

EMOCNN: Real-Time Facial Emotions Recognition Using CNN

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Outline

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Problem Statement

- The problem at hand is to design and implement a system that can effectively analyse facial expressions in real-time using the CNN model.
- The CNN model is known for its superior performance in image classification tasks and has shown promising results in various computer vision applications.
- However, adapting it to real-time facial expression recognition presents unique challenges such as handling varying lighting conditions, occlusions, and pose variations.
- The task should be capable of accurately recognizing a range of facial expressions, including happiness, sadness, anger, surprise, disgust, fear, and neutral expressions.

Data-Set Details

- One of the most popular FER datasets, FER2013, has 35,887 grayscale, 48×48 pixel photographs of faces.
- The collection includes pictures of the faces of seven emotions—anger, disgust, fear, happiness, neutrality, sadness, and surprise—that were photographed in various lighting, positions, and settings.
- The dataset's images are already divided into three sets, with 28,709 being used for training, 3589 for validation, and the remaining 3589 for testing.



Proposed Methodology

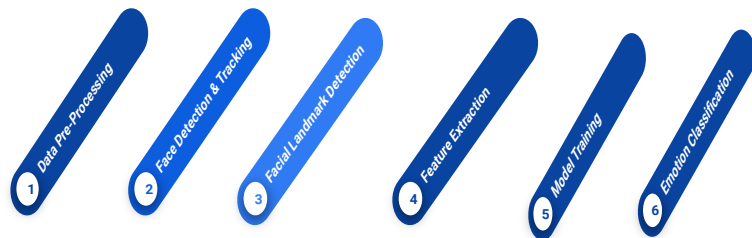
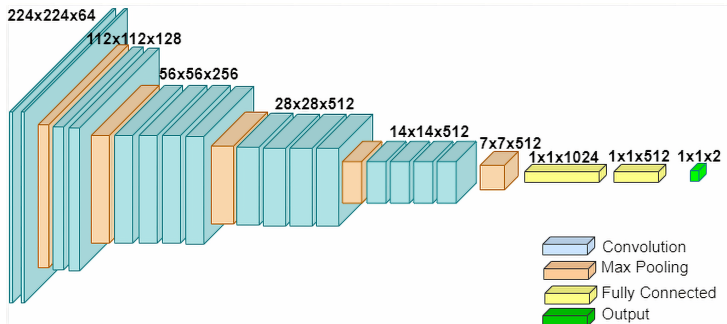
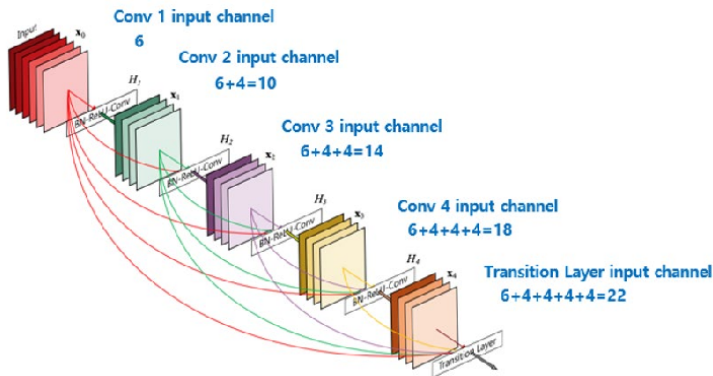


Figure: Proposed methodology Pipeline

Proposed Methodology-1: VGG

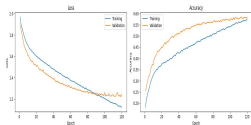


Proposed Methodology-2: DenseNet

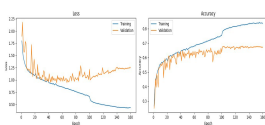


Results

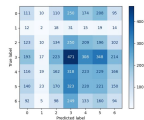
(a) VGG16



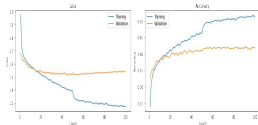
(b) VGG19



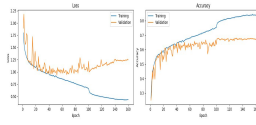
(e) Confusion Matrix of Best Model



(c) DenseNet



(d) Xception



(f) Demo Screenshot

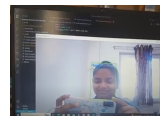


Figure: The accuracy-Loss Curve of all CNN Models and other results

Comparison with baseline paper

Result comparison with baseline paper based on testing Accuracy

CNN Model	Baseline Paper	Our Results
VGG16	57%	58.23%
VGG19	59.32%	59.65%
DenseNet	57.48%	67.25%
Xception	67%	67.61%

Conclusion

- In conclusion, facial expression recognition is a challenging task with significant applications in various domains such as human-computer interaction, emotion analysis, and virtual reality. The proposed method for real-time facial expression recognition using the Xception model has shown promising results in accurately and efficiently recognizing facial expressions.
- By leveraging the power of the Xception model, which is known for its strong performance in image classification tasks, the system effectively extracts deep features from preprocessed facial images. The system incorporates face detection and tracking algorithms, facial landmark detection, and fine-tuned training on labeled dataset to achieve robust and accurate facial expression recognition.

Thank You...