

The transdisciplinary nature of cartography reflected in diverse research topics of Master theses

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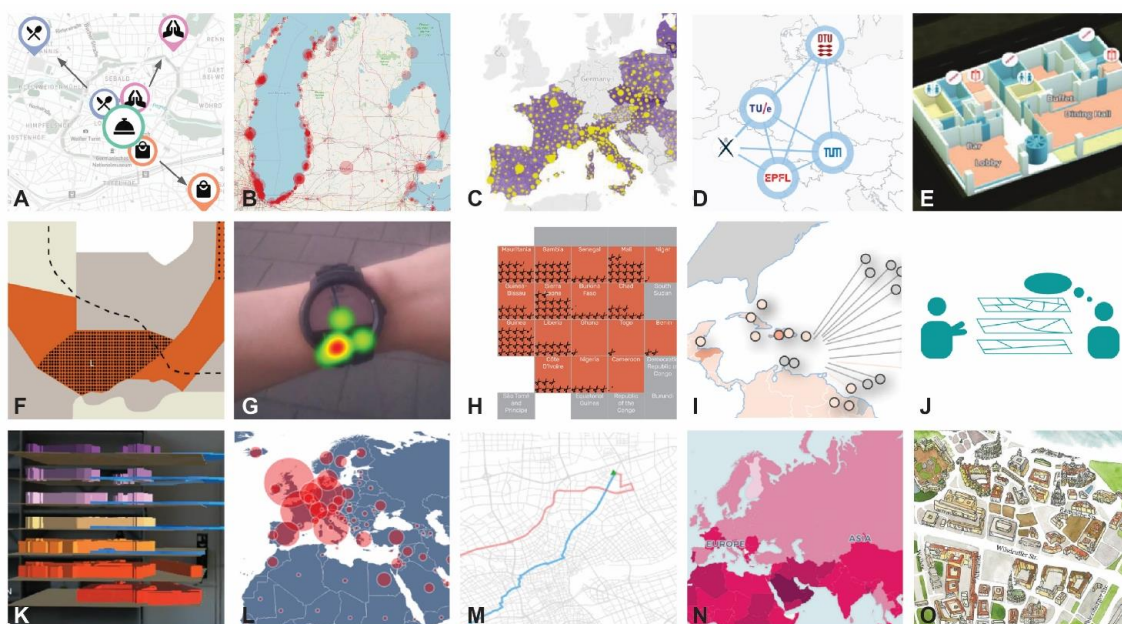
Abstract:

As the earliest player in the development of geographic information systems in the 1970s, cartography remains one of the fundamental components in the rapidly growing geoinformatics and geospatial data science. There is a substantial overlap with regard to knowledge, skills and competencies for the geo-related academic programs and the job market in the geo-sector. Cartography as a changing science, technology and art of designing and using maps has its independent scientific core aspects, which are characterised by the mutual benefits with a number of neighbouring disciplines such as computer graphics, semiotics, cognitive science, journalism and citizen science. Cartographers nowadays are needed not only in the changing cartographic profession, but basically in all research domains where interdisciplinary competence such as geodata literacy, graphic literacy, critical reflection of ethical values and design thinking play a fundamental role in addressing the grand challenges of a sustainable world.

In the next months, I will reflect “if” an academic study program can take into account all modern aspects of the field even though cartography is a continuously changing discipline and “how” students can be prepared for the multifaceted job market. In order to see “if” and “how” the transdisciplinary nature of cartography is mirrored within an academic study program, 170 finished Master theses from the last nine years (2013-2021) of the international Master of Science in Cartography (Cartography M.Sc., www.cartographymaster.eu) will be evaluated. The insights about the diverse range of covered aspects will be gained via a co-occurrence analysis and the results will be visualized and presented at EuroCarto 2022 in Vienna.

The Cartography M.Sc. program was launched in 2011 and is dedicated to educate global talents not only for the changing cartographic profession. Graduates should have the ability to influence and shape cartography strongly as an independent science with its own research and fount of knowledge, but also with an awareness of its distinct relations to the earth, information and communication sciences. The program is jointly designed, promoted and operated by four partner teams from four universities in Europe: Chair of Cartography, Technische Universität München (TUM, Germany), Research Division Cartography, Technische Universität Wien (TUW, Austria), Institute for Cartography, Technische Universität Dresden (TUD, Germany) and Department of Geo-information Processing, University of Twente (UT, The Netherlands). Up to 25 students from all over the world are enrolled every year. Students start in October the 1st semester at TUM, continue the 2nd semester at TUW and study the 3rd semester at TUD. Students complete their Master’s thesis at one of the four universities in the 4th semester. Associated partners are involved in thesis co-supervision. Successful students are finally awarded a joint degree ‘Master of Science (M.Sc.) in Cartography’.

The intakes so far have revealed a growing diversity of the cohort year over year. Since its commencement twelve years ago, the program has enrolled 230 students from 67 different countries. Besides the involvement of four universities, the diversity of the students with different cultural and educational background lead to a diverse range of finished Master theses. Sample topics cover “The Use of Maps on Smartwatches” or “Do Taxi Drivers Choose the Shortest Routes?” or “Integrating Geospatial Linked Open Data and Knowledge Networks into Business Intelligence”. The best theses have been either published in journal papers or presented at international conferences. Figure 1 demonstrates a subset of the Master theses. A complete list is available under <https://cartographymaster.eu/theses/>.



- A. Visualisation of Collective Spatial Keyword Queries and their Usability (Beinder, 2020)
- B. Privacy Aware Analysis of Spatial Social Media Data (Stephan, 2020)
- C. Integrating Geospatial Linked Open Data and Knowledge Networks into Business Intelligence (Ostrovna, 2020)
- D. Visualizing Connectivity within Innovation Ecosystems in Europe (Acero, 2019)
- E. Supporting Enhanced Disaster Management with Interactive 3D and Mixed Reality Maps (Helzel, 2019)
- F. Effects of Uncertainty Visualization on Decision Making and User Confidence (Bwisa, 2019)
- G. The Use of Maps on Smartwatches (Utebaliyeva, 2019)
- H. Thematic Maps portraying Sustainable Development Goal Indicator Data (Pirani, 2018)
- I. Sustainable Development Goals and uncertainty visualization (Gosling-Goldsmith, 2018)
- J. Use and user requirements of ecosystem service maps (Rühringer, 2018)
- K. Space-Time Cube Visualization in a Mixed Reality Environment (Turchenko, 2018)
- L. Spatial-temporal Analysis of International Connections Based on Textual Social Media Data (Guo, 2017)
- M. Do Taxi Drivers Choose the Shortest Routes? (Li, 2017)
- N. Multimedia Presentations of Spatial Journalistic Content (Torabi, 2017)
- O. Methodology for Producing a Hand-Drawn Thematic City Map (Jensen, 2017)

Figure 1: Examples of Master theses.

To execute the co-occurrence analysis of all 170 thesis topics, a list of all titles has been prepared and enhanced with metadata like submission date, students' country of origin, students' background (previous degree), supervisors and reviewers name, partner university, cooperation. Four coders from the four different partner universities will be invited to assign keywords to the topics related to methods and the spatial extent of the thesis. To minimize the mental load of the coders, the coders will only get the titles. After a first online meeting to code 15 randomly selected titles together, the four coders will code all 170 titles individually. In a final meeting, all coders should derive a conclusion and agree on the keywords for every title.

Afterwards, the keywords will be analysed and it will be researched which keywords co-occur with each other. In a co-occurrence visualization, two keywords (variables) will be mixed, sometimes with a third one. The visualization will provide the answers to the following questions: What are the main research fields in which the theses have been written? Which aspects are covered by which partner university? In which topics are further (industry) partners mainly involved? Which topics appeared/disappeared through time? What are the emerging clusters between the universities? Do the backgrounds of the students play a role in the topic selection? Which topics lead to a publication or PhD and will therefore create further research? What are the main research areas and do these areas address the main elements of a discipline in transition?

I expect the results to additionally show that the program focusses not only on a wide range of sectoral aspects and trends but also taking the personal background of the students into account. The program reflects cartography as a discipline dealing with the science, technology and art of making and using maps.

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