

Guest editorial: online multimedia signal and image processing

Ernesto Damiani¹ · Albert Dipanda² · Andrea Kutics³

Published online: 12 August 2015

© Springer Science+Business Media New York 2015

In recent years, multimedia has become an essential part of networking and online communication environments. As people connect to the Internet or to one another multimedia content such as photos, video and music, takes the lion's share of the overall artwork traffic. Multimedia-based applications use a wide range of signal and image processing techniques to enhance user experience.

Semantic multi-media retrieval has been a major research focus for the last decade. Recently, a large number of cutting-edge algorithms have been developed performing audio, image and video content extraction and object recognition. Artificial intelligence and machine learning techniques have been also extensively used to connect contextual and conceptual information to multimedia data. The importance of metadata has been boosted by the emergence of high-end devices such as tablets, smartphones, and other hand-held devices. Semantic-aware metadata can further improve intelligence of online multimedia environments.

This special issue targets online applications ranging from traditional signal and image-processing methods to evolving semantic-based multimedia, audio, image and video technologies. Also, it aims to demonstrate novel, flexible and easy-to-use applications developed for the next generation of devices.

This special issue received many submissions from researchers and practitioners working on multimedia signal and image processing. After two rounds of review, eventually seven high quality papers were chosen.

The paper titled “Extending the Image Ray Transform for Shape Detection and Extraction” presents a novel approach to image analysis performing feature extraction at low level and complements it with high-level feature extraction to determine structure, exploiting the Hough transform. Authors analyze performance with images from the Caltech-256 dataset and describe how their approach can select chosen shapes.

✉ Ernesto Damiani
ernesto.damiani@kustar.ac.ae

¹ Etisalat British Telecom Innovation Center/Khalifa University, Abu Dhabi, UAE

² University of Bourgogne, Dijon, France

³ International Christian University, Tokyo, Japan

In “Interference Impacts on 60 GHz Real-Time Online Video Streaming in Wireless Smart TV Platforms” authors present a new method for computing and estimating the impact of interference on real-time online 1080p@30Hz and 1080p@60Hz high-definition video streaming in 60 GHz wireless smart TV platforms. The analysis involves two different interference scenarios: (i) downlink interference from deployed 60 GHz access points to the associated mobile ad-hoc devices, and (ii) uplink interference from randomly deployed 60 GHz ad-hoc mobile devices to their associated access points.

In the paper titled “A Kernelized Sparsity-based Approach for Best Spectral Bands Selection for Face Recognition” authors present a study on face recognition in unconstrained illumination conditions. The contribution of this paper is twofold. First, the paper analyses the robustness of four state-of-the-art algorithms, namely Multi-block Local Binary Pattern (MBLBP), Histogram of Gabor Phase Patterns (HGPP), Local Gabor Binary Pattern Histogram Sequence (LGBPHS) and Patterns of Oriented Edge Magnitudes (POEM-WPCA) against high illumination variation. Second, the authors describe the performance of the four algorithms, using visible narrow band subspectral images.

The paper titled “Tactile-force Brain-computer Interface Paradigm - Somatosensory Multimedia Neurotechnology Application”, describes the extent to which a neurotechnology multimedia application exploiting tactile-force stimulus delivered to the hand holding a joystick can serve as a platform for a brain-computer interface (BCI). The authors present brainwave electroencephalogram (EEG) signal processing and classification procedures leading to successful online interfacing results. Experiment results with seven advanced and five naive users performing online BCI experiments are presented to provide a validation of the hand-location tBCI paradigm, while the feasibility of the concept is substantiated by noteworthy information-transfer rates.

In “Estimation of Viewers’ Ratings of TV Programs Based on Behaviors in Home Environments” authors present a system to estimate a viewer’s ratings of TV programs on the basis of his/her behaviors in a home environment. A Kinect sensor is used to measure various behavioral parameters. The system first detects whether a viewer is present by extracting keypoint trajectories in video sequences captured by the sensor’s video camera. Then, it identifies whether the viewer is gazing at the TV screen or not by extracting head pose information. The proposed system has been evaluated by having participants spend about 2 h watching different TV programs in a simulated home environment.

In “A Statistical Reduced-reference Method for Color Image Quality Assessment”, authors propose a natural scene statistic (NSS) method, basing on the statistical deviation between the steerable pyramid coefficients of the reference color image and the degraded one. Authors analyze the multivariate generalized Gaussian distribution (MGGD) to model the underlying statistics. In order to quantify the degradation, two measures, based respectively on the Geodesic distance between two MGGDs and on the closed-form of the Kullback Leibler divergence, are presented and evaluated. Authors performed an extensive evaluation of both metrics in various color spaces (RGB, HSV, CIELAB and YCrCb) using the TID 2008 benchmark and the FRTV Phase I validation process, presenting experimental results demonstrate the effectiveness of the proposed framework to achieve a good consistency with human visual perception.

In the paper “Evolutionary Algorithms for a Mixed Stereovision Uncalibrated 3D Reconstruction” authors deal with the problem of the reconstruction of an original 3D shape as a mixture of the passive and active stereovision systems. Similarly to the passive stereovision systems, two cameras are used to acquire the images. As for the active stereovision methods,

the detection of the points of interest (POIs) and the matching problem are solved by using a structured-light pattern that is projected onto the analysed object. Then, Evolutionary Algorithms (EAs) are designed to calculate the depth of the detected POIs. Several experiments are conducted and analysed to validate the different steps of the proposed method.

Putting together a special issue like this is always a team effort. We would like to express our heartfelt thanks to all authors who submitted manuscripts for consideration, and to anonymous dedicated reviewers for their constructive criticism and help in making the final decisions.