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Title: Facial Movement based User Authentication

Abstract

Face recognition is a form of biometric authentication that has received significant attention during the last decades. Using the human face as a key to security, face recognition technology can be potentially employed in many commercial and law enforcement applications. Despite of the fact that most of the face recognition techniques have greatly developed since the earliest forms, they suffer from spoofing attack which aims at deceiving the sensor by manipulating a face replica. One of the methods to solve this problem is to utilize facial movements.

Facial muscle movements represent facial behavior which makes it unrealistic to be replicated and thus more distinctive. The third dimension of facial data – depth – is also utilized to improve recognition performance and to avoid video-based attack. Apart from security concerns, physiologists and psychologists have discovered the imperative role of facial movements during human face perception. Therefore, a "3D dynamic signature" can be added to augment facial recognition for which relying on static features related to shape and color.

Previous researches in this field either focus on static facial analysis or ignore temporal characteristics when clustering facial movements. In this thesis, a user authentication method based on spatiotemporal facial movements is proposed. Facial movements are obtained by making a facial expression in front of a 3D camera and are encoded by a standard system. By discretizing motion classifications into values, the problem of face recognition can be reinterpreted as matching two time sequences – probe and gallery – for each facial movement category obtained during the enrollment phase and the verification phase, respectively. Experiments have been conducted to show the possibility of discriminating subjects based on their facial movements.