocessing**

* **Dataset**: FER-2013, Grayscale images (48x48 pixels) categorized into 7 emotions.
* **Data Augmentation**: Techniques like rotation, zoom, and flipping were applied to improve generalization.
* **Preprocessing**: Rescaled pixel values to [0, 1] range.

**Slide 5: Model Architecture**

* **CNN Layers**:
  + Conv Layers: Extract image features
  + MaxPooling: Dimensionality reduction
  + Dropout: Reduce overfitting
  + Dense Layer: Classifies emotions into 7 categories.
* **Final Layer**: Softmax activation function for multi-class classification.

**Slide 6: Training Setup**

* **Optimizer**: Adam (Learning rate: 0.0001)
* **Loss Function**: Categorical Cross-Entropy
* **Batch Size**: 64
* **Epochs**: 20
* **Train/Validation Split**: Split dataset for model training and testing.

**Slide 7: Performance Metrics**

* **Evaluation Metrics**:
  + Accuracy, Precision, Recall, F1-Score.
* **Confusion Matrix**: Show misclassified emotions like "disgust" often being confused with "fear" or "sadness".

**Slide 8: Accuracy & Loss Graphs**

* **Training Accuracy**: Trend analysis across 20 epochs.
* **Validation Accuracy**: Used to detect overfitting.
* **Loss Analysis**: Tracked training and validation loss to ensure model convergence.  
  (Insert plotted graphs)

**Slide 9: Model Testing**

* **Custom Image Testing**:
  + A custom image was captured via webcam, cropped using OpenCV, and fed to the trained model.
  + **Result**: Emotion was successfully predicted, with visualization via bar chart.

**Slide 10: Results & Challenges**

* **Test Accuracy**: XX% (Model's final performance on test set).
* **Challenges**:
  + Ambiguity in similar expressions like "Fear" and "Disgust".
  + Imbalance in dataset leading to potential bias.

**Slide 11: Conclusion & Future Work**

* **Key Takeaways**:
  + CNNs are effective but have limitations with subtle expressions.
  + Data augmentation and dropout help improve generalization.
* **Future Directions**:
  + More balanced data collection.
  + Advanced architectures like ResNet.
  + Real-time emotion detection in video.

**Slide 12: Code & Links**

* **Code Repository**:
  + GitHub: https://github.com/KumailAbbas1/Computer-Vision-Module
  + Colab: https://colab.research.google.com/drive/1g0QFsjDJs2qXF1BJXR81F6JatoOQA4Mh?usp=sharing