DATA ANALYSIS, VISUALIZATION & INTERACTION

Aviz

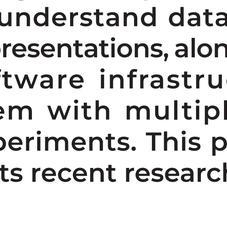
Aviz is a research group of Inria dedicated to using visual representations and interactions to understand data. It creates new visual representations, along with new interactions, software infrastructures, and validates them with multiple methods including experiments. This poster showcases some of its recent research projects.

Jean-Daniel Fekete

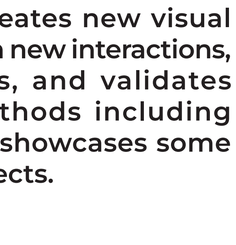
Petra Isenberg

Tobias Isenberg

Frédéric Vernier



Pierre Dragicevic



Steve Haroz

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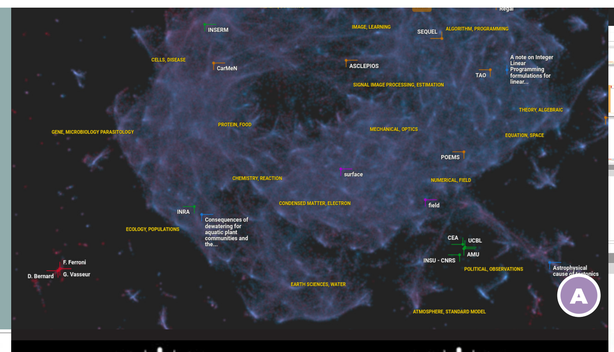

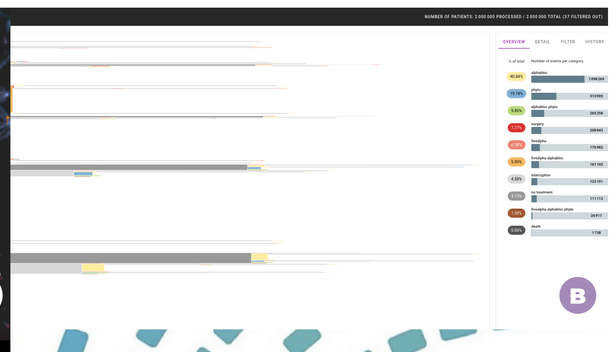

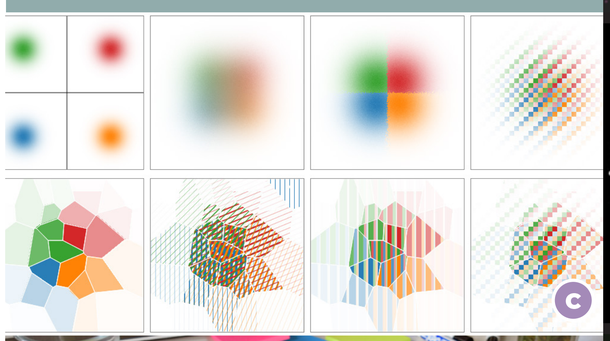

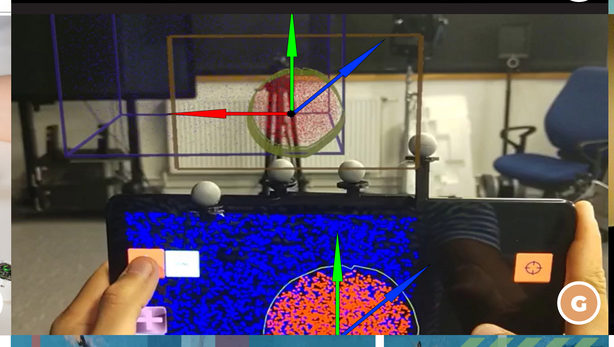

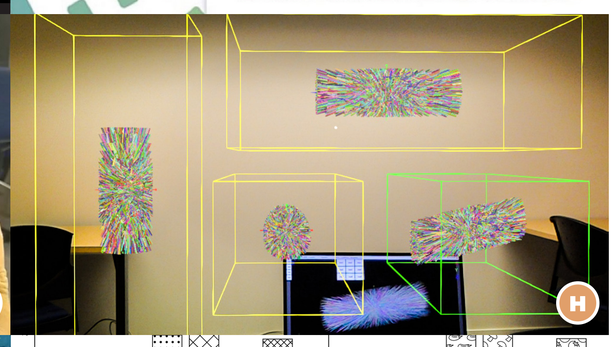

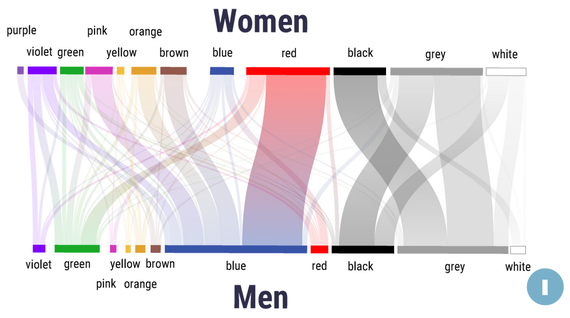

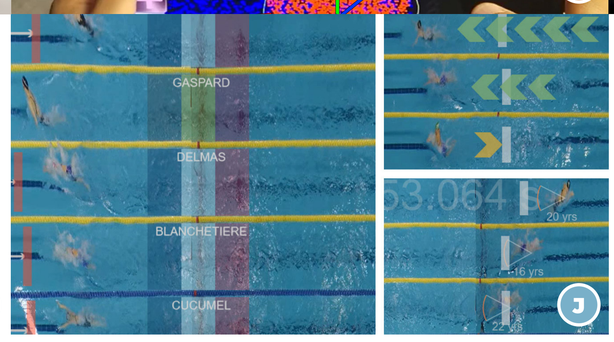

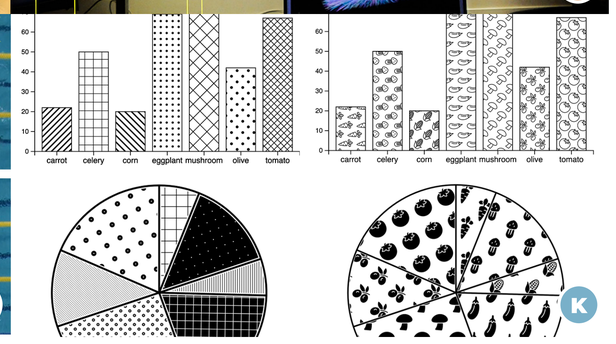

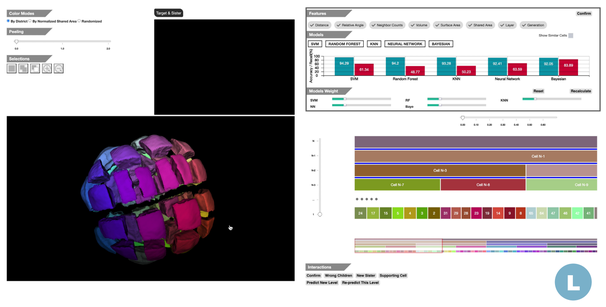

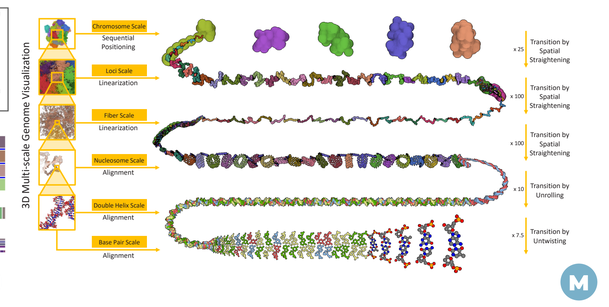

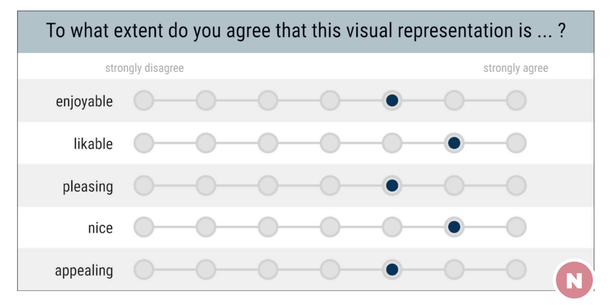

SCALABILITY

A Cartolabe

Cartolabe is an open-source software that builds and visualizes a visual map representing the scientific activity of an institution/university/domain from published articles and reports. Using the HAL Database, Cartolabe provides the user with a map of the themes, authors, and articles published by French public institutions. Several machine learning techniques are used for dimensionality reduction, clustering, and topic identification. Scalable interactive visualization techniques are used for the 2D representation of the results. It is a joint project with the TAU Inria project-team.

B ParcoursVis

ParcoursVis is an open-source software designed to explore patients' care pathways at scale. Current tools to visualize temporal event sequences are limited to tens of thousands of sequences to remain interactive. ParcoursVis can interactively visualize patients' care pathways made of a billion sequences, four to five orders of magnitudes higher. ParcoursVis currently focuses on non-cancerous prostate adenoma, and is being adapted to exploring patients' pathways in Paris emergency services in collaboration with Parisian hospitals (AP-HP).

C Scalability for Density Plots

Visualization techniques need to be adapted to scale to a large number of items. We investigate several methods to improve density plots and sampling methods to render visualizations of a large number of items in an effective way. We have enhanced density plots to support multiclass data using various rendering techniques. We have also enhanced sampling algorithms to render meaningful structures on large data sets in a streaming and progressive fashion.

PHYSICALITY IN INPUT/OUTPUT

D Visualization on Smartwatches

We study the perception of visualizations on smartwatch faces. The main goal of these studies is to extend our understanding of design constraints for smartwatch visualizations. Previous work has shown that a vast majority of smartwatch interactions last under 5 s. It is still unknown what people can actually perceive from visualizations during such short glances, in particular with such a limited display space of smartwatches.

E Mobile Data Visualization

We organized a Dagstuhl seminar on mobile data visualizations and edited the first book on the topic together with our co-organizers. In addition, we contributed multiple chapters on defining mobile data visualization, 3D mobile data vis, glanceable visualization, and a dedicated ideation methodology.

F Data Physicalization

We continue to be active in the area of data physicalization. For example, we worked on dynamic composite physicalizations, a new class of physical visualizations that use collections of self-propelled objects to represent data. Dynamic composite physicalizations can be used both to give physical form to well-known interactive visualization techniques, and to explore new visualizations and interaction paradigms.

G Hybrid Touch/Tangible Spatial Selection in Augmented Reality

Tangible touch tablets combined with Augmented Reality Head-Mounted Displays (AR-HMDs) or traditional 2D projections to perform spatial 3D selections. We are primarily interested in the exploration of 3D unstructured datasets such as cloud points or volumetric datasets.

H Understanding of Augmented Reality Extensions for Existing 3D Data Analysis Tools

We present an observational study with domain experts to understand how augmented reality (AR) extensions to traditional PC-based data analysis tools can help particle physicists to explore and understand 3D data.

PERCEPTION, COGNITION, DECISION-MAKING

I Gender Data Visualization

We study the practices and the effects of gender data visualization. Our main goals are to understand how practitioners (scientists or designers) represent gender in their visualizations, and to assess the extent to which stereotypical data visualizations (such as pink and blue) can bias the reader in decision-making tasks.

J Visualization in Motion

We provide a design workflow and a technology probe to embed and design visualization in motion in swimming videos. Our work shows the importance and impacts of motion context on the visualization design process.

K Black-and-White Textures in Visualization

We investigate the use of 2D black-and-white textures for the visualization of categorical data and contribute a summary of texture attributes, and the results of three experiments that elicited design strategies as well as aesthetic and effectiveness measures.

L Machine Learning Predictions to Improve Human-AI Teaming

We visualize the predictions of multiple machine learning models to help biologists as they interactively make decisions about cell lineage—the development of a (plant) embryo from a single ovum cell.

M Illustrative Visualization of the Whole Genome

ScaleTrotter allows viewers to smoothly transition from the nucleus of a cell to the atomistic composition of the DNA, while bridging several orders of magnitude in scale. The follow-up work Multiscale Unfolding does the same but in a single view, thus controlling the change in abstraction based on spatial location with the visualization.

N Measuring the Aesthetic Pleasure of Visualizations

We developed and validated a rating scale to assess the aesthetic pleasure (or beauty) of a visual data representation: the BeauVis scale. BeauVis scale consists of five items, "enjoyable," "likable," "pleasing," "nice," and "appealing." With our work we offer researchers and practitioners a simple instrument to compare the visual appearance of different visualizations, unrelated to data or context of use.

METHODOLOGIES FOR VISUALIZATION RESEARCH

VISUALIZATION TECHNIQUES

O Visualization of Social Media Location Data Biases, Errors, and Plausibility

Case study on a scientific exploration of location data biases, data errors, location hiding, and data plausibility based on geo-located image data on social media.

P A Model of Spatial Directness in Interactive Visualization

We discuss the concept of directness in the context of spatial interaction with visualization. In particular, we propose a model that allows practitioners to analyze and describe the spatial directness of interaction techniques, ultimately to be able to better understand interaction issues that may affect usability.

Q Dynamic Hypergraph Visualization

Parallel Aggregated Ordered Hypergraph (PAOH) is a novel technique to visualize dynamic hypergraphs. A PAOH display represents vertices as parallel horizontal bars and hyperedges as vertical lines that connect two or more vertices. PAOH is the first technique with a highly readable representation of dynamic hypergraphs without overlaps. It is easy to learn and is well suited for medium size dynamic hypergraph networks such as those commonly generated by digital humanities projects - our driving application domain.

Created on March 31st 2024 by Anne-Flore Cabouat