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Topic

Estimation of human emotion by analyzing facial expression transition of image sequences

Abstract

Face is a medium to deliver our emotional message to those around us, and we can read it in the otherwise. It is the first engaged area and the most readable area in non-verbal communication. In addition, face has a greatly influence in our way of interacting with others. Generally, there is a particular set of facial muscles that usually appears under the same emotional context. For example, a person reveals a smile in the happiness moment, or shows a sign of distress by wrinkles around forehead and eyebrows. In computer vision aspect, facial expression analysis is basically a supervised learning by classification or regression trained from labelled data. Many previous methods share a common flaw by assuming that facial expression feature can be modeled from a single image of the most intense part of facial expression. Therefore, the existing methods cannot handle the facial expression with less intensity. In addition, the conventional features such as texture features or geometric features are inconsistently varied for each person face. We created a new computer vision method to estimate the emotional messages from the transition of facial image sequences. Since typical motion based features are sensitive to face alignment errors, we proposed a novel robust temporal feature to measure facial activities. Our proposed feature can represent facial activities across space and time and can detect a subtle action of face. Moreover, in the early studies, researchers defined the categories of emotion by a few English words. These categories have been inherited to present. The limitation of emotion class number often induces impractical descriptions of facial expressions. To describe more complex facial expressions without prior assumption of emotion labeling, we applied our robust temporal feature and discriminative subspace method to automatically learn the underlying muscle activations in form of Action Units (AUs) according to Facial Action Coding System (FACS) standard.

Keyword: Facial expression analysis, Emotion, Robust temporal feature, Facial Action Coding System, Human Machine Interaction