COMP 5900: Image Processing and Stylization

Contact

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Nature of the course

This is a graduate course on image processing through the lens of image stylization applications. We will cover basic linear and nonlinear filters as well as recent developments in stylization techniques. One of the main approaches to the material will be reading the primary literature: several weeks will be spent discussing specific papers, with individual students from the class responsible for leading the discussion. Students will also make at least one paper presentation during the term as well as presenting their final projects.

Textbooks and Resources

There is no required textbook for the course. You may find a textbook on image processing useful; two suggestions are

- Milan Sonka, Vaclav Hlavac, Roger Boyle. Image Processing, Analysis, and Machine Vision.
- Rafael Gonzalez, Richard Woods. Digital Image Processing.

A recent book on image stylization is highly relevant to this course:

- Paul Rosin, John Collomosse. Image and Video-Based Artistic Stylization.

Papers for the course will typically come from the ACM Digital Library. You have direct access to the ACM DL while on campus; off campus, you will need to go through the Carleton library.

Topics

The course's main topics include the following, not necessarily in order.

- Linear filtering
- Edges
- Gradient-based processing
- Segmentation
- Texture

- Nonlinear filtering
- Halftoning
- Stroke-based rendering
- Extreme stylization

Evaluation

- Assignments: 30%
- In-class presentations: 10%
- Paper discussions: 15%
- Course project: 30%
- Final exam: 15%

Course Project

Propose your own project. You will produce an implementation and a final writeup in the style of a scientific paper, including abstract, background, algorithm description, evaluation with sample results, and references. Your writeup should be 8-12 pages in length, single-spaced in two-column format. I recommend using LaTeX and the "acmsiggraph" LaTeX class.

Typically a project will be of one of three types:

1. A novel algorithm for some stylization task, which might be

- simulating an artistic style or medium not previously seen in the literature
- an improvement on an existing stylization method
- an interactive system for stylization
- a procedural method for novel aesthetic images (possibly abstract)
- data fusion using multiple images or video

2. An implementation of a system for performing some desired real-world task, possibly inspired by problems in medicine or robotics.

3. A substantial implementation of an existing method, as described in a recent research paper (2006 or later).