

Editorial

Facial Image Processing

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Facial image processing is an area of research dedicated to the extraction and analysis of information about human faces; information which is known to play a central role in social interactions including recognition, emotion, and intention.

Over the last decade, it has become a very active research field that deals with face detection and tracking, facial feature detection, face recognition, facial expression and emotion recognition, face coding, and virtual face synthesis.

With the introduction of new powerful machine learning techniques, statistical classification methods, and complex deformable models, recent progresses have made possible a large number of applications in areas such as image retrieval, surveillance and biometrics, visual speech understanding, virtual characters for e-learning, online marketing or entertainment, intelligent human-computer interaction, and others.

However, much remains to be done to provide more robust systems, especially when dealing with pose and illumination changes in complex natural scenes. If most approaches focus naturally on processing from still images, emerging techniques may also consider different inputs. For instance, video is becoming ubiquitous and very affordable, and there is a growing demand for vision-based human oriented applications, ranging from security to human computer interaction and video annotation. Capturing 3D data may as well become very affordable and processing such data can lead to enhanced systems, more robust to illumination effects and where discriminant information may be more easily retrieved.

The scope of this special issue of the EURASIP Journal on Image and Video Processing is to present original contributions in the field of facial image processing, and especially on face verification and recognition, facial feature detection, face synthesis, and 3D face acquisition.

Among the 20 submitted papers, six articles have been selected for this special issue.

The paper by Arya and DiPaola addresses the construction of a behavioral face model for affective social agents based on three independent but interacting parameter spaces which are knowledge, personality, and mood. While a geometry space provides an MPEG-4 compatible set of parameters for low-level control, the behavioral extensions available through the triple spaces provide flexible means of designing complicated personality types, facial expression, and dynamic interactive scenarios.

Robust facial feature detection for facial expression recognition in uncontrolled environments is the focus of investigation in the work presented by Ioannou et al. The proposed system is based on a multicue feature extraction and fusion technique, which provides MPEG-4-compatible features assorted with a confidence measure, used to weight their importance in the recognition of the observed facial expression, while the fusion process ensures that the final result will be based on the extraction technique that performed better given the particular lighting or color conditions.

Mitéran et al. address 3D face acquisition, which is becoming of great importance in face recognition, virtual reality, and many other applications. They propose a new real-time stereo vision system that provides a dense face disparity map, based on a hybrid architecture (FPGA-DSP) allowing a real-time embedded and reconfigurable processing.

The paper by Wang et al. focuses on the fusion of 2D facial images and 3D stereo depth maps for enhancing face recognition. They propose an original machine learning method, the bilateral two-dimensional linear discriminant analysis (B2DLDA), able to extract discriminant facial features from the appearance and disparity images. They show that present-day passive stereoscopy does make a positive contribution to face recognition.

Ciocoiu and Costin study different localized representation and manifold learning approaches for face recognition. They conduct a systematic comparative analysis in terms of distance metrics, number of selected features, and sources of variability on the AR and Olivetti face databases. The reported results indicate that the relative ranking of the methods is highly task dependent, and the performances vary significantly according to the selected distance metric.

Finally, Lee and Sohn tackle the problem of multiview face recognition. Many current face descriptors give satisfactory results with frontal views, but fail to accurately represent all views of the human head. The authors propose a new paradigm to facilitate multiview face recognition, not through a multiview face recognizer, but through multiple single-view recognizers. The resulting face descriptor based on multiple representative views, which is of compact size, provides reasonable face recognition performance on any facial view.

To conclude, we would like to thank the authors, reviewers, and the editorial team of the EURASIP Journal on Image and Video Processing for their effort in the preparation of this special issue. We hope this issue allows the reader to get an insight in the recent advances on facial image processing and stimulates the cross-fertilization that has been ongoing between the image analysis and image synthesis communities.

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