

3MD3270 - Visualisation de données

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Nombre d'heures d'études élèves (HEE) : **40**

Nombre d'heures présentielles d'enseignement (HPE) : **24**

Année académique : **2024-2025**

Niveau avancé : **non**

Présentation, objectifs généraux du cours :

As the amount of data is growing faster than the speed of computers to process them, it becomes harder to analyze this data, to understand it both at a global level and at a smaller scale, and to make decisions based on the data. Visualization turns data into visual representations that allow users to understand it and to provide them with interactive tools that are designed to efficiently navigate and analyze these representations. The class introduces students to the field of visualization, discusses various types of visualizations according to the type of data being analyzed (tabular data, hierarchical data, graphs, texts, 3D data), and teaches the process to build data analysis tools.

Prérequis :

There is no official prerequisite for this course. However, to be successful in the class the students are expected to:

- have basic knowledge of programming
- be able to work with basic data tables (CSV) using standard tools such as MS Excel or LibreOffice
- be able and willing to learn a new data processing/visualization API, and independently debug code and solve issues using online resources.

Plan détaillé du cours (contenu) :

- 1. General class introduction, introduction to information visualization
- 2. Perception and color
- 3. Multi-dimensional data visualization
- 4. Graphs and trees
- 5. Interaction
- 6. Storytelling with data
- 7. Text visualization
- 8. 3D data visualization

Déroulement, organisation du cours :

- Each lecture block comprises a 1h30' lecture and a 1h30' lab. The lectures introduce basic concepts, while in the labs the students do practical exercises and are introduced to the assignments they complete in-between meetings.

Organisation de l' valuation :

We evaluate the course as follows:

- Assignments: The assignments are practical exercises done in groups, based on the material taught in the lectures. They have to be submitted between two meetings, and will be peer-reviewed. Students are graded on their participation in this peer feedback process. Assignments have to be handed in on time, otherwise students do not receive feedback and lose points.
- Project presentation: The final result of the assignment series is presented, and the presentation and the project itself are graded.
- Final exam: multiple-choice exam based on the lecture material.

We split the overall grade as follows:

- Peer feedback participation, on-time assignment submission: 10%
- Final group project and its presentation: 40%
- Final exam: 50%

Moyens :

- Assignments, project presentations, final exam.

Acquis d'apprentissage vis s dans le cours :

To understand the need for visualization to make sense of data

- to understand different data types and their visualization needs
- to understand the implications of the human visual system for visualization
- to get to know different types of visual representations
- to understand the need for and potential of interactivity for visualization
- to get practical experience through a group project, developing a visualization tool for a self-chosen dataset

Description des comp tences acquises   l'issue du cours :

- We expect that by the end of the course, the students will have a thorough understanding of data visualization techniques.

Bibliographie :

- Datasets: varying, to be chosen by the students Software tools for data visualization: <https://p5js.org/>, <https://plotly.com/>, <https://matplotlib.org/>, and similar
- Related conference: IEEE Conference on Visualization <http://ieevis.org/>
- Related courses: computer graphics, human-computer interaction, visual analytics, scientific visualization