

PA214 Visualization II / Seminar #1

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Seminar 1 – project topics

HCI^{LAB}

visitlab

Course Aim and Goal

- Today, you will pick a topic from our list or you can come with your own
- You can work individually or in groups
 - The number of people in the group will influence the required complexity of the final solution
 - We slightly prefer team projects ;)
- We will (roughly) follow the workflow used in the visualization research
 - You will go through all the stages including writing the research report.
- The main goal is to **understand what it means to do a research in visualizations**

Seminar organization

- Sharing progress (2nd and 4th seminar)
 - Up to 5 minutes – highlights of your work, achievements and failures
- Individual consultations
 - Consultations and feedback on your progress from Bára and Vitek
- Individual work on projects
 - Time for you to work on the issues you struggle with
- **We expect you to work on the project during the seminars and between them**

Grading Rules

- **Five deliverables** throughout the semester
- You need to get **at least 1/3 of the points** from **each** deliverable
- **Minimum score** for passing the course is **26 points**.
- **Grades:**
 - 50-46 points A
 - 45-41 points B
 - 40-36 points C
 - 35-31 points D
 - 30-26 points E
 - 25-0 points F

Deliverables 1/2

- D1: Do the related work research, familiarize with the data, formulate visualization task requirements, create the initial design sketch
 - *Related work, task requirements, data analysis (written report – Word / Google Docs / Miro / plaintext file)*
 - *5 points*
- D2: Finalize the design, select technologies, map data to the UI, start with the implementation (data processing)
 - *final design (pen&paper/digital sketches)*
 - *data processing implementation progress (show us the progress)*
 - *10 points*

Deliverables 2/2

- D3: Finalizing the implementation
 - *20 points: complete implementation*
 - *20 points*
- D4: Presenting the result
 - *Project presentation*
 - *5 points*
- D5: Project report
 - *Research report (initial submission) + feedback implementation (final submission)*
 - *5+5 points*

Seminars Schedule

Seminar 1	Assignment: Related work research, obtaining the data, analysis of task requirements, preparing the sketch of the initial design
	Feedback on: initial sketch (for review), data parser (to discuss)
Seminar 2	Assignment: Finalize the design, select technologies, map data to the UI, start with the the data processing implementation <i>Deliverable: Related work, task requirements, data analysis (D1)</i>
	Feedback on: final design, data preprocessing state, selected technologies
Seminar 3	Assignment: implementation - data processing, initial UI layout (no interaction) <i>Deliverable: final design, data processing implementation progress (D2)</i>
	Feedback on: current state of the implementation
Seminar 4	Assignment: Implementation of the interactivity (linked components, filtering, ...)
	Feedback on: current state of the implementation
Seminar 5	Assignment: Finish the implementation, prepare the presentation, written report info
exam period	Presentations + Written report <i>Deliverables: implementation (D3), presentation (D4)</i> <i>Deliverable: Research report (D5)</i>

Topic 1: Open Data Brno/Prague/Bratislava?

- Many big cities nowadays have Open Data portals containing various public datasets. For example this dataset mapping of movement, gender, age composition, method of transportation or groupness and activities of people within the Pribinova zone in Bratislava.
- <https://opendata.bratislava.sk/en/dataset/show/Mapovanie-pohybu-ludi-v-ramci-zony-Pribinova>

*For some of the datasets, you can find also their visual representations on their webpage. However, many of them are not appropriate. One example is the map of movements of citizens, captured from the data from mobile operators in Brno: <https://data.brno.cz/app/41bd778ef2e24f8d985cd54a963ce7a6>

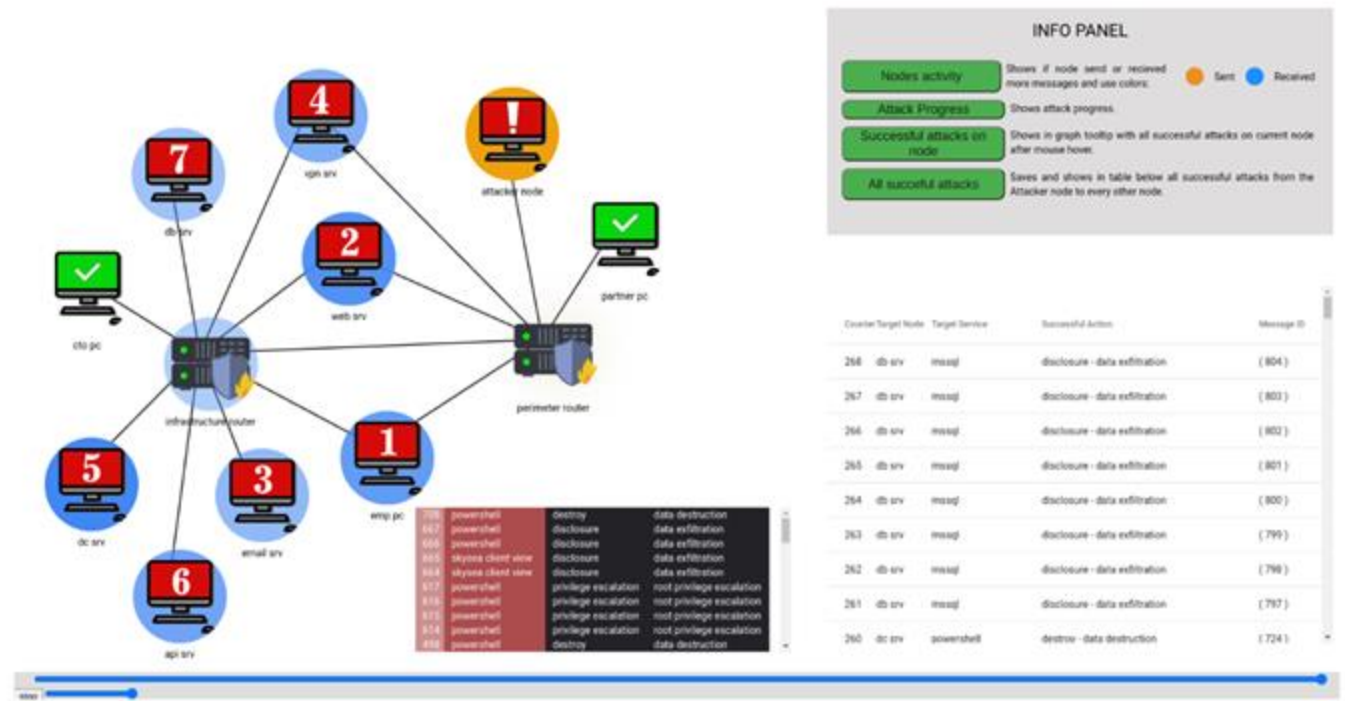
Topic 2: NASA Data Visualization

- **NASA has many datasets publicly available**
 - <https://data.nasa.gov/browse>
- Browse the datasets, select one (or combine more of them), and design your visualization for that



Topic 3: Cyber-Attack Simulator

- At the MUNI Cybersecurity Team, we develop a simulator of autonomous attackers. We need to analyze the data from simulation runs, describe and identify interesting characteristics of the attackers, compare them and highlight successful and unsuccessful attack strategies.
- We already have some work-in-progress prototypes:
 - <https://is.muni.cz/auth/th/xksi9>
 - <https://is.muni.cz/auth/th/kwd3w>
 - <https://is.muni.cz/auth/th/jl0cs>



Topic 4: Disaster at St. Himark

VAST 2019 Challenge

- Design visual analytics tools to help emergency services in understanding and managing the situation after earthquake in a city with nuclear power plant. You can choose from 3 mini-challenges:
 - 1. Identify areas of concern** based on citizen reports from damage reporting app and shake maps.
 - 2. Analyze contamination** from power plant based on stationary and mobile sensors.
 - 3. Social media** analysis to identify what the emergency concerns of the populace are.
 4. You can also fuse all the data together to get the big picture!

<https://vast-challenge.github.io/2019/overview.html>

Topic 5: Suicide Risk Analysis

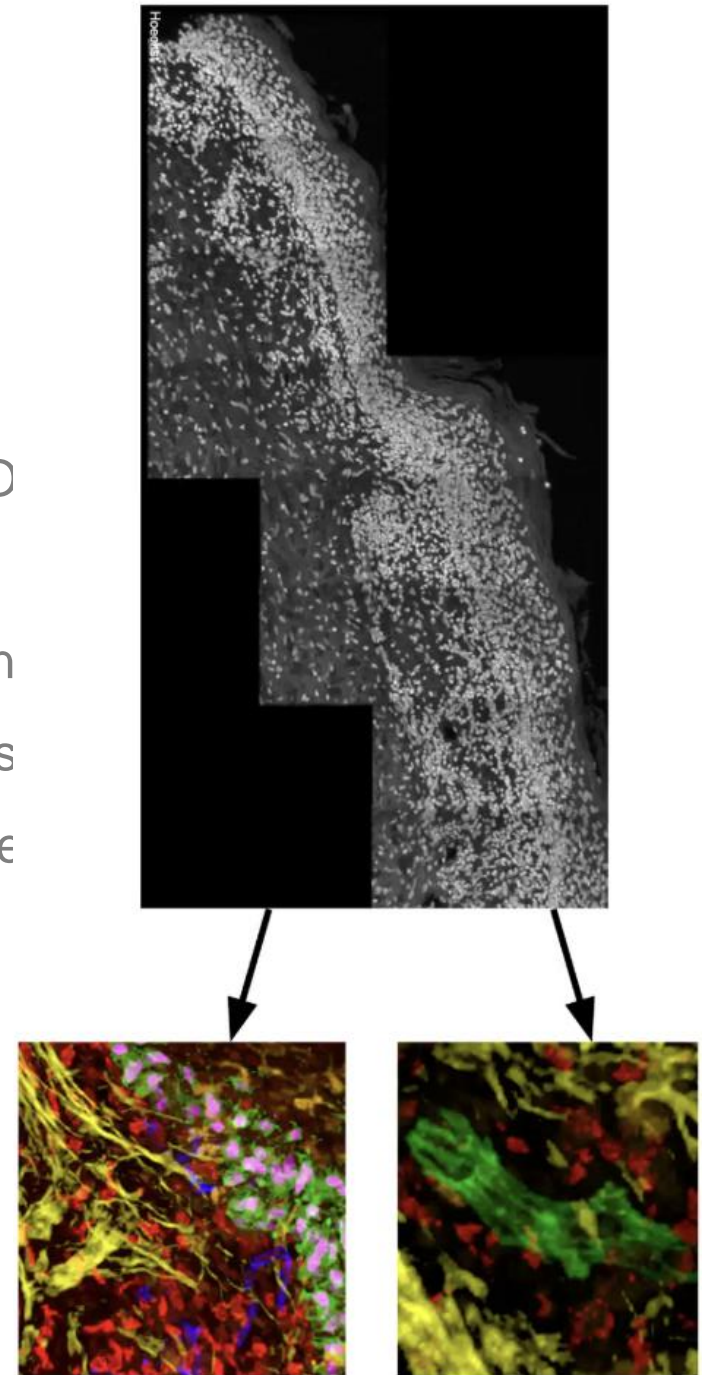
BioVis 2020 Challenge

- Design visualizations to help with analysis of multidimensional clinical geneological dataset of suicide risk. The dataset contains a selection of 10 family trees with a high incidences of suicide. Each person in the datasets is associated with a wide set of attributes, including demographic and clinical information.
- http://biovis.net/2020/biovisChallenges_vis/#data-challenge

Topic 6: 3D Microscopy Imaging: From a RAW imaging volume to biological findings

Bio+MedVis Challenge 2024

- Develop algorithms that optimize camera views for Regions of Interest (ROI) containing key biomarkers.
- Find multiple optimal views for each target structure with minimal occlusion
- Create a sequence of views that effectively highlights the regions of interest
- Develop methods, such as animation, to smoothly navigate between different view configurations.
- Suitable for teams
- http://biovis.net/2024/biovisChallenges_vis/



Topic 7: Visualization-based Discovery of novel materials

2025 IEEE SciVis Contest

This year's contest focus on the visualization-based discovery of **novel materials in recycling**. Overall, the contest is about applying more sophisticated visualizations, which could promote sustainability and innovation in materials engineering. The goal is to leverage advanced multidimensional visualization techniques to analyze complex data generated from simulations of chemical compositions and material properties. The contest comprises two main challenges:

Challenge 1:

Develop new multidimensional visualization methods that provide a comprehensive overview of simulated candidate materials.

Design interactive visualization tools that facilitate the exploration and comparison of candidate materials based on their composition, microstructure, and properties.

Challenge 2:

Integrate visualization with optimization algorithms to effectively direct simulations toward finding ideal chemical compositions.

Suitable for teams. Ideally motivated ones who are willing to continue with the project after the course.



- <https://sciviscontest2025.github.io/>

Topic 8: Might be Yours!

- **Let's discuss your own topic**