Lab Assignments Computer Graphics DT3025, HT2016

Martin Magnusson and Daniel Ricão Canelhas November 19, 2016

5 Current developments in computer graphics

In this task you will perform a brief literature survey and write a report on the state of the art in some sub-topic within computer graphics.

Learning goals

The purpose of this lab is to get a glimpse of cool new developments in computer graphics. More formally, the goal is to address the following learning goals from the curriculum:

- the preparedness of students to deal with changes in working life,
- gather and interpret information at a scholarly level,
- stay abreast of the development of knowledge (in the field),
- the ability to continuously update knowledge within the field of computer graphics as the state of the art progresses.

5.1 Literature survey

- 1. Select one or two group mates (i e, the report should be written by 2 or 3 students).
- 2. Select a topic (you can get inspiration from my suggestions below, or find something else that interests you).
- 3. Search for papers.
 - While going through related papers, narrow your topic down to something more specific. (Conducting a survey on the state of the art in shadow mapping in general would be a very large task, but "techniques for cascaded shadow maps" is more focused.)
 - Other references, such as reliable web sources, are OK too but always make a critical assessment of the reliability of the source.
- 4. Find at least 3 references.
- 5. Send your topic title and list of references to Martin for feedback. *Please do this no later than December 5.*
- 6. Write a report, about 10 000 characters including spaces (\approx 3 pages), with the following contents:
 - Problem description: background to the problem and what applications it pertains to.

- Short motivation of paper selection (why these papers are good/relevant, and how you found them).
- Describe the papers' approach to the problem.
- Conclusion.
- Future work: what part of the problem formulation remains to be solved?

Suggested topics

Below is a list of topic suggestions. You are not required to use these topics—they is just for inspiration. You should narrow down your topic to something more specific than the items listed here.

- 1. Shadow mapping
 - (novel ways to deal with aliasing, for example)
- 2. Real-time soft shadows
 - The references list of the EG'10 course notes is a good starting point for both the above topics.
- 3. Real-time global illumination
- 4. Volumetric clouds
 - Hufnagel et al. (2012) is a good starting point for this
- 5. Non-realistic rendering
 - (cel-shading and other "artistic" rendering techniques)
- 6. Rasterisation-based refraction
- 7. Recent developments in reflectance models
 - (what is a state-of-the-art alternative to Cook–Torrance, for example)
- 8. Light transport
 - (better path tracing, Metropolis light transport, for example)
- 9. BRDF acquisition
 - (modern methods for acquiring a BRDF of an existing material with your mobile phone, for example)
- 10. Browse through some recent SIGGRAPH proceedings and select a topic that interests you. *This is a good idea also for the topics listed above.*
 - SIGGRAPH 2015
 - SIGGRAPH 2014

Assessment criteria

Grade 3 The report is complete, following the instructions above (Item 6). The report is well structured and written in clear English.

Grade 4 The report also

- clearly describes the problem statement and what has been done in a way that can be understood by someone who is not an expert in the field,
- in the comparison of the selected references also discusses what sets them apart from previous work.

Grade 5 The report also contains

- a thorough and insightful comparison of the selected references, and what sets them apart from previous work,
- a thorough and insightful conclusion of the problem formulation, based on the selected references.

It may be difficult to self-assess to what degree your report fulfils these criteria. You are welcome to send a draft version to Martin before the deadline, to get feedback on what grade it currently matches, and what to be done to reach a higher grade.

Deadline

The deadline is January 5. If you hand in your report after this, it will still be graded, but only when there is time.

You will get feedback on what grade your report matches, with a chance of complementing it for a higher grade, if necessary.