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Facial Expression Recognition Using Enhanced Convolution Neural Network with Attention Mechanism

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Abstract: Facial Expression Recognition (FER) has been an interesting area of research in places where there is human-computer interaction. Human psychology, emotions and behaviors can be analyzed in FER. Classifiers used in FER have been perfect on normal faces but have been found to be constrained in occluded faces. Recently, Deep Learning Techniques (DLT) have gained popularity in applications of real-world problems including recognition of human emotions. The human face reflects emotional states and human intentions. An expression is the most natural and powerful way of communicating non-verbally. Systems which form communications between the two are termed Human Machine Interaction (HMI) systems. FER can improve HMI systems as human expressions convey useful information to an observer. This paper proposes a FER scheme called EECNN (Enhanced Convolution Neural Network with Attention mechanism) to recognize seven types of human emotions with satisfying results in its experiments. Proposed EECNN achieved 89.8% accuracy in classifying the images.

Keywords: Facial expression recognition; linear discriminant analysis; animal migration optimization; regions of interest; enhanced convolution neural network with attention mechanism

1 Introduction

Human expressions are one of the most effective forms of communications between humans. An expression can provide information on the internal emotional state of a human being. Expressions can flow from a speaker to a listener in a conversation and vice versa. In case of automatic recognitions, an expression can be treated as a deformation of the human face or changes in facial pigmentations [1]. A facial expression transfers around 55% of the intent in a communication which is more than what voice and language can convey together [2]. Researchers have been analyzing emotions, behavior and psychology of humans using FER which has generated significant interest in the areas of HCI, mental health assessments [3] and intelligent transport systems [4]. Moreover, Multimedia gadgets based on FER