186.175 Seminar aus Computergraphik 186.046 Seminar aus Visualisierung

SS 2021

Organizer: Hsiang-Yun Wu

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Institute of Visual Computing&Human-Centered Technology

TU Wien, Austria Last update: 10th March 2021

Seminars



- 186.175 Seminar aus Computergraphik (by default)
- 186.046 Seminar aus Visualisierung
- 186.848 Seminar aus Medizinischer Informatik
 - You are requested to work on a medical related topic



Seminar



Get an idea how scientific work is carried out (in CG)

- Practice to review literature and get familiar with a particular scientific topic
 - Selecting, reading and understanding
 - Summarizing and explaining (orally and written)
 - Comparing and discussing
- Write a review on a paper
- Practice to give a talk







Select a topic



Topic



- Students can work alone or in groups of 2
- State-of-the-Art
- TUWEL: <u>https://tuwel.tuwien.ac.at/course/view.php?id=35632</u>
- wu@cg.tuwien.ac.at

Important!!

Register your topic on TUWEL Registration start: today

Registration due to:

12th March 2021, 23:59

Rank by your preference



Seminar



Select a topic

Submit list of literature



Literature List



- List of papers related to the topic
- Seminar subscription
- **20.03.2021**: List of literature submission deadline
- Contact your supervisor
- Approx. 10~15 papers in a list (pdf)



Seminar



Select a topic

Submit list of literature

Attend 3 lectures

All three lectures will be held in the seminar room of institute 186



Attend 3 Lectures



31.03.2021 (Wed) 11:00 - 13:00 (s.t.)

Wie schreibt man eine wissenschaftliche Arbeit Professor Wimmer

13.04.2021 (Tue) 11:00 - 13:00 (s.t.) – Zoom Q&A from 13:00

Forschung und wie sie funktioniert

Professor Gröller

27.04.2021 (Wed) 11:00 - 13:00 (s.t.)

Wie halte ich einen Vortrag

Professor Purgathofer



Seminar



Select a topic

- Submit list of literature
- Attend 3 lectures
- Write the report



Report

- State-of-the-Art report
- Final report: 8 pages (16 pages / group)
- In English
- Regular meetings with supervisor
- Format as for a scientific paper
 - LaTeX (Template on the wepage)
- 22.04.2021: Report submission deadline (minimum 6 pages)



Seminar



- Select a topic
- Submit list of literature
- Attend 3 lectures
- Write report
- Write review



Review



- Review paper of other student (or group of students)
- Submit review form (on TUWEL)
- 25.04.2021: Receive a review form and a report from another student.
- **20.05.2021**: Review submission deadline
- 22.05.2021: Receive two reviews (one from your supervisor and one from another student)



Seminar



Select a topic

- Submit list of literature
- Attend 3 lectures
- Write report
- Write review
- Refine report



Seminar

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Select a topic

- Submit list of literature
- Attend 3 lectures
- Write report
- Write review
- Refine report
- Give a talk



Slides



- Use the institute format <u>Candidate for new Powerpoint template</u> <u>16:9</u> (<u>https://www.cg.tuwien.ac.at/resources/onTalks/</u>)
- Format: PDF or PowerPoint
- 09.06.2021 (17:00): Submit on TUWEL





Talk



- 15 + 3 minutes (will be adjusted based on the registered number)
- In English
- Active discussion participation
- 10.06.2021, 9:00 s.t. 17:00: Talks
 - on Zoom, Check the link on TUWEL



Seminar

Select a topic

- Submit list of literature
- Attend 3 lectures
- Write report (draft version)
- Write review
- Refine report
- Give a talk
- Submit final version



Report

- State-of-the-Art report
- 8 pages (16 pages if working in a group)
- In English
- Format reports in the style of a scientific paper
 - Use LaTeX (template is on the TUWEL/ LVA page)
- **18.06.2021**: Final report submission deadline



Grading

- It is necessary to attend the 3 lectures to get a positive grade!
- Grading criteria:
 - 45% written report
 - 30% presentation
 - 15% review
 - 5% attendance during the presentations
 - 5% active discussion after the presentations



Report Grading

Grading criteria:

Structure, figures,...

Language

- Content
- References
- Checklist

Downloads and Links

Downloads

- LaTeX template to be used for composing the report
- Libre Office or PowerPoint template for the student presentations
- "Forschung und wie sie funktioniert" (by E. Gröller)
- "Wie schreibt man eine wissenschaftliche Arbeit" (by M. Wimmer).
- "Wie halte ich einen Vortrag" (by W. Purgathofer).

Paper search engines

- Citeseer
- Google
- Free preprints of published and not (vet) published papers
- The Collection of Computer Science Bibliographies
- ACM Digital Library, SIGGRAPH Proceedings
- IEEE Computer Society Digital Library

Tips for writing papers and preparing presentations

- How to write a scientific paper
- Important Tips for presentation (in German)
- Tips and Suggestions for Presentations
- A not so short introduction to LaTeX
- Netspeak, one word leads to another.
- Thesaurus, an online engine to search thesaurus.
- Editsaurus, a free online grammar and spelling checker
- Grammarly, a free online grammar and spelling checker
- Overleaf, a free online LaTeX editor
- TeXworks, a free cross-platform LaTex package (Linux, MacOS, Windows)
- Tex Live, a free cross-platform LaTex package (Linux, MacOS, Windows)
- LaTeX Workshop, a free plug-in for Visual Studio Code
- Practical Tips and Tricks for Paper Writing MiKTeX, free distribution of LaTeX for Microsoft Windows
 - TexnicCenter is an IDE for developing LaTeX documents on Microsoft Windows

https://www.cg.tuwien.ac.at/research/publications/2010/groeller-2010-PTT/groeller-2010-PTT-.pdf

Report Grading



Points will be deducted for:

- Delayed submission
- Page number below 8 (16 in a group)

Plagiarism check!

	How many relevant references did the student provide?				
	How well was the topic covered by the related work?				
Structur	e and Format				
	Structure				
	Grammar and spelling				
	Citations and References				
	Figures				
	Is the Latex template correctly used?				
	Figure and section cross-referencing				
	Page limit: How many pages are missing?				
Languag	e / writing				
	Red thread / storytelling				
	Red thread / storytelling				
	Red thread / storytelling Understandability, accuarcy, compactness				
	Red thread / storytelling Understandability, accuarcy, compactness Consistency				
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Content	Red thread / storytelling Understandability, accuarcy, compactness Consistency Is the topic covered well? Discussion / categorization / comparisons Abstract Introduction				
Content	Red thread / storytelling Understandability, accuarcy, compactness Consistency Is the topic covered well? Discussion / categorization / comparisons Abstract Introduction Conclusion				
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"plagiarism involves the use of another person's work without full and clear referencing and acknowledgement" http://tim.thorpeallen.net/Courses/Reference/Citations.pdf



Presentation Grading

Grading Criteria

- Content Expertise
- Didactic / Preparation
- Presentation Technique
- Overtime





All the information is here:

https://www.cg.tuwien.ac.at/courses/SeminarAusCG/SE/2021S

All the questions go here:

https://tuwel.tuwien.ac.at/course/view.php?id=35632

or wu@cg.tuwien.ac.at



Topics 2021



1. Automatic Layout Generation



- Layout algorithms for computational composition of many media (text, images, etc.) into a single:
 - Magazine cover
 - Advertisement or banner
 - Poster ...



[Liang et al., BigMM 2018]



2. Visualization of Bipartite / k-Partite Graphs



- Graph with vertices divided into two independent sets, such as
 - People and affiliations, genes and conditions, actors and movies
- Which visualization techniques exist?
- How to explore a k-partite graph interactively?



[Sun et al., BiSet, TVCG 2016]



[Streit et al., Furby, BMC Bioinformatics 2014]



3. Visualization of Networks in Virtual Reality



Immersive analysis of 3D graphs in virtual reality from the 90ies to now:

- Rendering & graph layout
- Embodied interaction & effective locomotion



[Osawa et al., 2000]

[Drogemuller et al., 2017]

[Kwon et al., 2016]



4. Cluster-Separation Measures





5. Automated Generation of Infographics



A.	B .	C. destination	D. departure	E. arrival	F.
scheduled	carrier	city name	delay (min)	delay (min)	passengers
01-Jan 00:05	UA	New York	-4	1	193
01-Jan 04:00	AA	Los Angeles	0	-2	204
01-Jan 06:13	MQ	San Francisco	7	-11	96
01-Jan 07:33	00	Atlanta	11	-2	112
•••		•••	•••	•••	•••













6. Hierarchical Aggregation for Information Visualization





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Figure 1: An X-ray is augmented onto the user. The X-ray is simulated from a CT of the same person. The printed image is a real X-ray of the same person.

[Blum 2016, mirracle]



8. Style Transfering







9. Visualizing Dynamical Systems in Biology



[Amirkhanov et al. 2019]

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10. Texturing: Past and Present



Conduct a survey of the history and the state of the art in texturing



nttps://developer.nvidia.com/gpugems/gpugems2/part-ii-shading-lighting-and-shadows/chapter-11-approximate-bidirectional-texture



11. Molecular VR



Conduct a survey of the state of the art in molecular VR



https://dl.acm.org/doi/fullHtml/10.1145/3388536.3407891



12. Post Processing



Conduct a survey of the state of the art in post processing



https://developer.nvidia.com/gpugems/gpugems/part-iv-image-processing/chapter-21-real-time-glow



13. Text and Image Labeling in AR



Challenge:

Combinatorial complexityOptimization







14. Visualization of Knowledge Graphs



Challenge:

Formulation for machine learning technique







15. Sport Analytics



- Tactic development
- Education and training
- Visualization



without dribbler loss

with dribbler loss



16. Visualization & 3D Interaction Techniques for Remote Analysis in AR/VR Applications



The testing or exploration of components or products over long distances (remote analytics) is of high importance in industry. By **supporting or guiding the analysis on-site** by a remote expert, a strong cost reduction can be achieved by eliminating the need for experts on-site and thus enabling much faster decision making. Multidimensional data which has a physical reference, i.e. from material structures, can rarely, or only to a limited extent, be evaluated on desktop monitors using standard 2D visualization techniques. This requires new **immersive visualization and interaction techniques** that realize efficient remote collaboration or telepresence between off-site experts and on-site technicians. Your task is to provide an overview over the state-of-art methods which can be used to enable a **Remote Analysis** in AR/VR applications.



2] "3D Collaboration Method over HoloLens™ and Skype™ End Points" 📔 [1] "Augmented Reality for Remote Collaboration in Aircraft Main





17. Tracking and Visualization of Features

Feature tracking and visualization has long been an important topic in the field of time-varying volume visualization, and its objective is to identify features and determine the correspondence between them in adjacent time steps. Tracking the evolutionary process of features not only has the potential to improve understanding scientific phenomena, but also to lead to new insights into the mechanisms underlying evolutionary events. Feature tracking algorithms aim at identifying the temporal evolution of features in a series of raw data snapshots, as XCT scans of in situ experiments or time-varying multidimensional datasets. In order to trace or understand the evolution of the features, a visualization of their changes is necessary.





18. Immersive Analytics for Volumetric Data



In recent years, augmented and virtual reality have gained attention, due to head-mounted displays and mobile devices supporting such immersive environments becoming more and more affordable. Immersive analytics systems implemented on such devices are increasingly used, also in the analysis of large volumetric data, such as acquired from magnetic resonance imaging or X-ray computed tomography. Volumetric datasets are acquired and analyzed in a wide variety of domains, such as the medical sciences, biology, or in material sciences. Immersive analytics systems require new visualization and interaction paradigms, when compared to traditional desktop computer systems; in the context of the immersive analysis of volumetric data, this applies for example for tasks such as refining the viewing parameters, or analyzing data derived from the volumetric data. Your task is to provide an overview over the state-of-the-art of immersive analytics methods for exploring volumetric data.



Source: Mirhosseini et al., 2019 [1]

Source: Sereno et al., 2019 [1]



19. Neural Volume Rendering





(a) Capture Process

(b) Input

(c) Nerfie

(d) Nerfie Depth

https://dellaert.github.io/NeRF/



20. Visualization of Dynamical Systems







21. Visualization of Text in Voynich Manuscript





Common syllables in a Geman book, showing entire volume





Folio 68



Topics 2020



- 1) Automatic Layout Generation
- 2) Visualization of Bipartite / k-Partite Graphs
- 3) Visualization of Networks in Virtual Reality
- 4) Cluster-Separation Measures
- 5) Automated Generation of Infographics
- 6) Hierarchical Aggregation for Information Visualization
- 7) The Use of Markerless Augmented Reality in Anatomical Education
- 8) Style Transfering
- 9) Visualizing Dynamical Systems in Biology
- **10)** Texturing: Past and Present
- 11) Molecular VR
- 12) Post Processing
- 13) Text and Image Labeling in ARSpecial Effects in Computer Graphics

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- 14) Visualization of Knowledge Graphs
- 15) Sport Analytics
- **16)** Visualization & 3D Interaction Techniques for Remote Analysis in AR/VR Applications
- 17) Tracking and Visualization of Features
- 18) Immersive Analytics for Volumetric Data
- 19) Neural Volume Rendering
- 20) Visualization of Dynamical Systems
- 21) Visualization of Text in Voynich Manuscript

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Thank you.

Projects: https://www.cg.tuwien.ac.at/courses/Topics

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