Special section on Non-Photorealistic Animation and Rendering (NPAR) 2010

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Editorial

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Non-Photorealistic Animation and Rendering (NPAR) is a firmly established and vibrant research field within Computer Graphics, delivering new techniques for expressive rendering and visual communication of ideas and information. As a field, NPAR's origins reach back over twenty years, to seminal works exploring the emulation of traditional artistic media and the stylized visualisation and abstraction of geometry and images. Today, NPAR has diversified to cover a much broader range of topics, spanning computational photography, vector graphics, perceptual models, interactive methods to augment the creative process, motion stylization, and video enhancement. Accordingly, NPAR has become a focal point for the convergence of several disciplines; drawing not only from computer graphics, but also from computer vision, human computer interaction, psychology, and the Arts. NPAR is now a truly cross-disciplinary research field.

Within this Special Section we are pleased to present extended versions of nine research papers presented at the 6th ACM/Eurographics International Symposium on Non-Photorealistic Animation and Rendering (NPAR 2010) in Annecy, France. This prestigious symposium was established a decade ago in response to the growing interest in NPAR research, and remains a highly competitive publication forum for this specialism. The papers collected herein have been extended from their NPAR 2010 versions through addition of a further significant technical contribution and new results. All papers passed through at least one additional round of peer review, in addition to the double-blind review process already conducted via NPAR 2010. Any extended paper for which one guest editor held a conflict was handled separately and independently by the other editor. Where possible, the reviewers evaluating the paper accepted to NPAR 2010 were the same as invited to review the extended paper for this Special Section. We are also indebted to the additional reviewers recruited to ensure the high quality of this Special Section, and thank all the anonymous reviewers for their thoughtful feedback.

The papers within the Special Section touch on many of the topics outlined above, representing a good cross-section of current activity and trends in NPAR. One such trend is style transfer through example-based rendering, which has gathered considerable momentum through the fusion of NPAR with Computer Vision and Machine Learning techniques. "Directional Texture Transfer with Edge Enhancement" [1] describes how high-frequency textures such as brush-work, may be learned and re-applied to stylize photographs, principally in a painterly style. Visual structures are preserved and enhanced by considering both the image texture and the gradient direction in the style transfer process. "Progressive Color Transfer for Images of Arbitrary Dynamic Range" [2] also proposes an example-based process for photograph stylization, focussing on the transfer of high-dynamic range (HDR) color rather than texture.

The best paper award at NPAR 2010 was received by the authors of "Non-photorealistic Depth-based Image Editing" who, for the Special Section, have extended their work [3] to cover additional styles and have leveraged the GPU for real-time stylization. In doing so the technique shows potential for video stylization; a perennial topic in NPAR, but especially timely in this case due to the increasing presence of NPAR in movie special effects, and the recent trend toward depth-aware post-production techniques. Progress toward temporal coherence in video stylization is presented in "Stylized Ambient Displays of Digital Media Collections" [4]. The authors adopt a segmentation-based approach to stylization, presenting a new video segmentation algorithm. A novel NPAR application is also presented in the form of a Digital Ambient Display, situated in domestic living spaces, that stylizes and transitions through home media collections. Image stylization is also addressed in both "Contour-drive Sumi-e rendering of real photos" [5] and "Scale-dependent and Example-based Stippling" [6]. The latter draws upon observational studies of artistic practice to guide the placement of stipple patterns, and contributes a new user study as well as a GPU implementation in this extended paper. The integration of artistic practice into NPAR research, and the evaluation of results using well-grounded studies, continues to be a principal challenge within the field; a point noted by Doug DeCarlo and Matthew Stone [7], Aaron Hertzmann [8], and Amy Gooch et al. [9] in their NPAR 2010 meta-papers outlining grand challenges in the field. It is encouraging to see a trend toward such studies in the recent NPAR papers, and many of those within this Special Section.

A common practical motivation for NPAR is to improve the communication and comprehension of visual content. "Multi-perspective Compact Explosion Diagrams" [10] addresses this goal through automated generation of exploded diagrams from mesh geometry. An alternative presentation style is explored in "Shape & Tone Depiction for Implicit Surfaces" [11], where algorithms for stroke placement on HRBF implicits are considered to render the geometry in a Pen-and-Ink style. A rather unique approach to producing fluid effects using vector graphics is described in "Vector Graphics Depicting Marbled Flow" [12], with a focus on GPU implementation.

The Special Section would not have been realised without the valued contributions of the authors, and the hard work of a number of individuals. In particular, the efforts of Joaquim Jorge both in securing this Special Section for NPAR 2010, and in his assistance in the production process. In the latter regard, our thanks are extended to Emily Rae and all those at Elsevier for an efficient production schedule. We also thank those involved in the organisation of NPAR

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