

A new deformable mesh model for face tracking using edge based features and novel sets of energy functions

Ali Taimori · Alireza Behrad

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Abstract This paper presents a new method for automatic human face locating and tracking. The proposed method consists of two modules including face locating and face tracking. The face locating module has a hierarchical structure, which consists of a skin color classifier together with AdaBoost based face detectors. The face tracking module is considered to be the main contribution of the paper. The module is based on the unstructured 2-D triangular deformable meshes, which employs a new robust and illumination insensitive feature extraction and matching algorithms as well as new sets of mesh energy functions. The feature extraction and matching algorithms are established upon edge points and their representation using fuzzy set theory, which is called fuzzy edges. For matching features, a multiresolution algorithm is utilized based on fuzzy edges and edge pyramid. The new mesh energy functions are also employed to manage both rigid and non-rigid motions in the head and face. Experimental results demonstrate the accuracy and stability of the proposed method for both face locating and face tracking.

Keywords Deformable mesh · Face locating and tracking · Feature extraction · Fuzzy sets theory · Optical flow · Mesh energy functions

1 Introduction

Visual Face Locating and Tracking (FLAT) are known as one of the fundamental steps in face processing systems [7, 19, 25, 44]. The FLAT domain encompasses a vast range of applications such as human identification based on face recognition [7], human-computer

A. Taimori
Department of Electrical and Computer Engineering, Science and Research Branch,
Islamic Azad University, Tehran, Iran
e-mail: a.taimori@srbiau.ac.ir

A. Behrad (✉)
Electrical and Electronic Engineering Department, Faculty of Engineering, Shahed University, Tehran, Iran
e-mail: behrad@shahed.ac.ir