

Preface

The objective of the Multimedia Communications, Services and Security (MCSS 2015) conference is to present research and development activities contributing to many aspects of multimedia communications, systems, and security. As in previous years, we invited theoretical and experimental papers as well as work-in-progress research in the domain of audio-visual systems including novel multimedia architectures, multimedia data fusion, acquisition of multimedia content and QoE management, watermarking technologies and application content search methods, interactive multimedia applications, cryptography, and biometry. An overview of the selected subjects and publications, given below, shows that the subjects included in MCSS 2015 are current and important from the point of view of potential practical implementation.

Road Traffic Safety and Efficiency Supported by Multimedia Analysis

Optimal placement of advertisements (such as large billboards) in the proximity of roads and highways can significantly affect traffic safety. A variety of options for performing multifactorial research in this area are presented. The methodology makes it possible to conduct an objective assessment of risks arising from the presence of advertisements by roadsides.

Another aspect of road traffic analyzed at MCSS is efficient estimation of traffic parameters based on sparse measurements covering a small fraction of road segments within a large urban road network. The solution is intended to be used within dynamic maps used for route planning and traffic control. Estimation models based on fuzzy cognitive maps (FCM) formalism and applying FCM learning techniques based on the evolution algorithm to determine model parameters are also presented.

Biometric Methods for Security Purposes

In the well-explored domain of facial biometrics, methods that go beyond traditional models can lead to more robust systems. One such method, outlined in an MCSS paper, assumes following the movement of feature points over the course of an expression to make user authentication systems more secure. To do this, a new algorithm was developed using a process known as ranking, in order to describe facial expressions with low computational cost.

Behavioral biometrics such as mouse dynamics are gaining attention today by addressing the limitations of conventional verification systems. A novel method of continuous verification of users by following their mouse activity is presented. The method, based on comparing mouse activity against simple statistical profiles, can

complement regular verification systems and its simplicity makes it effective for continuous verification.

Another research paper dedicated to user authentication investigates the accuracy of an identification scheme based on the sound of typing a password. The innovation of this method lies in the comparison of performance between timing-based and audio-based keystroke dynamics data in authentication and identification settings.

Cryptography

Elliptic curve cryptography (ECC) offers security levels similar to other cryptographic methods while using smaller bit key sizes. A novel mapping model for converting pixels of a plain image into coordinates of predefined elliptic curve points is proposed. The method is used in combination with existing algorithms, such as Koblitz's encoding method and chaos-driven elliptic curve pseudo-random number generator (C-D ECPRNG).

Protection of Critical Infrastructures with SCADA Systems

Protection in critical infrastructure, especially when dealing with highly dynamic and complex systems such as SCADA, requires preparation of appropriate strategies for predicting and reacting to anomalous events. However, if prediction is difficult (or even impossible), dedicated plans for dealing with such problems should be devised in order to adapt the strategies ad hoc when problems arise. Studies have been conducted into planning under uncertainty, with applications in problems such as scheduling. The work presented at MCSS 2015 discusses SCADA as a problem similar to scheduling, and constructs a system dedicated to preparing ready-to-use strategies before certain events arise.

Potential Commercial Applications of Image Analytics

DEEP by Viaccess-Orca is an example of a commercial application based, to some extent, on collaboration between industry and academic research teams. DEEP is a comprehensive new content discovery solution that combines search, recommendation, and second-screen devices into a single immersive experience. Automated generation of content for DEEP relies on structured sources of data and on multimedia databases. Using the Internet as a source of multimedia can result in the acquisition of near duplicates – visually similar images. An enhanced method of near duplicate detection for a certain type of photograph – images of celebrities – is proposed. An overview of the IMCOP system was conducted, complementing this method. It uses the innovative concept of intelligent discovering and sharing multimedia content using the Internet. As with previous MCSS conferences, this year's event was also an opportunity for all researchers focusing on the future of multimedia communications,

services, and security to come together, collaborate, and share experiences. We were delighted to host this year's gathering that facilitated discussions on the future course of state-of-the-art technologies in the fields addressed by the MCSS conference.

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Andrzej Dziech
Mikołaj Leszczuk
Remigiusz Baran

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