Title : *Facial Emotion Detection using Neural Networks*

Objectives:

1. Develop a neural network model for accurate recognition of diverse facial expressions and emotions.
2. Create a personalised emotion analysis component that tailors insights based on individual emotional patterns.
3. Design an intuitive user interface for clear emotional insights interpretation.
4. Elevate user experience by enriching human-computer interactions with emotional insights.

Technology Stack:

1. **Python**: Programming language
2. **TensorFlow**: open-source deep learning framework that provides tools for building and training neural networks.
3. **Keras**: Keras is an API that runs on top of TensorFlow (or other backends) and simplifies the process of building, training, and evaluating neural networks.
4. **OpenCV (Open Source Computer Vision Library)**: OpenCV provides functions for capturing and manipulating image and video data, essential for real-time emotion analysis.
5. **NumPy**: for handling image data and performing mathematical computations in the facial emotion detection process.
6. **Pandas**: used when managing datasets, performing data preprocessing, and organising the output of the emotion detection system.
7. **Neural Network Architectures :**
- **Convolutional Neural Networks (CNNs) :** for image analysis tasks and to capture spatial patterns and features that are essential for recognising emotions from facial images) and
- **Long Short-Term Memory (LSTM) Networks :** The output features from the CNN are then passed on to the LSTM network, which will handle the temporal aspects and capture the evolving patterns of emotions over time in the video sequences.

By combining CNNs and LSTMs, the project aims to create a holistic model that understands both static and dynamic aspects of facial emotion expressions, resulting in more accurate and nuanced emotion detection.

Scope of project implementation:

1. **Human-Robot Interaction:** Robots equipped with emotion detection capabilities understand and respond to human emotions, fostering natural and empathetic interactions in fields like customer service and elderly care.
2. **Emotion-Adaptive AI Assistants:** Integrating our emotion detection system into AI-powered assistants like Siri or Google Assistant leads to emotionally intelligent interactions.
3. **Personalised Entertainment:** Streaming platforms use emotion analysis to recommend content based on users' current emotional states, providing a more personalised and engaging entertainment experience.