The work will build upon a very active research on visualization authoring tools [Kim et al., 2017; Ren, B. Lee, and M. Brehmer. Charticulator: Interactive construction of bespoke chart layouts. ACM AVI, pp. 17-24, 2014.], which brings together experts from Human-Computer Interaction (HCI), Information Visualization, and Computer Graphics. There are opportunities for collaboration with Inria Sophia Antipolis (Computer Graphics), as well as Inria Bordeaux, the École Centrale de Lyon, and the University of Toronto (Visualization and HCI). We also foresee close interactions with design experts.

Mission confiée

Context

Professionals commonly switch between sketches on paper and computers to reach a new data visualization design [Landers and Heller, 2014]. Computer programs are powerful tools that allow professionals to generate solutions keeping a direct binding with the underlying data. But many expert designers first start by exploring visualization solutions through hand-drawn sketches. Before having access to the actual data, these sketches enable them to “visualize the architecture of the infographics and cultivate ideas for shaping the data visually” while later, sketching with data can “help raise new questions about the data itself”[Lupi, 2015].

Unfortunately, dominant visualization systems target data-exploration and data-analysis tasks and fail to meet communication purposes [Kosara, 2016]. Previous studies [Bigelow, 2014] also suggest that current visualization tools impose a data-to-graphics workflow that hinders visual thinking. As a result, the process of creating an original infographic can be extremely manual, involving multiple tools that are largely disconnected from the underlying data. In contrast, we aim to address the more ambitious goal of computer-aided design that treats infographic creation as a visual-thinking process [Ware, 2008]. This process is driven by the graphics, starting from sketches, moving to flexible graphical structures that embed constraints, and ending with data and generative parametric instructions, which can then re-feed the designer’s sketches and graphics.

Principales activités

Objectives

The key objectives of the PhD thesis are as follows:

1. Deviser un grammars of expressive visualization graphics that accommodate flexible and organic sketch-based representations.
2. Establish a set of sketching-operators that can express representative workflows for constructing creative visualizations through sketching.
3. Design sketch-based user interface techniques for data illustrators or visualization designers that turn sketches into organic, generative elements of a design solution.

The work will build upon a very active research on visualization authoring tools [Kim et al., 2017; Ren et al., 2019; Tsandilas, 2021], sketching user interfaces [Tsandilas et al., 2015; Xia et al., 2018], visualization grammars [Satyanarayan, 2017], approaches for synthesizing diagrams [Ye et al., 2020], and shape grammars [Stony, 2006].

References


Compétences

The candidate is expected to have a Master degree (M2-level for the French system) and background in Human-Computer Interaction, Information Visualization, or Computer Graphics. The candidate must have good programming skills and be enthusiastic about conducting research in a topic that combines the above fields.

The PhD thesis will ideally start early in 2023. Do not hesitate to contact me directly for additional information. To apply, please add your CV, a motivation letter, and any additional information that could make your application stand out: links to projects and interactive prototypes, or research reports (e.g., Master thesis or paper) that demonstrate your research experience.

Avantages

- Subsidized meals
- Partial reimbursement of public transport costs
- Leave: 7 weeks of annual leave + 10 extra days off due to RTT (statutory reduction in working hours) + possibility of exceptional leave (sick children, moving homes, etc.)
- Possibility of teleworking (after 6 months of employment) and flexible organization of working hours
- Professional equipment available (videoconferencing, loan of computer equipment, etc.)
- Social, cultural and sports events and activities
- Access to vocational training
- Social security coverage