



IRM PRESS

701 E. Chocolate Avenue, Suite 200, Hershey PA 17033-1240, USA

Tel: 717/533-8845; Fax 717/533-8661; URL-<http://www.irm-press.com>

ITB10089

Chapter VI

Techniques for Face Motion & Expression Analysis on Monocular Images

Ana C. Andrés del Valle
Institut Eurécom, France

Jean-Luc Dugelay
Institut Eurécom, France

Abstract

This chapter presents a state-of-the-art compilation on facial motion and expression analysis. The core of the chapter includes the description and comparison of methods currently being developed and tested to generate face animation from monocular static images and/or video sequences. These methods are categorized into three major groups: “those that retrieve emotion information,” “those that obtain parameters related to the Face Animation synthesis used,” and “those that use explicit face synthesis during the image analysis.” A general overview about the processing fundamentals involved in facial analysis is also provided. Readers will have a clear understanding of the ongoing research performed in the field

of facial expression and motion analysis on monocular images by easily finding the right references to the detailed description of all mentioned methods.

Introduction

Researchers from the Computer Vision, Computer Graphics and Image Processing communities have been studying the problems associated with the analysis and synthesis of faces in motion for more than 20 years. The analysis and synthesis techniques being developed can be useful for the definition of low-rate bit image compression algorithms (model-based coding), new cinema technologies, as well as for the deployment of virtual reality applications, videoconferencing, etc. As computers evolve towards becoming more human-oriented machines, human-computer interfaces, behavior-learning robots and disable-adapted computer environments will use face expression analysis to be able to react to human action. The *analysis of motion and expression from monocular (single) images* is widely investigated because non-stereoscopic static images and videos are the most affordable and extensively used visual media (i.e., webcams).

This chapter reviews current techniques for the analysis of single images to derive face animation. These methods can be classified based upon different criteria:

1. the nature of the analysis: global versus feature-based, real-time oriented;
2. the complexity of the information retrieved: general expression generation versus specific face motion;
3. the tools utilized during the analysis: for instance, the cooperation of a 3D head model;
4. the degree of realism obtained from the Face Animation (FA) synthesis; and
5. the environmental conditions during the analysis: controlled or uniform lighting, head-pose dependence or not.

Table 1 depicts a rough evaluation of the techniques that we review in this chapter by comparing these criteria, considering the data provided by the referenced articles, books and other bibliographical material, as well as the judgment of the authors.

32 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage: www.igi-global.com/chapter/techniques-face-motion-expression-analysis/4170

Related Content

An Aesthetics of Digital Virtual Environments

Adam Nash (2015). *New Opportunities for Artistic Practice in Virtual Worlds* (pp. 1-22).

www.irma-international.org/chapter/an-aesthetics-of-digital-virtual-environments/132413

Magnet Mail: A Visualization System for Emails

Paulo Castro and Adriano Lopes (2010). *International Journal of Creative Interfaces and Computer Graphics* (pp. 29-39).

www.irma-international.org/article/magnet-mail-visualization-system-emails/47003

Game-Based Learning: Augmented Reality in the Teaching of Geometric Solids

Rui Leitão, J.M.F. Rodrigues and Adérito Fernandes Marcos (2014). *International Journal of Art, Culture and Design Technologies* (pp. 63-75).

www.irma-international.org/article/game-based-learning/116024

Teaching Artful Expressions of Mathematical Beauty: Virtually Creating Native American Beadwork and Rug Weaving

Jim Barta and Ron Eglash (2009). *Handbook of Research on Computational Arts and Creative Informatics* (pp. 280-289).

www.irma-international.org/chapter/teaching-artful-expressions-mathematical-beauty/19724

Interpretative Reading of an Illusory Painted Wall: A Survey and Analysis of a Work from Antonio Galli Bibiena in Bologna

Francesca Porfiri (2016). *Handbook of Research on Visual Computing and Emerging Geometrical Design Tools* (pp. 403-419).

www.irma-international.org/chapter/interpretative-reading-of-an-illusory-painted-wall/149314