Editorial of the special issue on Computational Image Editing

Marcelo Bertalmío, Rémi Giraud, Seungyong Lee, Olivier Lézoray, Vinh-Thong Ta, David Tschumperlé

Editorial of the special issue on Computational Image Editing

Marcelo Bertalmío[a], Rémi Giraud[b], Seungyong Lee[d], Olivier Lézoray[e], Vinh-Thong Ta[c], David Tschumperlé[e]

[a]*Universitat Pompeu Fabra, Barcelona, Spain,*
[b]*Bordeaux INP, Univ. Bordeaux, CNRS, IMS, UMR 5218, F-33400 Talence, France*
[c]*Bordeaux INP, Univ. Bordeaux, CNRS, LaBRI, UMR 5800, F-33400 Talence, France*
[d]*POSTECH, Pohang, Korea*
[e]*Normandie Univ, UNICAEN, ENSICAEN, CNRS, GREYC, F-14000 Caen, France*

1. Background and motivation

In the past decade, smartphones and social media applications have revolutionized our relationship to images: photographs are now ubiquitous and users demands have moved from simple image storage, posting and tagging to more advanced image editing. Image editing can also be referred as image manipulation and encompasses the processes of altering images to modify their visual content or quality. There are a lot of possible ways to visually modify images with computational techniques, *e.g.*, noise reduction, removal of unwanted objects, sharpening, compositing, matting, to quote just a few.

While smartphones are a very visible driver of the popularization of computational image editing techniques, this has been made possible thanks to the remarkable development of the techniques that have supported this revolution, from the display of high dynamic range images to the wide range of filters provided, for instance, by Instagram.

Even with these recent advances, computational image editing is still one of the toughest problems of the imaging industry. Hence, professional photography editing is a long and laborious process that is highly dependent on the professional photographer skills who can spend hours to produce qualitative enhancements. Therefore, such enhancements can be subjective from the user experience point of view. It is easy to understand that if it normally takes many hours to perform a professional editing of a picture, doing it faster and automatically at a larger scale is difficult and challenging. Nevertheless, recent advances have put to the forefront deep learning based computational image editing for artistic style transfer, automatic colorization or inpainting methods with very impressive results. With the help of hardware acceleration, these computationally intensive applications begin to be feasible on mobile devices.

The aim of the proposed special issue is to present some of the cutting-edge works currently being done on computational image editing and to reveal the challenges that still lie ahead.

2. Quick facts about the special issue

The guest editors suggested putting together this special issue on Computational Image Editing to the Editor-in-Chief in April 2019. In May 2019, the guest editors and the Editor-in-Chief established the outline and schedule of the special issue. In June 2019, the first call for papers was distributed through the Internet.

Between June 2019 and January 2020, 11 manuscripts were submitted for review and possible inclusion in the special issue. Each of these papers was reviewed by two or three experts in the fields of computer vision and image processing. After two rounds of rigorous reviews between January 2020 and March 2021, 5 papers were finally accepted for inclusion in this special issue. We hope that the reader will enjoy the interesting research works selected for this special issue.

3. Scanning the special issue

The papers included in this special issue provide a good coverage of the field and are illustrative of the variety of topics encountered in Computational Image Editing. Accepted papers cover both theoretical and

Email addresses: marcelo.bertalmio@upf.edu (Marcelo Bertalmío), remi.giraud@bordeaux-inp.fr (Rémi Giraud), leesy@postech.ac.kr (Seungyong Lee), olivier.lezoray@unicaen.fr (Olivier Lézoray), vinh-thong.ta@bordeaux-inp.fr (Vinh-Thong Ta), david.tschumperle@ensicaen.fr (David Tschumperlé)

practical aspects of image processing and content manipulation. We organized the special issue around the following topics.

3.1. Image processing

The first two papers are devoted to image processing tasks. In "Multi-scale Multi-attention Network for Moiré Document Image Binarization", Guo *et al.* [1] consider the problem of binarizing document images corrupted by Moiré patterns from camera-captured screens. They propose a multi-scale and multi-attention deep network that is composed of three components: a multi-scale module for feature extraction at different scales, a multi-attention module for feature integration at three different attention levels, and a binarization module to finally obtain binarized de-Moiré images of high quality. The next paper authored by Tan *et al.* [2] is entitled "Multi-focus Image Fusion with Geometrical Sparse Representation". They consider the problem of generating an image with all objects in focus by integrating multiple partially focused images. They propose an algorithm that represents images by geometric sparse coefficients from a single dictionary image and use these coefficients to evaluate the clarity of source images to fuse them in a multi-focused image.

3.2. Image content manipulation

The next three papers are devoted to approaches that manipulate the visual content of images. In the paper entitled "Pic2PolyArt: Transforming a Photograph into Polygon-based Geometric Art", Low *et al.* [3] consider the problem of transforming an image into an artwork composed of geometric shapes. They identify the main subject and important features with a combination of saliency, edge, and face detection techniques that are used to generate seeds for triangle- and polygon- based geometric abstraction. The next paper, written by Liu *et al.* [4], is entitled "Learning Shape and Texture Progression for Young Child Face Aging". They consider the problem of synthesizing faces of a certain person at different ages. They propose to use a deep learning framework with generative adversarial networks to model the face transformation with respect to both geometry deformation and textural variations. Finally, in "Photorealistic style transfer for video", Zabaleta *et al.* [5] consider the problem of transferring visual style of a reference color image to a video. They describe an automatic algorithm based on the statistical properties of images that can modify the style of a video in terms of luminance, color and contrast from a color graded image.

4. Acknowledgments

The guest editors thank all those who have helped to make this special issue possible, especially the authors and the reviewers of the articles. They thank the editorial staff for her help and support in managing the issue, and finally, gratefully acknowledge the Editor-in-Chief for giving them the opportunity to edit this special issue.

5. References

[1] Y. Guo, C. Ji, X. Zheng, Q. Wang, X. Luo, Multi-scale multi-attention network for moiré document image binarization, Signal Processing: Image Communication 90 (2021) 116046. doi:https://doi.org/10.1016/j.image.2020.116046.
URL http://www.sciencedirect.com/science/article/pii/S0923596520301892

[2] J. Tan, T. Zhang, L. Zhao, X. Luo, Y. Y. Tang, Multi-focus image fusion with geometrical sparse representation, Signal Processing: Image Communication 92 (2021) 116130. doi:https://doi.org/10.1016/j.image.2020.116130.
URL http://www.sciencedirect.com/science/article/pii/S092359652030237X

[3] P.-E. Low, L.-K. Wong, J. See, R. Ng, Pic2polyart: Transforming a photograph into polygon-based geometric art, Signal Processing: Image Communication 91 (2021) 116090. doi:https://doi.org/10.1016/j.image.2020.116090.
URL http://www.sciencedirect.com/science/article/pii/S0923596520302149

[4] L. Liu, H. Yu, S. Wang, L. Wan, S. Han, Learning shape and texture progression for young child face aging, Signal Processing: Image Communication 93 (2021) 116127. doi:https://doi.org/10.1016/j.image.2020.116127.
URL http://www.sciencedirect.com/science/article/pii/S0923596520302368

[5] I. Zabaleta, M. Bertalmío, Photorealistic style transfer for video, Signal Processing: Image Communication.