

Offre n°2022-05436

PhD Position F/M Creative Visualization Sketching

Le descriptif de l'offre ci-dessous est en Anglais

Type de contrat : CDD

Niveau de diplôme exigé : Bac + 5 ou équivalent

Fonction : Doctorant

A propos du centre ou de la direction fonctionnelle

Located at the heart of the main national research and higher education cluster, member of the Université Paris Saclay, a major actor in the French Investments for the Future Programme (Idex, LabEx, IRT, Equipex) and partner of the main establishments present on the plateau, the centre is particularly active in three major areas: data and knowledge; safety, security and reliability; modelling, simulation and optimisation (with priority given to energy).

The 500 researchers and engineers from Inria and its partners who work in the research centre's 30 teams, the 60 research support staff members, the high-level equipment at their disposal (image walls, high-performance computing clusters, sensor networks), and the privileged relationships with prestigious industrial partners, all make Inria Saclay Île-de-France a key research centre in the local landscape and one that is oriented towards Europe and the world.

Contexte et atouts du poste

The thesis is fully funded by Inria and the [ANR project GLACIS](#), 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, 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. Devise a grammar 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 [Stiny, 2006].

References

4. Bigelow, S. Drucker, D. Fisher, and M. Meyer. Reflections on how designers design with data*ACM AVI*, pp. 17–24, 2014.
5. Cairo. *The Functional Art: An Introduction to Information Graphics and Visualization*, New Riders, Aug 2012.
6. Kosara. Presentation-oriented visualization techniques. *IEEE Computer Graphics and Applications*, 36(1):80–85, Jan 2016.
7. Landers and S. Heller. Infographics Designers' Sketchbooks. *Adams Media*, October. 2014. [Website](#).
8. W. Kim, E. Schweikart, Z. Liu, M. Dontcheva, W. Li, J. Popovic, and H. Pfister. Data-Driven Guides: Supporting expressive design for information graphics. *IEEE Transactions on Visualization and Computer Graphics*, (99):1–1, Jan 2017. [Website](#).
9. Lupi. Sketching with data opens the mind's eye. *National Geographic*, July 2015. [Website](#).
10. Lupi and S. Posavec. *Observe, Collect, Draw!: A Visual Journal Diary*, Princeton Architectural Press. Sep. 2018.
11. Ren, B. Lee, and M. Brehmer. Charticulator: Interactive construction of bespoke chart layouts/*IEEE Transactions on Visualization and Computer Graphics*, 25(1):789–799, Jan. 2019, [Website](#).
12. G. Stiny. *Shape: Talking about Seeing and Doing*. MIT Press, 2006.
13. Satyanarayan, D. Moritz, K. Wongsuphasawat, and J. Heer. Vega-Lite: A grammar of interactive graphics. *IEEE Transactions on Visualization and Computer Graphics*, 23(1):341–350, 2017. [Website](#).
14. Tsandilas, A. Bezerianos, and T. Jacob. SketchSliders: Sketching Widgets for Visual Exploration on Wall Displays. *ACM CHI Conference on Human Factors in Computing Systems* pp. 3255–3264, 2015. [Video summary](#).
15. Tsandilas. StructGraphics: Flexible Visualization Design through Data-Agnostic and Reusable Graphical Structures. *IEEE Transactions on Visualization and Computer Graphics (VIS'20)*, pp. 315–325, 2021. [Website](#).
16. Ware. *Visual Thinking for Design*. Morgan Kaufmann, 2008.
17. Xia, N. Henry Riche, F. Chevalier, B. De Araujo, and D. Wigdor. DataLink: Direct and creative data-oriented drawing. *ACM Conference on Human Factors in Computing Systems (CHI)*, pp. 223:1–223:13, 2018. [Website](#).
18. Ye, W. Ni, M. Krieger, D. Ma'ayan, J. Wise, J. Aldrich, J. Sunshine, and K. Crane. Penrose: from mathematical notation to beautiful diagrams. *ACM SIGGRAPH* 39(4), Article 144, July 2020, 16 pages. [Website](#).

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 home, 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

Informations générales

- **Thème/Domaine :** Interaction et visualisation Systèmes d'information (BAP E)
- **Ville :** Gif-sur-Yvette
- **Centre Inria :** [Centre Inria de Saclay](#)
- **Date de prise de fonction souhaitée :** 2023-02-01
- **Durée de contrat :** 3 ans
- **Date limite pour postuler :** 2023-04-01

Contacts

- **Équipe Inria:** [EX-SITU](#)
- **Directeur de thèse :**

A propos d'Inria

Inria est l'institut national de recherche dédié aux sciences et technologies du numérique. Il emploie 2600 personnes. Ses 215 équipes-projets agiles, en général communes avec des partenaires académiques, impliquent plus de 3900 scientifiques pour relever les défis du numérique, souvent à l'interface d'autres disciplines. L'institut fait appel à de nombreux talents dans plus d'une quarantaine de métiers différents. 900 personnels d'appui à la recherche et à l'innovation contribuent à faire émerger et grandir des projets scientifiques ou entrepreneurials qui impactent le monde. Inria travaille avec de nombreuses entreprises et a accompagné la création de plus de 200 start-up. L'institut s'efforce ainsi de répondre aux enjeux de la transformation numérique de la science, de la société et de l'économie.

Attention: Les candidatures doivent être déposées en ligne sur le site Inria. Le traitement des candidatures adressées par d'autres canaux n'est pas garanti.

Consignes pour postuler

Sécurité défense :

Ce poste est susceptible d'être affecté dans une zone à régime restrictif (ZRR), telle que définie dans le décret n°2011-1425 relatif à la protection du potentiel scientifique et technique de la nation (PPST). L'autorisation d'accès à une zone est délivrée par le chef d'établissement, après avis ministériel favorable, tel que défini dans l'arrêté du 03 juillet 2012, relatif à la PPST. Un avis ministériel défavorable pour un poste affecté dans une ZRR aurait pour conséquence l'annulation du recrutement.

Politique de recrutement :

Dans le cadre de sa politique diversité, tous les postes Inria sont accessibles aux personnes en situation de handicap.