Editorial: Recent trends in multimedia forensics and visual content verification

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Editorial on the Research Topic
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Huge amounts of multimedia content are in fact generated every day, pervading the web and popular sharing platforms such as social networks. Such data carry embedded traces due to the whole creation and sharing cycle, which can be recovered and exploited to assess the authenticity of a specific asset. This includes identifying the provenance of media data, the generation device or crafting method, as well as potential manipulation of the multimedia signal. Also, the massive introduction of artificial intelligence and of modern performing devices, together with new paradigms for content sharing and usage, have determined the need to research novel methodologies that can globally take into account all these important changes.

This Research Topic gathers cutting-edge techniques for the forensic analysis and verification of media data, including solutions at the edge of signal processing, machine/deep learning, and multimedia analysis. Research approaches to multimedia forensics have rapidly evolved in the last years, as a consequence of both technological advancements in media creation and distribution, and methodological advancements in signal processing and learning.

One evident aspect is the disruptive diffusion of deep learning models for addressing tasks related to audio-visual data. As a consequence of the impressive performance boost they brought in different areas, deep architectures nowadays dominate in multimedia forensics research as well.

Then, forensic methodologies need to be updated with respect to the constant evolution of acquisition devices and data formats. Therefore, algorithms are also designed with the goal of efficiently analyzing high-resolution data, possibly subject to advanced in-camera processing.

In addition, there is an increasing need for detection technologies that are able to identify synthetically generated visual data, in response to the impressive advancements of generative models based on Artificial intelligence (AI) such as Generative Adversarial Networks (GANs).

We are glad to introduce the accepted manuscripts to this Research Topic, which are well aligned with these cutting-edge research trends and are authored by highly recognized

researchers in the field. In particular, the following contributions are appearing in the Research Topic.

- "Does Deep Learning-Based Super-Resolution Help Humans With Face Recognition?" by E. Velan, M. Fontani, S. Carrato and M. Jerian:

The study explores the impact of super-resolution algorithms based on deep learning on the human ability of recognizing individuals from facial images. In particular, those recent techniques are compared with the performance obtained by employing conventional image interpolation methods in upsampling the image data.

Empirical results from a campaign involving more than 130 subjects shows that, in terms of recognition accuracy by human observers, the application of AI-based super-resolution algorithms do not bring substantial advantages with respect to model-based interpolation.

- "A Very Fast Copy-Move Forgery Detection Method for 4K Ultra HD Images" by L. Bertojo, C. Néraud and W. Puech:This paper proposes a new keypoint-based method for copy-move forgery detection in digital images. The method takes advantage of the robustness of SURF keypoints and uses a fast feature matching algorithm based on the generalized two nearest-neighbor algorithm to drastically reduce computation time. The method does not use a threshold for keypoint detection, allowing for low-intensity matching and efficient detection of forgeries in uniform or weakly textured areas. Experimental results show that the proposed method is very efficient in terms of F1-score and computation time, and can successfully deal with high-resolution 4K images.
- "An Eyes-Based Siamese Neural Network for the Detection of GAN-Generated Face Images" by J. Wang, B. Tondi and M. Barni:

The authors propose to distinguish between GAN-generated and real faces by analyzing inter-eye symmetries and inconsistencies. A Siamese Neural Network (SNN) is utilized to extract high-level features characterizing the inter-eye similarity used to discriminate between real and synthetic pairs of eyes. Extensive experiments witnessed that achieved results are comparable, and in some cases superior, to those obtained by state-of-the-art methods leveraging on the analysis of the entire face image.

We believe these articles, with their strongly innovative approach to highly relevant Research Topic in the field, are of great interest to the multimedia forensics and verification community.

We deeply thank the co-authors of the submitted papers, as well as the reviewers for their invaluable work in raising the scientific quality of the submissions.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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