

Chapter 18

Facial Gesture Recognition for Emotion Detection: A Review of Methods and Advancements

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ABSTRACT

Facial gesture recognition (FGR) is widely regarded as an effective means of displaying and communicating human emotions. This chapter provides a comprehensive review of FGR as a biometric marker technology for detecting facial emotions, encompassing the identification of the six basic facial expressions: happiness, sadness, anger, surprise, fear, and disgust. FGR utilizes advanced algorithms to accurately identify and classify facial emotional states from images, audio, or video captured through various devices such as cameras, laptops, mobile phones, or digital signage systems. Given the importance of accuracy, computational efficiency, and mitigating overfitting, this review also discusses the diverse range of methods and models developed in facial expression recognition research. These advancements aim to enhance the accuracy of the models while minimizing computational resource requirements and addressing overfitting challenges encountered in previous studies.

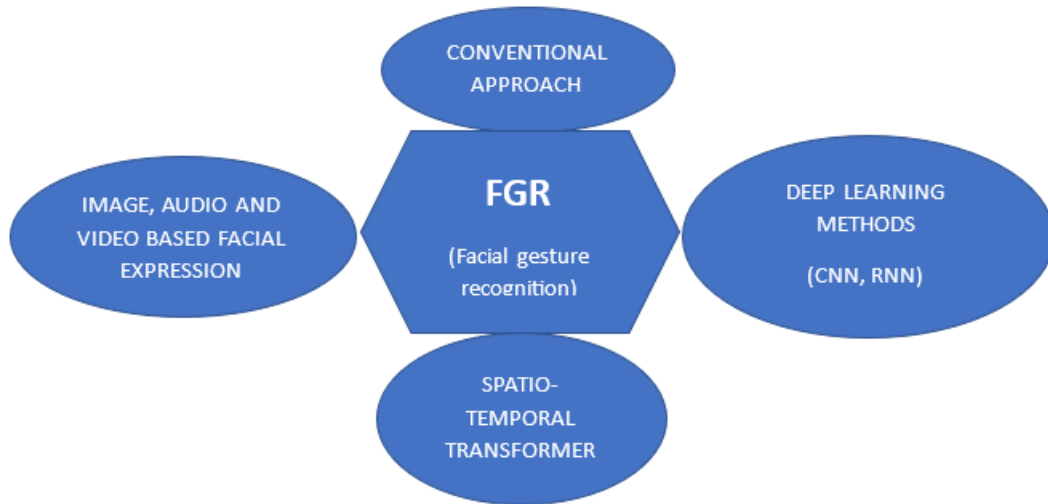
INTRODUCTION

FGR is a biometric marker technology that detects human facial emotions. This technology includes a sentiment analysis tool and can identify the 6 basic facial expressions i.e., happiness, sadness, anger, surprise, fear, and disgust. FGR uses an algorithm to identify facial emotional states. This technique

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Facial Gesture Recognition for Emotion Detection

Figure 1. Different methods/techniques and sources to detect facial expression



analyzes faces in images, audio, or video caught through cameras, laptops, mobile phones, or digital signage systems. Facial analysis through computer cameras includes three steps i.e., Face identification, Facial landmark detection, Facial expression, and emotion classification.

Background and Motivation

Facial gesture recognition (FGR) has gained significant attention in recent years due to its potential in understanding and analyzing human emotions. The face is a powerful means of nonverbal communication, and facial gestures serve as a crucial channel through which humans convey their emotional states. As such, developing robust technologies for recognizing and interpreting facial expressions has become a subject of extensive research.

The motivation behind studying facial gesture recognition lies in its wide-ranging applications and implications across various fields. Understanding human emotions is essential in domains such as psychology, social sciences, human-computer interaction, and affective computing. Emotion detection through facial gestures can facilitate more effective communication, improve user experience, and enable advanced human-centered technologies.

Moreover, facial gesture recognition has the potential to revolutionize areas like healthcare, where it can assist in pain assessment, mental health diagnosis, and monitoring patients with neurological disorders. Additionally, in the entertainment and gaming industries, FGR can enhance virtual reality experiences by allowing systems to respond dynamically to users' emotional states.

The development of accurate and efficient facial gesture recognition methods is also driven by the need for improved human-computer interaction. By enabling machines to understand and respond to human emotions, it is possible to create more intuitive and empathetic interfaces. This can enhance user satisfaction, engagement, and overall system performance.

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