

Dagstuhl Report – CAe 2006

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The Dagstuhl-Seminar on **Computational Aesthetics in Graphics, Visualization and Imaging** took place from 28 May until 2 June, 2006, with 54 registered participants and some visiting PhD students from Germany. The high interest in the topics dealt at the seminar resulted in a tight scheduling of presentations and panel discussions.

The program, according to the Dagstuhl tradition, was finished during the seminar. We have seen 36 presentations, and organized discussions in smaller groups at the last day of the seminar, summarizing the results and trends, and looking for answers of open questions and for application areas of computational aesthetics.

This seminar had some really important results. It was the second meeting of this topic, after the First EG Workshop on Computational Aesthetics in Girona, Spain, May 2005. At the closing session of the successful seminar it was evident that this new interdisciplinary area has already its international community established, containing mostly *widely known high level researchers*, their groups of students, and people from industry. Computational aesthetics has grown over its pioneer age, and became slowly a *new discipline* based on the techniques, algorithms of overlapping subfields of the computer imagery.

Computational Aesthetics has built *new bridges* and *fruitful interactions* between the different areas of computer imagery, and it represents a practical, new quality or *meta-level*. This new quality is similar to the relation of individual cars and the question of traffic regulation, safety, and control of the highways. In producing the first generation of cars these aspects or levels were not important and really predictable.

The perceptual, cognitive and artistic meta-level represented by computational aesthetics ensures in the future the communication between the researchers of computer imagery techniques, and the artist and designer community. For these people the algorithmic details are basically not really interesting, they need practical tools, e.g. in the visualization, printing, painting, movie industry, CAD systems, architecture, and other application areas.

The panel discussions have dealt with the following questions trying to address them regardless of the subfield (NPR, modeling, HDRI, color, etc...):

- What is Computational Aesthetics?
- What are the metrics in computational aesthetics? What about evaluation of success?
- What are the degrees of freedom and precision of intensioning in the field of computational aesthetics? Which are the constraints?
- Suggest unique workshop/conference formats for following up this Dagstuhl meeting
- Can we take the human out of the loop? At what point does this happen?
- How can we engage/incorporate art & design (and other) communities?
- What is the 'Holy Grail' of Computational Aesthetics? What are the grand challenges?
- Visual styles (only?) achievable by computer? (i.e. if we don't just repeat what artists have done, considering the field of computational aesthetics, what can we create? what is enabled?)
- Applications?
- Where does Computational Aesthetics come in: algorithm/process? Content? Intent? Observer?

The participants gave interesting answers for some of the above questions, but in some cases a uniform agreement of conflicting approaches was not found, and we did not come up with an exact definition of Computational Aesthetics. However, just these discussions were very useful and inspiring. For the future workshops/conferences a steering committee was established. We plan to continue the Computational Aesthetics topic in the form of an annual conference. The next ones shall take place in Banff (Canada) in 2007, and probably in Lisbon (Portugal) in 2008.

The unusually cold and rainy weather in Dagstuhl was compensated by the interesting presentations showing elegant new methods and beautiful images. The detailed program can be found on the web page of the seminar. Here we mention only some interesting fields. The program was thematically ordered, and there were also some difficult to classify presentations.

The main topics were Non Photorealistic Rendering, illustrative and stylized Visualization, High Dynamics Range Imaging, Colors and Imaging, and Metrics of Aesthetics. On the first day we have seen a flexible class of developable geometrical surfaces with architectural applications, human face 'beautification', new painterly NPR styles for complex natural phenomena, and a presentation about the relations of aesthetics and algorithms. The program continued with illustrative, interactive, attention focusing, perceptually optimized, stylized and other visualization techniques or

problems, like 'pentie'. New results of information theoretically based metrics and the 'crest lines' were applied for automatic viewpoint selection. In HDR imaging two new methods were introduced, and presented interesting applications and evaluation techniques. The colors and their applications were represented by four presentations about color harmonization, re-coloring methods, producing faithful colors, and visualization of natural images. We have seen some unique presentations about relativity, optimization or time domain aspects in aesthetics. Of course, NPR techniques were also represented, e.g. with fluid jet painting, flocking strokes, stylized reality and the analysis of hand drawn and computer generated images. The not mentioned presentations can be found in the list of abstracts.

The high interest of participants, the inspiring discussions, a lot of new ideas and the results demonstrated the impulse and potential of this rapidly launching area. The successful seminar will be continued in form of annual conferences, and further Seminars on Computational Aesthetics will be held in the future.