

Snapshot Painter. An interactive aQtree application

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Introduction

A wealth of knowledge exists concerning non-photorealistic rendering techniques to which the artistic community has limited access. A cooperation between the University of Konstanz, brainpets GbR, and the Filmakademie Baden-Wuerttemberg sets out to bridge the divide between technical research and practical film-making. The result is aQtree, a work-in-progress expressive rendering application focused on enabling animated 3D content of convincing coherent quality [Maas2007]. The goal of the collaboration is both to allow artists access to NPR and to generate feedback with which to test and expand research and theory

Snapshot Painter

The Snapshot Painter is a proof-of-concept for the modular structure of the library. This module processes 2d image data such as photographs or renderings, turning them into a computer generated artwork. The algorithms are currently adopted to a watercolor style combined with loose and sketchy strokes. As the intent is to communicate our vision of animated npr content respecting issues of temporal coherence, the image we generate is embedded within a dynamic artwork: the forms evolve in fluid patterns that turn the single image to a dynamic temporal process. The basis of this effect are several dilating masks seeded by particles. The dilation is realized by a combination of a Gaussian filter kernel and a scaling factor.

Pipeline

Our pipeline is composed of several image-processing operators. First, a preprocessing phase initiates a small scale abstraction using basic image processing tools such as morphological and bilateral smoothing to resemble brush-like structures while removing high frequency details. We then pursue a level-of-detail concept using large scale abstraction: Computing a common unsharp mask with a large filter kernel extracts regions of particular spatial interest, similar to [Luft2006a]. By utilizing this unsharp mask as a shape descriptor for the watercolor layers, we achieve a convincing reduction of the input image while preserving all important details.

Furthermore, we exploit a crucial characteristic of the unsharp mask: Due to the low-pass filter it smears tones across edges providing a natural way of introducing complementary contrast. We exploit this feature to enhance our abstracted input image with this complementary palette in reference to the special role color plays in watercolor painting. The final watercolor style is implemented by existing techniques such as the image processing approaches by Bousseau et al. [Bousseau2006] or Luft and Deussen [Luft2006b].

The line strokes within our pipeline are computed according to the "Loose and Sketchy Animation" presented by Curtis et al. [Curtis1998]. Thereby the gradient of the input image is traced by particles resulting in highly stylized line strokes.



Complementary color palette. A common unsharp mask is exploited to introduce complementary color contrasts. After amplifying saturation the unsharp mask is combined with the abstracted input image.



Large scale abstraction as level-detail-concept. An unsharp mask that extracts regions of particular interest is utilized as shape descriptor for the watercolor layers.



Perceptual side-effect: The image is built up in a dynamic process that presents the viewer with an array of small, changing details appearing throughout the image area.

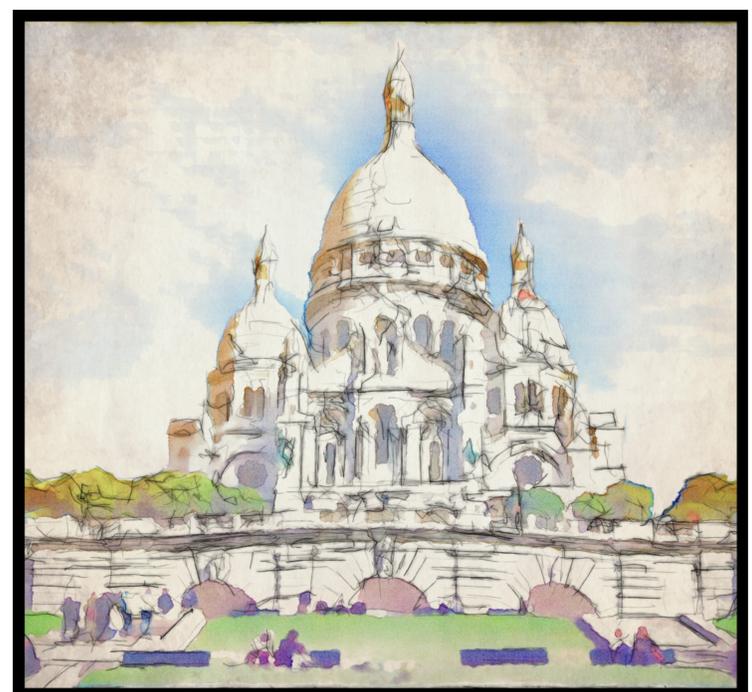
[Bousseau2006]: BOUSSEAU, A., KAPLAN, M., THOLLOT, J., AND SILLION, F., 2006. Interactive watercolor rendering with temporal coherence and abstraction. NPAR, 141–149.

[Curtis1998]: CURTIS, J. C., 1998. Loose and sketchy animation. ACM SIGGRAPH 98: Electronic art and animation catalog, 145.

[Luft2006a]: LUFT, T., COLDITZ, C., AND DEUSSEN, O. 2006. Image enhancement by unsharp masking the depth buffer. ACM Transactions on Graphics 25, 3 (jul), 1206–1213.

[Luft2006b]: LUFT, T., AND DEUSSEN, O. 2006. Real-time watercolor for animation. Journal of Computer Science and Technology 21, 2(mar), 159-165.

[Maas2007]: MAAS, D., MAAS, T., AND LUFT, T., 2007. Love.leech.tomato. A non-photorealistic-ally rendered short film. NPAR, Poster Session.



Input image. Sacré-Cœur Basilica, photo by Florian Schütz.



Small scale abstraction. Combination of a morphological and a bilateral smoothing operator.

