CMPT 828 - G100 Illumination in Images and Video

Instructor(s): Mark Drew

Calendar Objective/Description:
Explores current research in the field of imaging, computer vision, and smart cameras that aims at identifying, eliminating, and re-lighting the effects of illumination in natural scenes. One salient direction in this research is the identification and elimination of shadows in imagery. The topics touched on in the endeavour include physics-based image understanding, image processing, and information theory. Students in vision and in graphics should be interested in the material in this course.

Instructor’s Objectives:
The course consists of students giving seminars about the papers in the reading list, and all of us discussing these papers. As well, you are expected to produce a project and a short written summary of the course topics, including what you actually did in your project. A few default projects are suggested.

The emphasis in the course is on understanding the material, not on production of materials and illustrations: to this end, actual slides for the presentations of the papers assigned are made available, and you can change these or not as you wish.

As well, the course is meant to be practical, in that some of the seminars are devoted to going through Matlab code that actually does what the papers indicate can be done. At the end of the course, you should walk away with a solid understanding of how to code this type of material. For the project, not all code is given, and indeed you may very well generate your own direction on how this research should proceed. It is usual for at least one international-level student-driven paper to be generated out of this course (but it is by no means required that you must necessarily be extremely innovative: just understanding the material is very likely enough for most students).

For meeting your breadth requirement, CMPT 828 is included in Area 5.

Prerequisites:
None

Topics:
- Images and cameras
- Spectra; Colour images as arrays; vector space algebra
- Image formation models
- Spectral sharpening
- Illumination invariants
- Edges and images
- Shadow elimination
- Colour image re-integration
- Smart cameras: flash/no-flash image pairs
- Multiple images: Polynomial Texture Mapping

Grading:
To be discussed in the first week of classes. The course has a seminar format, and participation is important. You are expected to read and present papers and code from our reading/resources list to the group, in class. As well, a project will be carried out in which you implement some of the ideas discussed. You produce a course ideas summary and project report at semester end. Prerequisites: Interest in images or graphics or computer vision. An undergraduate course in graphics or computer vision or image processing would be an asset, but is not required. Familiarity with (not much) vector algebra is necessary, as is the ability to implement algorithms in a language such as Matlab (or the willingness to learn how -- not difficult). Please feel free to contact me if you have any concerns about your suitability for taking this course.

**Academic Honesty Statement:**

Academic honesty plays a key role in our efforts to maintain a high standard of academic excellence and integrity. Students are advised that ALL acts of intellectual dishonesty will be handled in accordance with the SFU Academic Honesty and Student Conduct Policies (http://www.sfu.ca/policies/gazette/student.html).