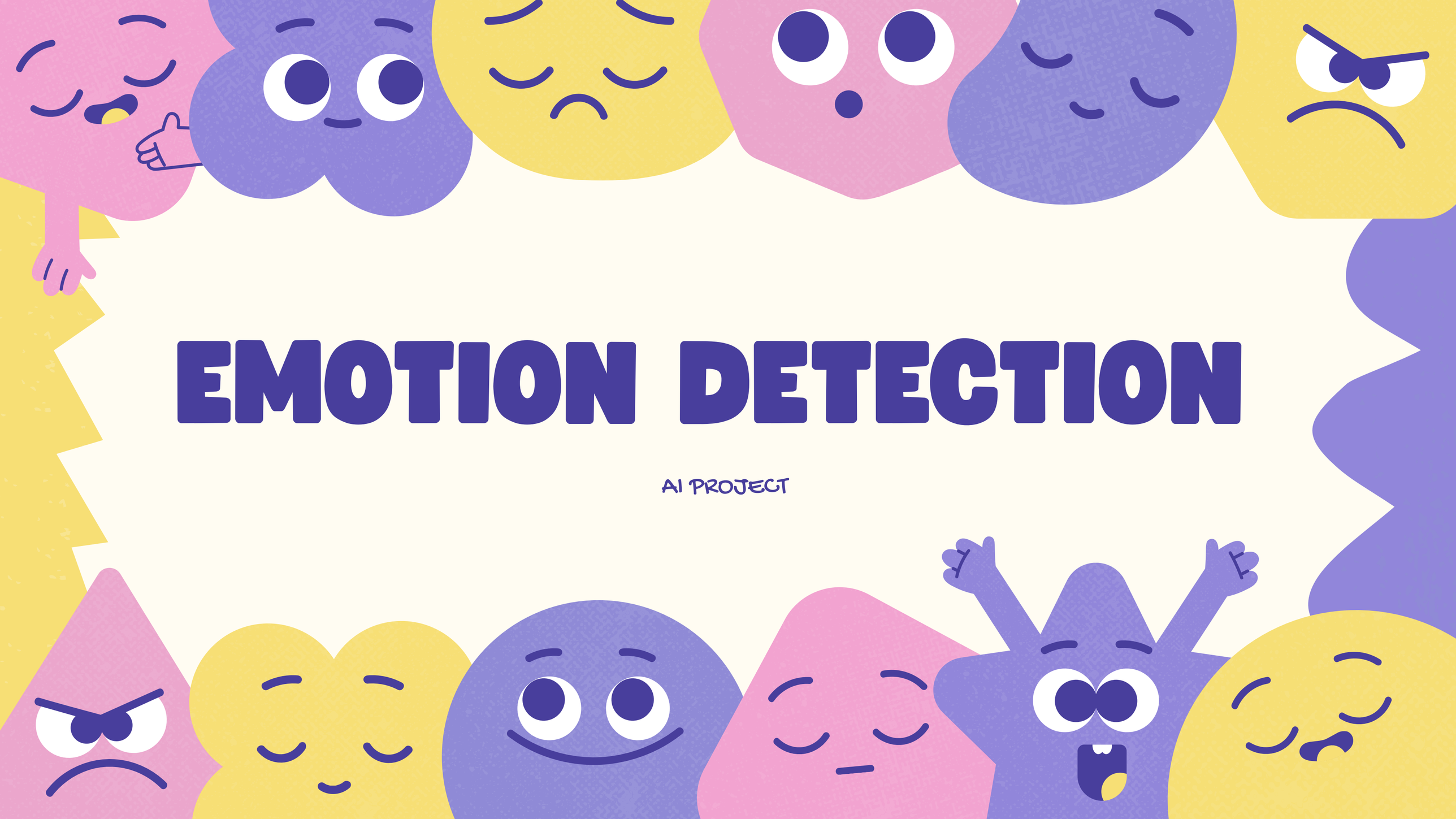

EMOTION DETECTION

AI PROJECT

SUMMARY

This project focuses on an image-based Emotion Detection AI system that predicts human emotions from a single input image. The user uploads or provides a facial image, and the system classifies the emotion expressed in that image. The project applies Convolutional Neural Networks (CNNs) to analyze facial features and identify emotions such as Happy, Sad, Angry, Fear, Surprise.

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PROBLEM STATEMENT

- Real-world Problem: Recognizing human emotions (happy, sad, angry, fear, etc.)automatically from facial images.
- It can be used in mental health analysis, human–computer interaction, and
- emotion-aware applications.
- Demonstrates the power of computer vision and deep learning.
- Many existing systems require controlled environments or perform poorly under varying lighting, facial angles, and background conditions.

OBJECTIVES

FIRST

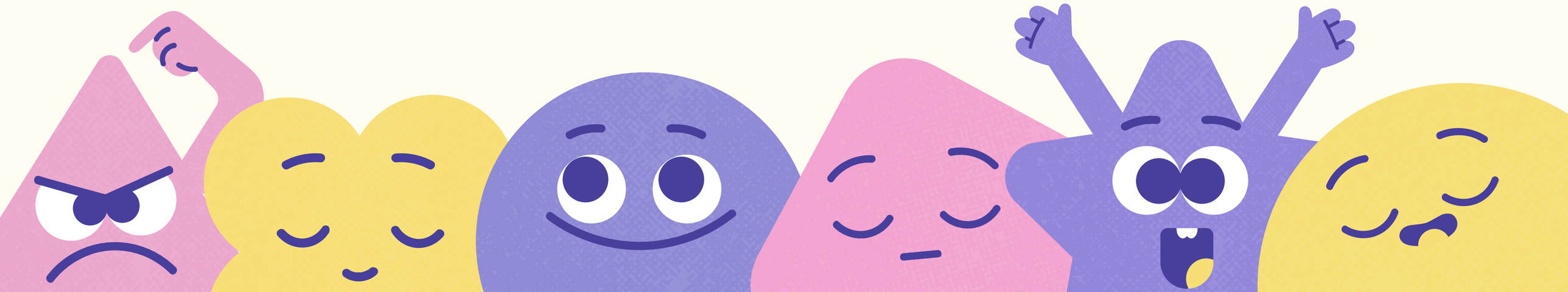
- To develop an AI model that detects emotions from single facial images

SECOND

- To design and train a CNN-based emotion classification model

THIRD

- To apply image preprocessing techniques for improved prediction accuracy

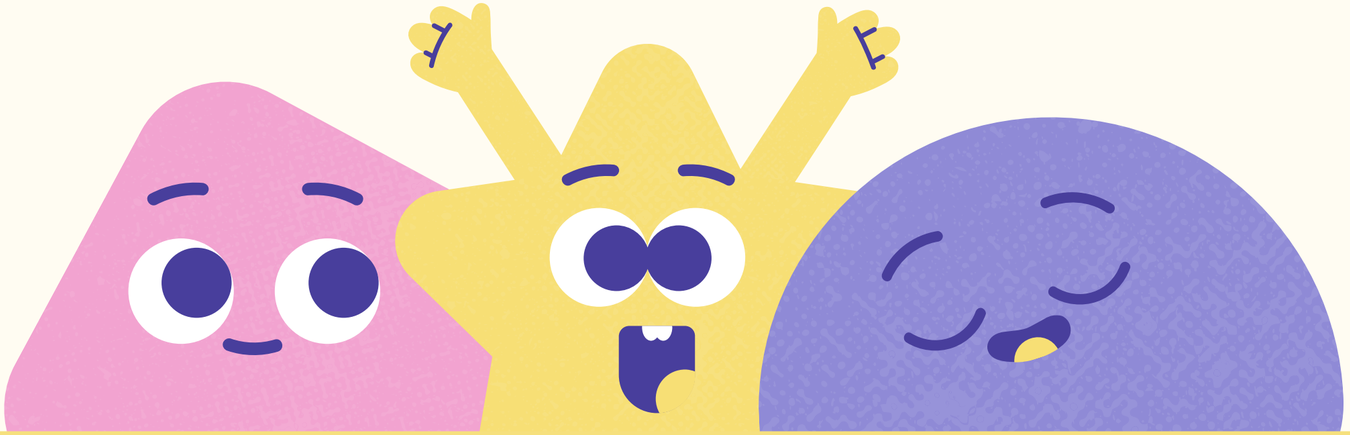


DATA OVERVIEW

- Data Type: Static facial images
- Emotion Classes: Happy, Sad, Angry, Fear, Surprise, Disgust, Neutral.
- Image Format: JPG / PNG
- Image Mode: Grayscale or RGB
- Dataset Source: Kaggle Emotion Dataset
- Dataset Size: Approximately 20,000–35,000 images
- Use Case: Single image input for emotion classification

DATA PREPROCESSING

- Conversion of images to grayscale to reduce computation
- Resizing images to a fixed size (e.g., 48×48 or 224×224 pixels)
- Normalization of pixel values to the range [0, 1]
- Data augmentation (rotation, flipping) applied only to training images
- Dataset split:
- Training: 80%
- Validation/Test: 20%



MODEL SELECTION

- Model Type: Convolutional Neural Network (CNN)
- Architecture:
- Convolutional layers for feature extraction
- MaxPooling layers for dimensionality reduction
- Dropout layers to prevent overfitting
- Fully connected Dense layers
- Softmax output layer for emotion classification
- Activation Functions: ReLU and Softmax

TRAINING PROCESS

- Loss Function: Categorical Cross-Entropy
- Optimizer: Adam
- Batch Size: 32
- Epochs: 20–30
- Platform: Python with TensorFlow/Keras
- Environment: Google collab
- The model is trained on labeled facial images and validated on unseen static images.

EVALUATION

- Metrics Used:
  - Accuracy
  - Loss
  - Confusion Matrix
- Model performance evaluated using static test images only
- Class-wise emotion prediction accuracy analyzed

RESULTS

- Training Accuracy: ~94–96%
- Validation Accuracy: ~88–91%
- High accuracy for emotions like Happy and Surprise
- Moderate confusion between similar expressions such as Fear and Surprise
- The system successfully detects emotions from user-provided images

LIMITATIONS

- Performance depends on image quality and lighting
- Difficulty detecting emotions from partially visible faces
- No real-time or video-based emotion detection
- Limited ability to handle extreme facial expressions
- Dataset bias may affect accuracy for diverse facial features

FUTURE SCOPE

- Improve accuracy using advanced CNN architectures
- Expand dataset for better generalization
- Deploy as a web or mobile application for image upload-based emotion detection
- Combine emotion detection with sentiment analysis for enhanced insights


THANK YOU
SO MUCH