Chair for Computer Graphics and Visualization
TUM School of Computation, Information and Technology
Technische Universität München

Kick-off Session for Master Seminar

Recent Highlights in Visual Data Analytics (IN2107)

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Dr. Junpeng Wang

April 10, 2024

Outline

- What to expect
- Visual data analytics
- Schedule of the seminar
- General information
- Questions

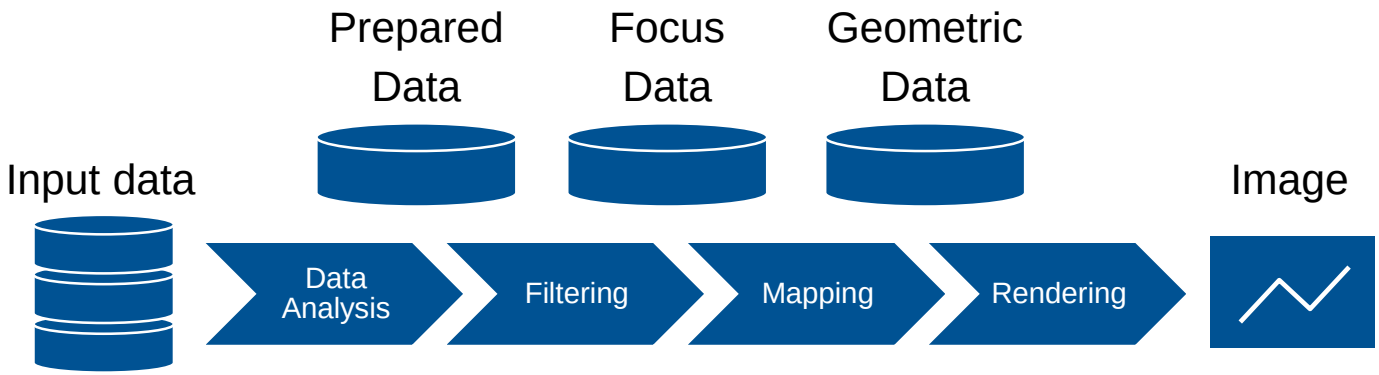
What to expect

During the seminar, you will…

- Work independently on **recent topics in visual data analytics**
- Read and understand a **recent publication from the field**
- Write a short **summary report** about said publication
- Give a **presentation** about the topic of the paper

Visual Data Analytics

The Visualization Pipeline



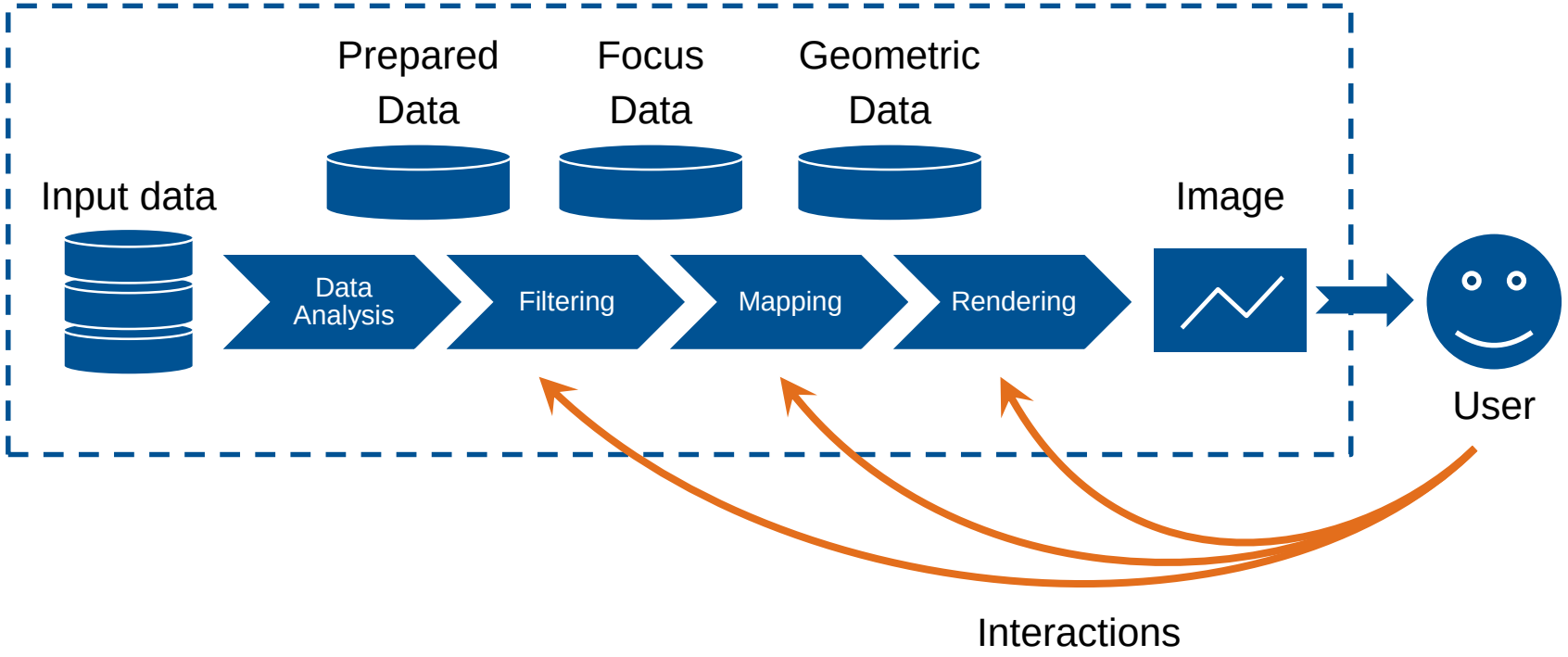
- Missing data handling
- Smoothing
- Interpolation
- …

- Selection
- Priorization
- …

- Shapes
- Positions
- Colors
- …

- Splatting
- Line rendering
- Volume rendering
- …

The **Visual Analytics** Pipeline



Visual Analytics Research

By Data:

- Information visualization
  - Tabular data
  - Tree data
  - Text
  - Unstructured data
- Scientific visualization
  - Volumetric data
  - Meshes
  - Time series
  - Uncertainty information
  - …

By Application:

- Medical data
- Physical sciences
- Engineering
- Social sciences
- Machine learning
- …

By Methodology:

- Volume rendering
- Dimensionality reduction
- Superresolution
- Data abstraction
- …

Papers for the Seminar

Papers for the Seminar

1. A Comparative Visual Analytics Framework for Evaluating Evolutionary Processes in Multi-objective Optimization
2. A Parallel Framework for Streaming Dimensionality Reduction
3. Adaptive Sampling of 3D Spatial Correlations for Focus+Context Visualization
4. ASTF: Visual Abstractions of Time-Varying Patterns in Radio Signals
5. AttentionViz: A Global View of Transformer Attention
6. Class-constrained t-SNE: Combining Data Features and Class Probabilities
7. DendroMap: Visual Exploration of Large-Scale Image Datasets for Machine Learning with Treemaps
8. Fast Compressed Segmentation Volumes for Scientific Visualization
9. IDLat: An Importance-Driven Latent Generation Method for Scientific Data
10. Interactive Focus+Context Rendering for Hexahedral Mesh Inspection
11. Interactive Visual Cluster Analysis by Contrastive Dimensionality Reduction
12. Interactive Volume Visualization via Multi-Resolution Hash Encoding based Neural Representation
13. ManiVault: A Flexible and Extensible Visual Analytics Framework for High-Dimensional Data
14. Parametric Dimension Reduction by Preserving Local Structure
15. PC-Expo: A Metrics-Based Interactive Axes Reordering Method for Parallel Coordinate Displays
16. Photon Field Networks for Dynamic Real-Time Volumetric Global Illumination
17. PROWIS: A Visual Approach for Building, Managing, and Analyzing Weather Simulation Ensembles at Runtime
18. PSRFlow: Probabilistic Super Resolution with Flow-Based Models for Scientific Data
19. The Transform-and-Perform Framework: Explainable Deep Learning Beyond Classification
20. Uncertainty-Aware Multidimensional Scaling
21. Uncertainty-Aware Principal Component Analysis

Seminar Schedule

- Students select a paper from the pool of listed publications
  - Send us your preferences via mail: list **at least 4 papers**, ranked as 1 (highest priority), 2, 3, …
  - **Deadline** for preference submission: **April 17, 2024, 23:59 (CET)**
  - Papers will be matched with the preferences of the students (if possible)
- Students read their paper and submit a **written summary report** (of the paper) by mid of the semester
  - **Deadline** for report submission: **May 31, 2024, 23:59 (CET)**
  - Use latex template provided on webpage, **4-6 pages with 2 appropriately sized figures (max)**
- Students hold a **40 minutes presentation** about the paper in front of the seminar
  - Dates for presentations: **First week of July 2024**
  - Presentations will be held in “sessions” filled with similar papers, similar to a conference format

General Information

- You will be assigned one of the following supervisors:
  - Fatemeh Farokhmanesh
  - Kevin Höhlein
  - Dr. Junpeng Wang

- If you have questions or want feedback on your report / presentation – contact your supervisor
- Don’t miss **deadlines!**
- Language of the seminar is **English**
- **Presence in the presentation sessions is mandatory**!
- Use proper citations when working with sources / references!
- Avoid working only in the last few days – feedback may not be possible anymore

Questions?


setup
analytics
toolkits
illumination
compression
prototyping
system
attention
projection
analysis
framework
t
machine
hex
manifold
objective
latent
tracing
GPU
error
parallel
reduction dimensionality
marching
computer
resolution
provenance
normalizing
integration
rendering
streaming
diagrams
storytelling
linear
AI
time
ensemble
human
segmentation
neural
explainable
management
deep
transformer
chord
contrastive
abstraction
data
volume
dimensionality reduction
representation
high dimensional
oriented
signal
meshes
coordinates
multi
correlation
non
SNE
uncertainty
sequence
scientific
binary
centered
constraint
multidimensional
vision
weather
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super
global
space
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treemaps
implicit
radio
sampling