

Seminar aus Computergraphik 186.175, WS 2017/18, 2.0h (3 ECTS)

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Register to course in TISS: to get news & updates

These slides will on the website after this meeting

Official registration: by **submitting** the literature list

Topics are presented and **assigned** here today



Practice selecting, reading and understanding

- Search and select papers relevant to your topic
- Summarize them as a state-of-the-art report
- Prepare a talk about your topic in the seminar

This permits in-depth familiarization with the topic



- Submit a literature list (chosen with supervisor)
- Attendance of 3 lectures
- Meetings with supervisor: paper selection, discussion of papers, preparing talk slides
- Alternative: evaluate and compare algorithms
- Final talk in seminar



- Analyze recent papers (select with supervisor)
- Study secondary literature to understand topic
- How to find relevant papers:
- SIGGRAPH Proceedings
- Google Scholar: find the right key words
- Survey papers, often-referenced papers
- Submits a list of 10+ papers per email to supervisor & me → official registration



- 8 pages per student, preferably in english
- Format in the style of a scientific paper
- Use LaTeX template on course website
- LaTeX tools and guides also on the website
- Submit the draft in PDF format, per email to supervisor+organizer



- You will get a draft of another student to review
- Typical conference review form (Eurographics)
- This helps author to improve the manuscript
- Guides on review writing on course website
- You will receive 2 reviews (student, supervisor)
- Improve final report according to reviews



- Prepare slides in advance, using template
- Each student talks for 15 minutes, english pref.
- 5 minutes discussion after each talk
- Focus is on overview/comparison of methods
- Present so that other students will understand it
- Active discussion is mandatory and is graded
- Submitted slides are presented on seminar PC



- Lecture attendance 5%
- Review: 20%
- Seminar slides+talk: 30%, discussion 5%
- Final report: 40%
- Late submission: 15% off per day, max. 1 week



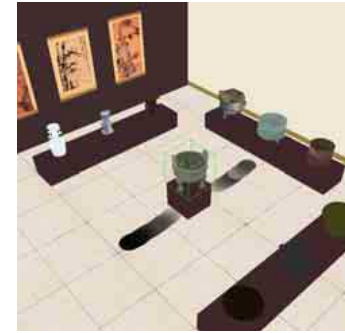
- 25.10. 23:59 Submit literature list (per email)
- 10.11. 14:00 – 16:00 Lecture Prof. Wimmer
- 23.11. 13:00 – 15:00 Lecture Prof. Gröller
- 29.11. **13:00 – 15:00** Lecture Prof. Purgathofer
- 04.12. 23:59 Submit report draft
- 18.12. 23:59 Submit review
- 24.01. 23:59 Submit slides
- 25.01. 09:00 – 13:00 Seminar talks
- 25.01. 23:59 Submit final report



- Now 18 topics will be presented
- After the presentation, please mark down at least 3 in order of preference (1, 2, 3, ...)
- I will try to make a fair assignment of topics



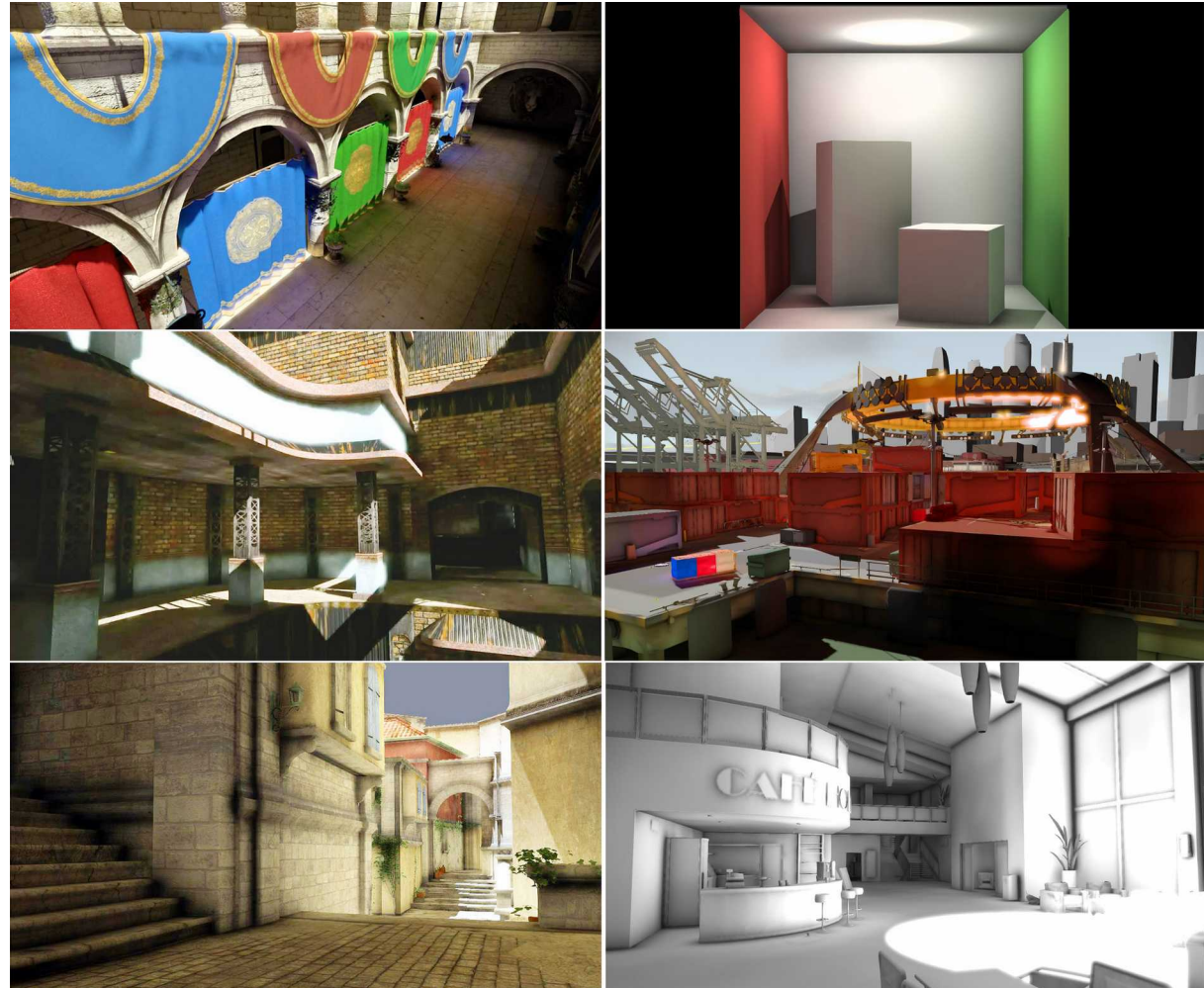
- Solve the Inverse Lighting Problem for 3D Scenes
- Light Painting
- Sketch Based Lighting



Lin, Wen-Chieh, et al. "Interactive lighting design with hierarchical light representation." *Computer Graphics Forum*. Vol. 32. No. 4. Blackwell Publishing Ltd, 2013.



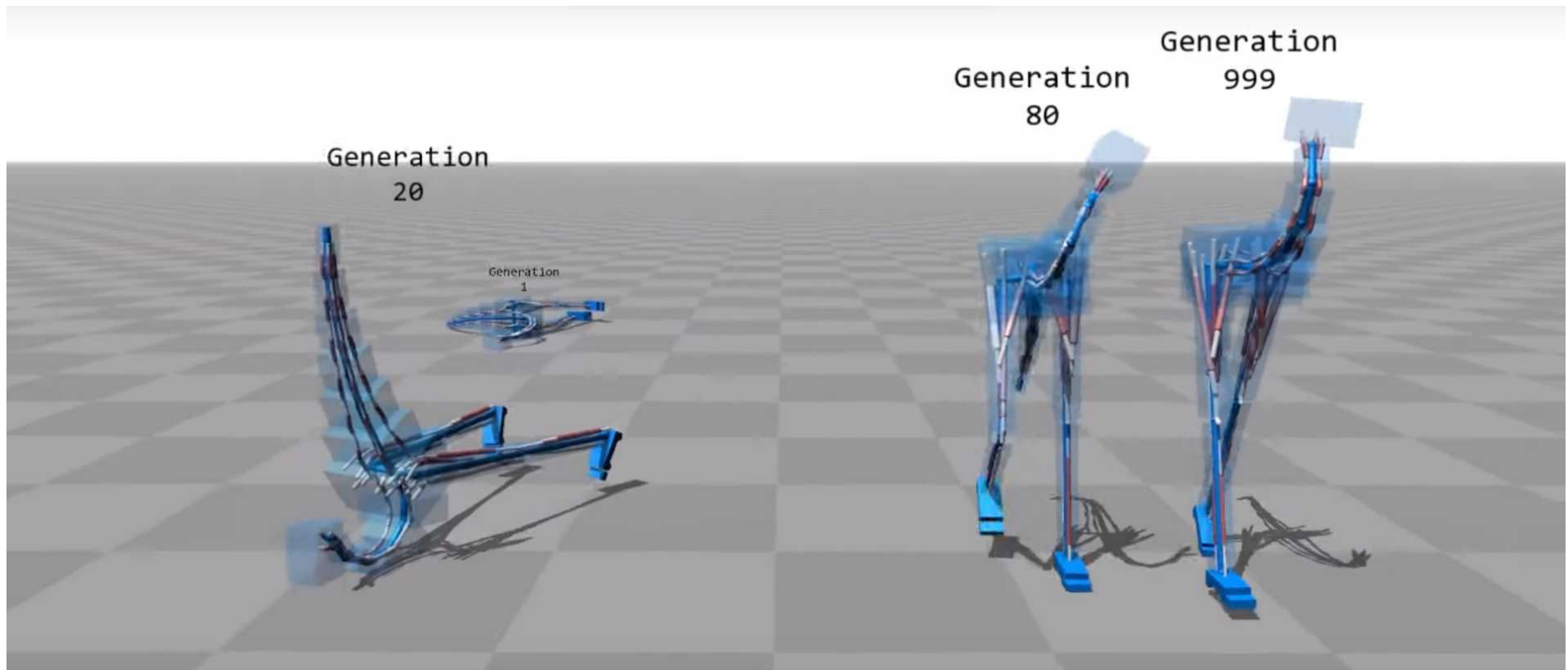
- Radiosity
- Raytracing
- Quality versus Speed
- GPU methods



Crassin, Cyril, et al. "CloudLight: A System for Amortizing Indirect Lighting in Real-Time Rendering." *Journal of Computer Graphics Techniques* Vol 4.4 (2015).



3 Reinforcement Learning in Graphics



Reinforcement learning is an amazing tool for optimizing the behavior of an agent in an environment. It is capable of playing computer games at a high level and also has applications in computer graphics. [Check this out.](#)

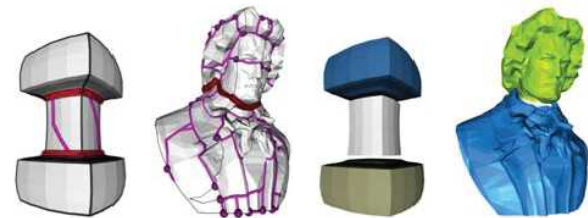




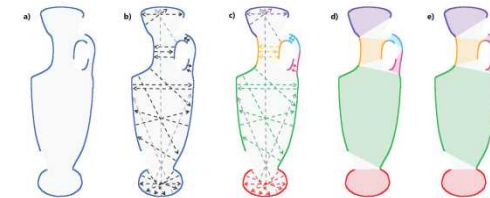
Neural networks are universal function approximators that are used to solve difficult problems in image and speech recognition, image synthesis, and many more. [Check this out](#) and see for yourself!



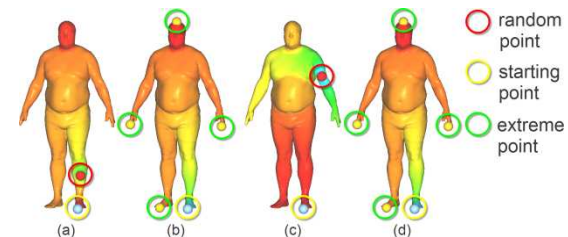
Conduct a survey of shape segmentation methods.



Pocket cuts [Lien et al 2007]



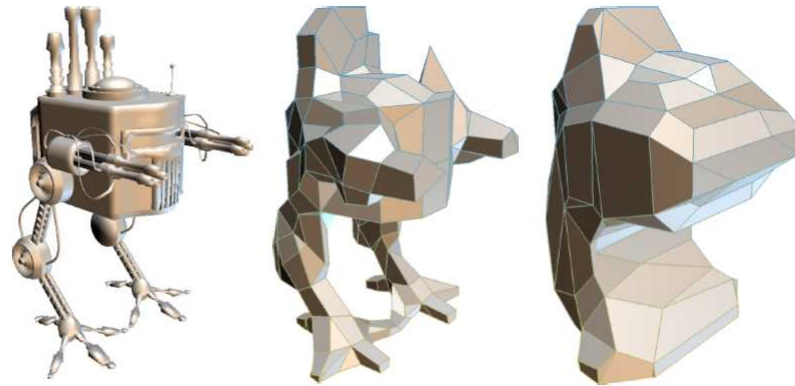
Lines of sight [Kaick et al 2014]



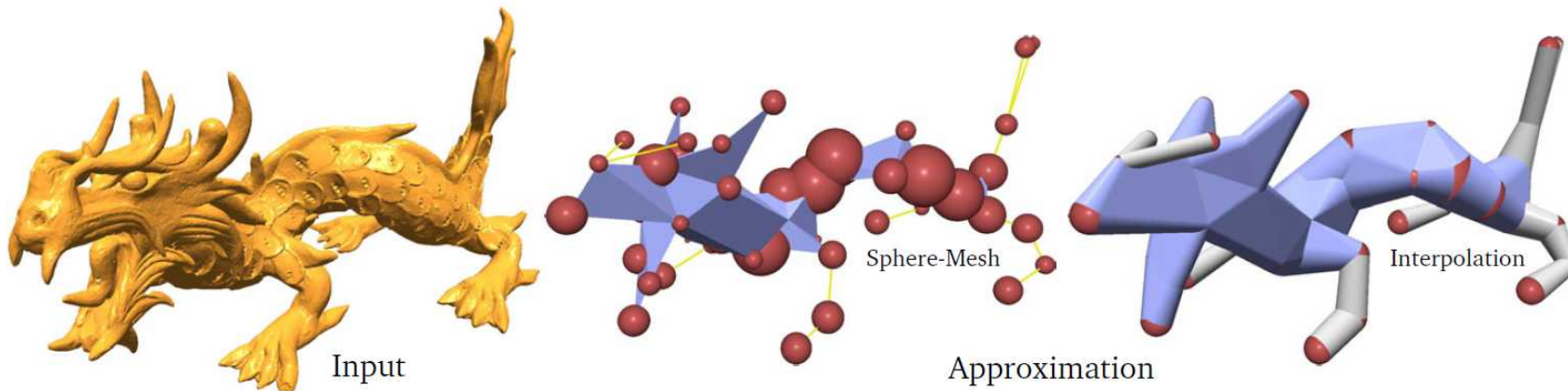
Concavity aware fields [Au et al 2012]



- Mesh simplification
- MAT, CSG
- Bounding volumes
- Sphere meshes
- Bounding proxies



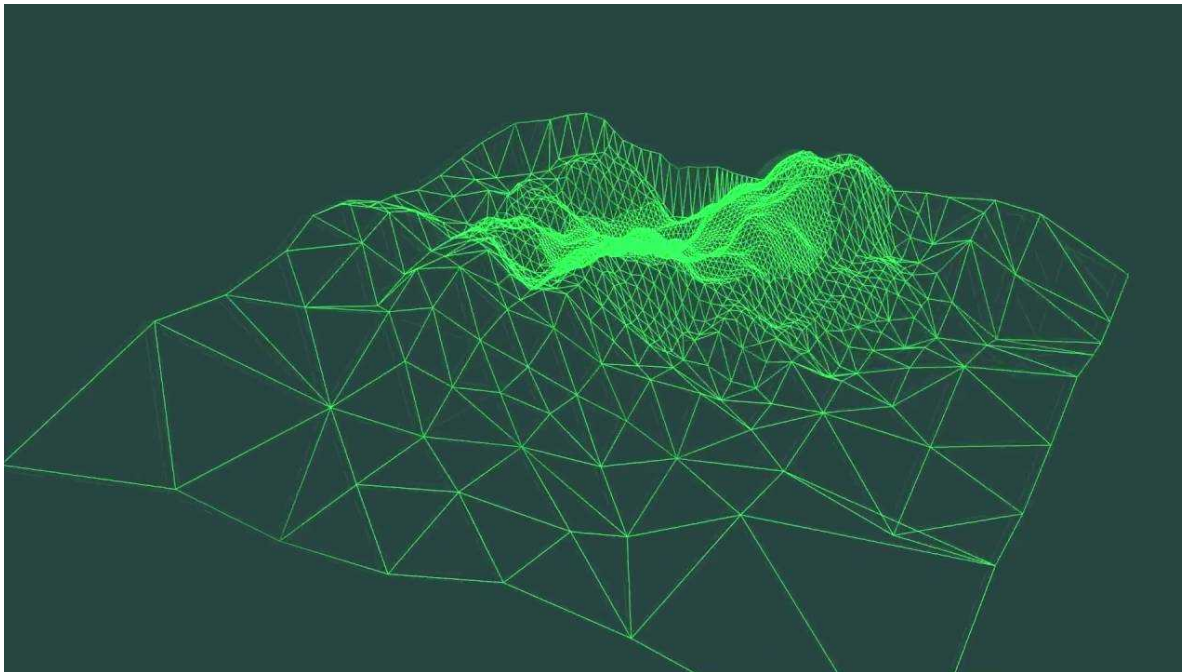
Bounding proxies. Calderon et al 2017.



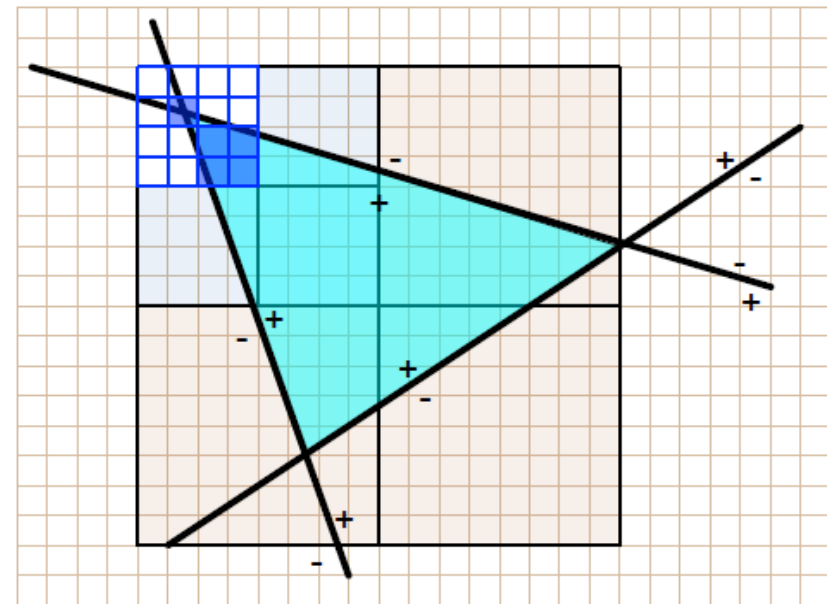
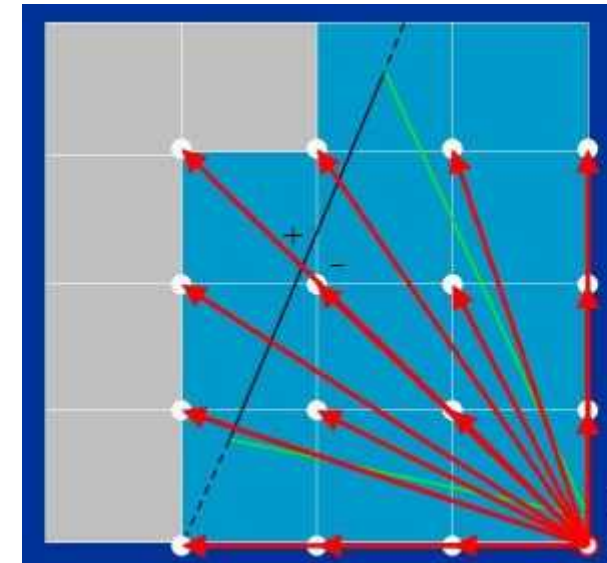
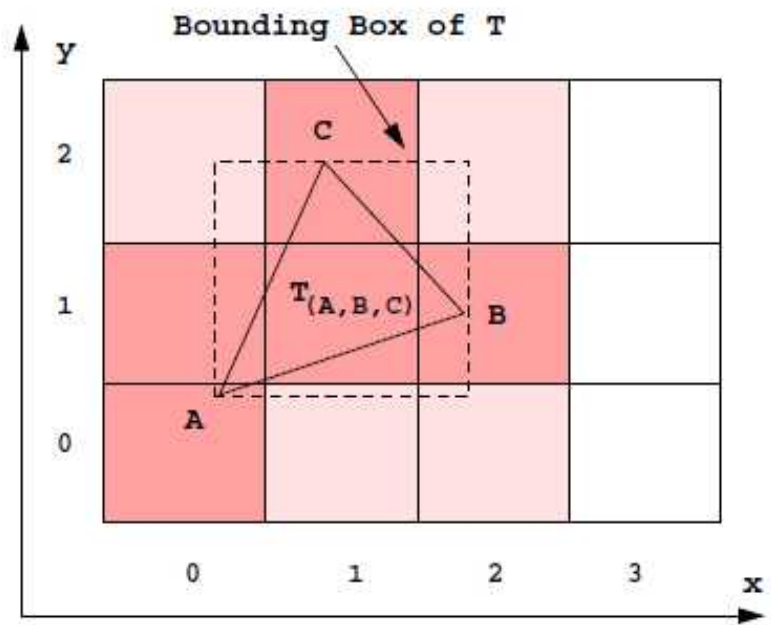
- Detailed 3D models require a lot of space
- Investigate 3D model compression techniques and their advantages (disk usage, load times, ...)



- Some models are too large to be loaded and rendered as a whole
- LOD structures allow you to load and render only the essential parts of a model (or map)



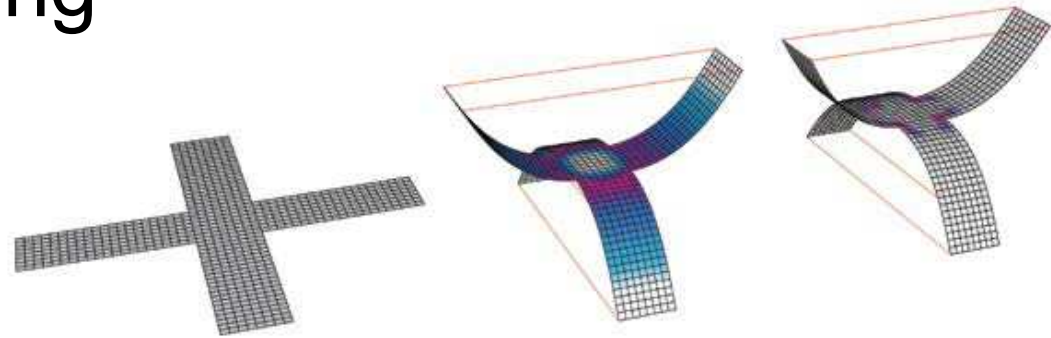
- Investigate how GPUs perform rasterization
 - ◆ Tile-Based Rasterization
 - ◆ Efficient Memory Patterns



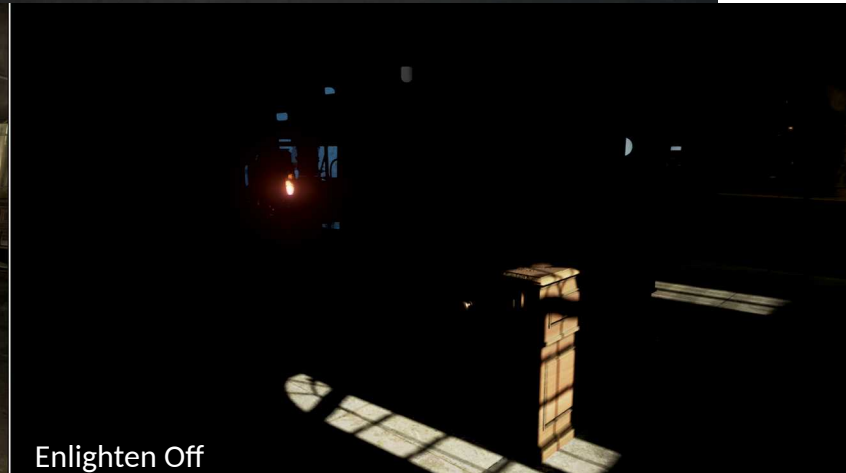
Survey about Bending Active Structures

■ Design Methods

■ Form Finding



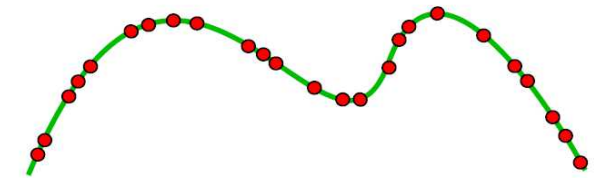
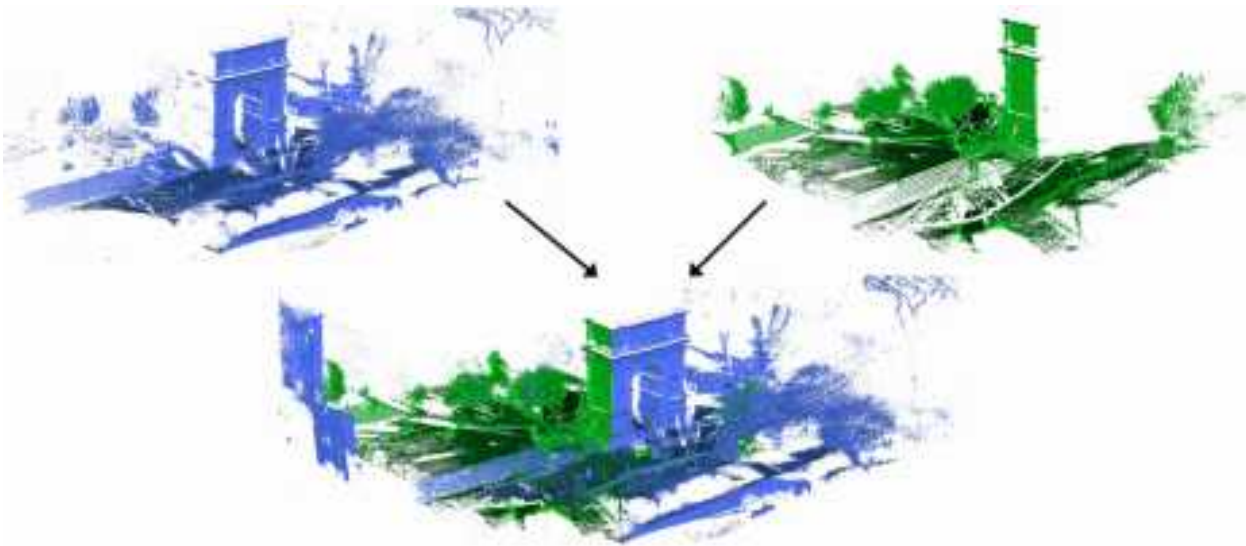
- provide an chronological overview of real-time global illumination techniques



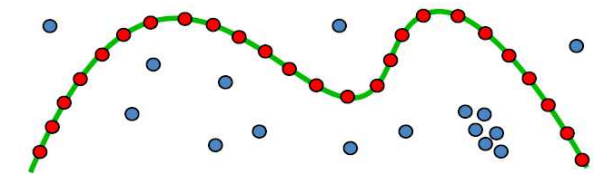
- provide an overview of techniques that can render specialized effects such as phosphorescence, fluorescence, chromatic aberration, lens flare, etc.



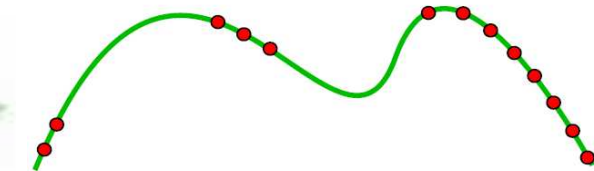
- Merge laser scans
- Match overlapping areas
- Problem: sampling artifacts



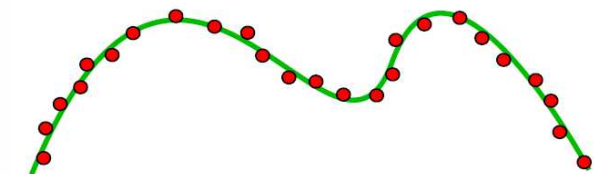
Nonuniform sampling



Outliers



Missing data



Noisy data



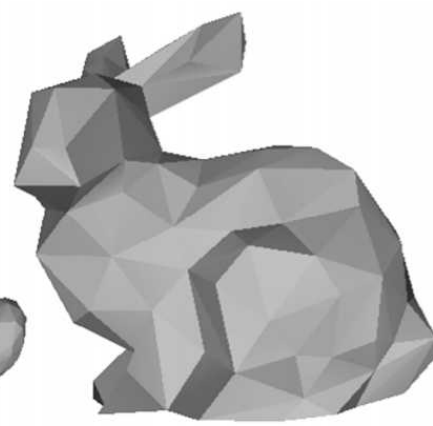
- Render only the necessary
- Increase performance
- Popping Artifacts



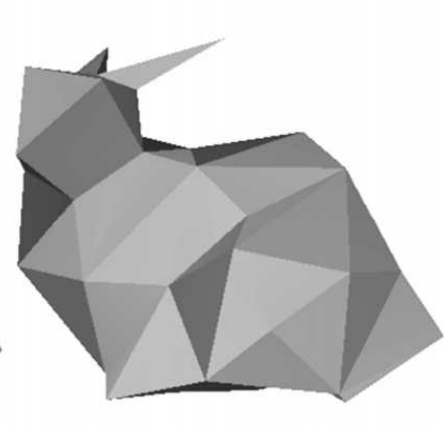
■ 69,451 polys



■ 2,502 polys



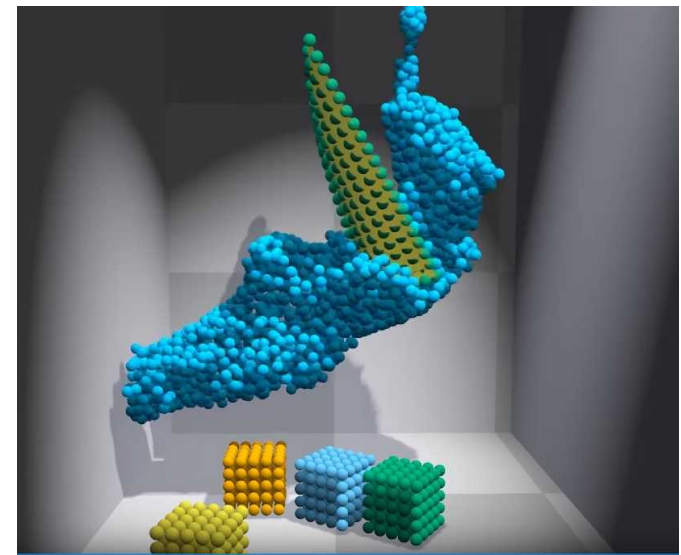
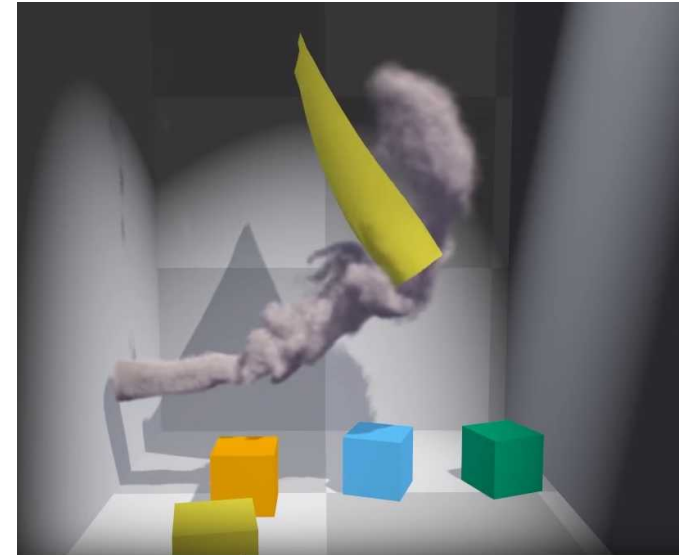
■ 251 polys



■ 76 polys

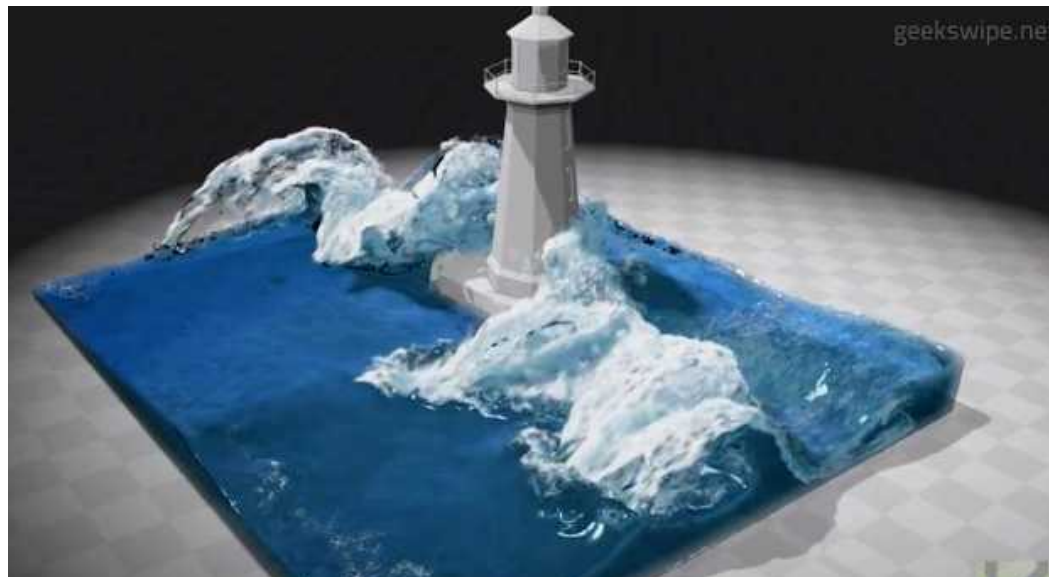


- Position-Based Dynamics
- Set of particles connected by constraints
- Stable two-way interaction of all object types
 - ◆ Cloth
 - ◆ Deformables
 - ◆ Liquids
 - ◆ Gases
 - ◆ Rigid Bodies

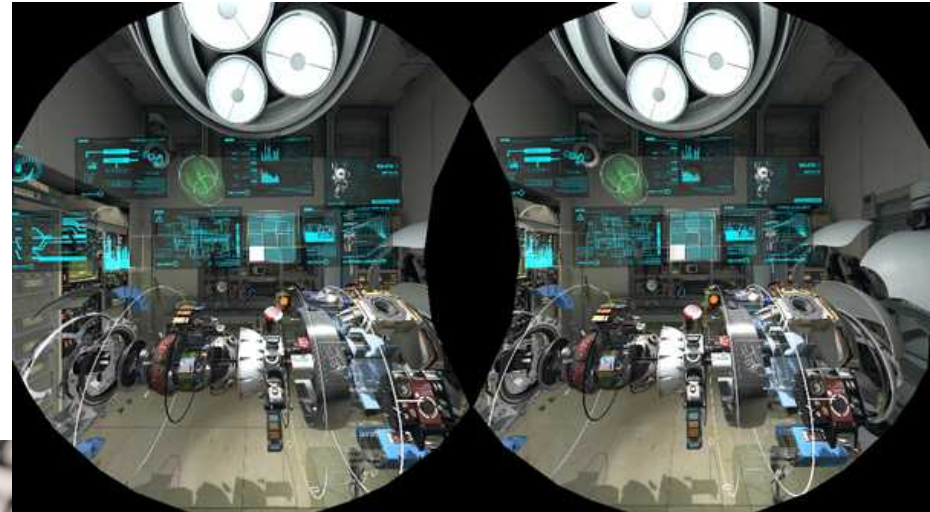


■ State of the art report about real-time fluid simulation techniques

- ◆ Position-Based Fluids
- ◆ Fluid-Implicit-Particle methods
- ◆ Data-Driven Fluid Simulations
- ◆ ...



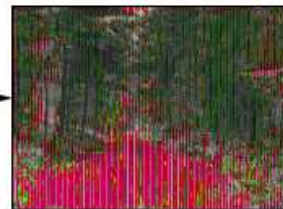
■ Conduct a survey on recent advances in rendering for VR.



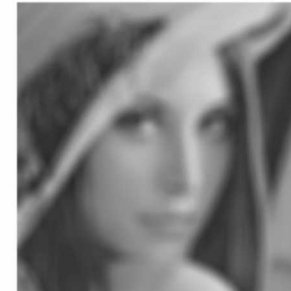
■ Conduct a survey on image comparison and quality metrics.



Visual
Difference
Predictor



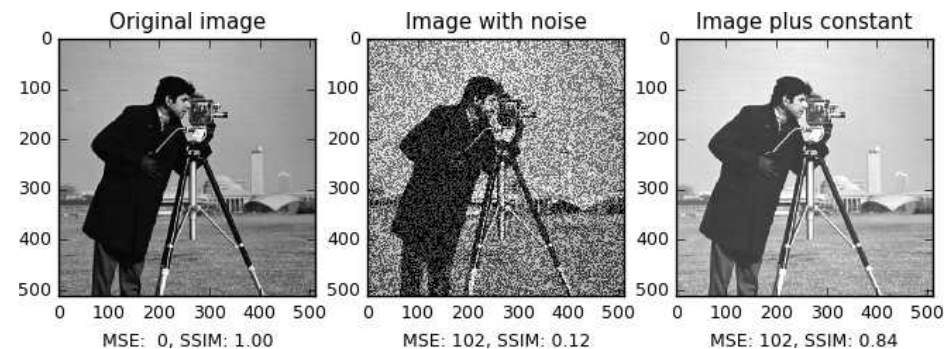
MSE=225, MSSIM=0.949



MSE=225, MSSIM=0.688



MSE=225, MSSIM=0.723



- Please mark at least 3 topics in order of preference (1, 2, 3, ...), with your name, email and student number
- Hand in the sheet
- Then I will assign the topics on the spot



- Get in contact with your supervisor ASAP
- Discuss literature list with your supervisor
- Submit the list (to both me and supervisor) per email by 25.10.

