

ICA Commission on Visual Analytics

Report on Activities from 2019-2023

Co-Chairs: Anthony C. Robinson and Arzu Çöltekin

Terms of Reference

The Commission on Visual Analytics will:

- Promote and advance visual analytics in cartography, which is the science of analytical reasoning as supported by interactive visual interfaces to spatio-temporal data.
- Develop science, technology, and design approaches to address major challenges associated with geographic information analysis and synthesis that enable users to solve key societal and environmental problems.
- Foster interdisciplinary and international collaboration between potential users of geospatial visual analytics and researchers, as well as between allied research communities in other disciplines and other ICA Commissions.

The Commission will achieve this vision by:

- Actively disseminating technical and methodological advances in cartographic visual analytics through workshops, seminars, edited special issues of journals, and peer-reviewed publications - with linkages to other ICA Commissions and allied organizations in other fields.
- Conducting annual meetings, workshops, or tutorials to develop research in key thematic areas, partnering with international conferences and other ICA commissions to expand our reach beyond traditional venues and audiences and to diversify who engages with visual analytics in the ICA.
- Recruiting and retaining a co-chair and bolstering the core membership to help guide Commission activities and foster collaboration within and outside of the ICA.
- Maintaining a dedicated web presence and engaging with members via social media to highlight Commission activities and promote participation beyond attendance at in-person meetings through new forms of distance collaboration.

Meetings & Workshops

Since 2019 the Commission on Visual Analytics has led the following meetings and workshops:

2023 – Cartography and AI (MapAI 2023), an ICC 2023 pre-conference workshop held in Stellenbosch, South Africa.

<https://viz.icaci.org/registration-and-draft-agenda-for-the-icc-pre-conference-workshop-on-cartography-and-ai-mapai-2023/>

The Commission has also co-sponsored these events with other ICA Commissions and non-ICA sister organizations:

2022 - Co-led workshop on Cybercartography at AGILE 2022 in Vilnius, Lithuania on June 14: <http://cybercarto.ntua.gr/events/agile2022/>

2022 - Co-led in collaboration with ISPRS working group on Geovisualization virtual and augmented reality, "Digital twins: Vision papers" Double thematic session at the ISPRS 2022. <https://www.isprs2022-nice.com/index.php/session/digital-twins-vision-papers/>

2021 – Cybercartography: A Beyond State-of-the-Art Role of Geovisualization in the Understanding of the World Workshop at AGILE 2021: <http://cybercarto.ntua.gr/events/index.html>

2021 - Co-led Virtual Geographic Environments, multiple sessions in the 28th International Conference on Geoinformatics CPGIS: <https://www.cpgis.org/Files/202107190420334591.pdf>

2019 - [User Experience Design for Mobile Cartography: Setting the Agenda](#), an [ICC 2019](#) pre-conference Workshop held in Beijing, China.

Publications & Journal Special Issues

*The Commission on Visual Analytics has developed a range of **articles** to support the goals outlined in the 2019 Terms of Reference:*

Chen, Min, Christophe Claramunt, Arzu Çöltekin, Xintao Liu, Peng Peng, Anthony C. Robinson, Dajiang Wang, et al. 2023. "Artificial Intelligence and Visual Analytics in Geographical Space and Cyberspace: Research Opportunities and Challenges." *Earth-Science Reviews* 241 (June): 104438. <https://doi.org/10.1016/j.earscirev.2023.104438>.

Gołębiowska, I., Opach, T., Çöltekin, A., Korycka-Skorupa, J., Ketil Rød, J. (2023). Legends of the dashboard: An empirical evaluation of split and joint layout designs for geovisual analytics interfaces. *International Journal of Digital Earth* 16(1), 1395-1417. <https://doi.org/10.1080/17538947.2023.2197262>

Gołębiowska, I., Çöltekin, A. (2022). What is wrong with the rainbow? An interdisciplinary review of empirical evidence for and against the rainbow color scheme in visualizations. *ISPRS Journal of Photogrammetry and Remote Sensing*, 194 (195-208). <https://doi.org/10.1016/j.isprsjprs.2022.10.002>

Liu, X., Chen, M., Claramunt, C., Batty, M., Kwan, M-P., Senousi, A.M., Cheng, T., Strobl, J., Çöltekin, A., Wilson, J., Bandrova, T., Konecny, M., Torrens, P., Zhang, F., He, L., Wang, J., Ratti, C., Kolditz, O., Klippel, A., Li, S., Lin, H., Lü, G. (2022). Geographic information science in the era of geospatial big data: A cyberspace perspective. *The Innovation*, <https://doi.org/10.1016/j.xinn.2022.100279>.

Tliba, M., Kerkouri, M.A., Ghariba, B., Chetouani, A., Çöltekin, A., Shehata, M., Bruno, A. (2022). SATSal: A Multi-level Self-Attention Based Architecture for Visual Saliency Prediction. *IEEE Access* (10): 20701-20713. <https://doi.org/10.1109/ACCESS.2022.3152189>

Çöltekin, Arzu, Amy L. Griffin, and Anthony C. Robinson. 2021. "Visualizations." *Oxford Bibliographies: Geography*. <https://doi.org/10.1093/obo/9780199874002-0224>.

Çöltekin, Arzu, Amy L. Griffin, Aidan Slingsby, Anthony C. Robinson, Sidonie Christophe, Victoria Rautenbach, Min Chen, Christopher Pettit, and Alexander Klippel. 2020. "Geospatial Information Visualization and Extended Reality Displays." In *Manual of Digital Earth*, 229–77. Singapore: Springer Singapore. https://doi.org/10.1007/978-981-32-9915-3_7.

Robinson, Anthony C., Pyry Kettunen, Luciene Delazari, and Arzu Çöltekin. 2023. "New Directions for the State of the Art and Science in Cartography." *International Journal of Cartography*, June, 1–7. <https://doi.org/10.1080/23729333.2023.2216334>.

*In addition, the Commission has edited and co-edited the following **journal special issues**:*

2023 – *International Journal of Cartography* – Special Focus Issue on the State of the Art and Science in Cartography. This issue is co-edited with the Commission on User Experience and Commission on Cognitive Issues in Geovisualization.

<https://www.tandfonline.com/doi/full/10.1080/23729333.2023.2216334>

2023 *ISPRS International Journal of Geo-Information* - Special issue on Eye tracking in Cartography https://www.mdpi.com/journal/ijgi/special_issues/Eye_Tracking_Cartography

2019 - *Information Visualization* - Special Section on Visual Movement Analytics:

<https://journals.sagepub.com/toc/ivia/18/1>

2019 - *ISPRS International Journal of Geo-Information* - Special Issue on Geovisualization:

https://www.mdpi.com/journal/ijgi/special_issues/Geovisualization

Outreach & Web Presence

Commission Website: <http://www.viz.icaci.org/>

Commission Twitter Presence: <http://www.twitter.com/@icaviz>

ICA Commission on Visual Analytics co-chairs have been invited to present on Commission work at the following events:

Talks by Anthony Robinson:

Robinson, A.C. "Manipulation and Mechanization in Social Media Cartography", Lecture for the Department of Geography, University of Oregon, Eugene, Oregon, April 20, 2023.

Robinson, A.C. "Maps, Manipulation, and Machine Learning: Understanding Cartography in Social Media" Invited talk for the International Symposium on Cartography and Geomedia. Poznan, Poland, June 20, 2022.

Robinson, A.C. "Machine Learning to Understand Viral Cartography in Social Media" Invited talk for the pre-conference workshop on Cybercartography at AGILE 2022. Vilnius, Lithuania, June 14, 2022.

Robinson, A.C. "The Presence of Absence in Geovisualization" Lecture for the Department of Geography, University of Colorado at Boulder. Boulder, CO, March 11, 2022.

Robinson, A.C., Anderson C.L. "Understanding emotional responses to color schemes on categorical maps" Lecture for the Geographic Information Visualization and Analysis laboratory at the University of Zurich. Zurich, CH, October 28, 2021.

Robinson, A.C. "Seeing What's Missing in Geovisual Analytics" Keynote for the AGILE 2021 pre-conference workshop: Cybercartography: A Beyond State-of-the-Art Role of Geovisualization in the Understanding of the World. Online, June 8, 2021.

Robinson, A.C. "Disinformation by Design in Viral Maps" Lecture for The Data Deluge: Opportunities and Challenges Symposium for the Penn State Institute for Computational and Data Sciences. Online, October 22, 2020.

Robinson, A.C. "Disinformation by Design in Viral Maps" Lecture for Hacking the U.S. Election: How can we make U.S. Elections more Secure? Symposium. Washington, DC, February 24, 2020.

Robinson, A.C. "Making Great Maps by Design" Lecture for the 2019 Meeting of the National Association of Science Writers. University Park, PA, October 25, 2019.

Robinson, A.C. "Design, Dissemination, and Disinformation in Viral Cartography" Lecture for the Institute of Interactive Technologies, University of Applied Sciences and Arts Northwestern Switzerland, Brugg, Switzerland, June 25, 2019.

Robinson, A.C. "Design, Dissemination, and Disinformation in Viral Cartography" Lecture for the Department for Geoinformatics, Carinthia University of Applied Sciences, Villach, Austria, June 12, 2019.

Robinson, A.C. "Rethinking the Scale of Geospatial Education" Keynote for the 2019 SaudiGIS Conference, Dammam, Saudi Arabia, April 8-10, 2019.

Robinson, A.C. "Viral Cartography: Elements of Design, Sharing, and Disinformation" Lecture for the Department of Geography, The Ohio State University, Columbus, OH, January 17, 2019.

Talks by Arzu Çöltekin (selected):

Çöltekin, A. Immersive technologies & extended reality: Implications for Digital Earth and beyond Keynote at the 13th International Symposium of Digital Earth, Athens, Greece, 11 July 2023.

Çöltekin, A. Visualization flows and the challenge of multivariate data visualization. Public transportation Switzerland Meetup, Olten, Switzerland, 29 June 2023.

Çöltekin, A. Thinking with and without an extended version of reality: Forms of visuospatial knowledge representation and their effects on what we know. "Thinking Within" symposium, 13 April 2023, Wageningen, The Netherlands

Çöltekin, A. Human computer interaction for visualization, Keynote at VIZBI Visualizing Biological Data Heidelberg, 31 March 2023.

Çöltekin, A. "Collaborative Use of Mixed Reality: Human-Computer Interaction Considerations", Guest lecture at the ETH Zurich, December 12, 2022

Çöltekin, A. "When the whole world is a display". DataViz for Society, Digital Future Society, Barcelona, December 2, 2022.

Çöltekin, A. "Recognizing and overcoming illusions: A journey to our unconscious mind" University of Haifa, November 10, 2022.

Çöltekin, A. "Rethinking our relationship with space: Modern forms of representation and spatial cognition" Invited talk at CUSP London Seminar, King's College London, 30th of June 2022.

Çöltekin, A. "Humans in their spatial context: From eye tracking to spatial computing." Invited talk for the pre-conference workshop on Cybercartography at AGILE 2022. Vilnius, Lithuania, June 14, 2022.

Çöltekin, A. "Visualization, virtual reality and reproducibility: Challenges and opportunities." Keynote at the Open Data Science Europe workshop 2022, 13-16 June 2022.

Çöltekin, A. "How unconscious is unconscious bias?" WomenTech Global Conference 2022, Berlin, Germany, 7th of June, 2022.

Çöltekin, A. "Mixed Reality to support collaborative planning processes" Geosummit 2022, Olten, Switzerland, 1st of June 2022.

Çöltekin, A. "Seeing the Future: What does the world of education, data (science), visualization and outer space look like in 50+ years?" Invited panelist. A Conference in Honor of Alyssa Goodman, Harvard University, 4th of May 2022.

Çöltekin, A. "Visuospatial knowledge acquisition in virtual environments: Effects of age, visual realism and task types in navigational learning." University of Geneva, Department of Psychology, March 9th 2022.

Çöltekin, A. "Implications of extended reality for the future of information societies: Information, interaction, visualization in extended reality" Zurich World Information Architecture (WIAD) conference, March 5th, 2022.