

ELTE
FACULTY OF
INFORMATICS

INSTITUTE OF
CARTOGRAPHY AND
GEOINFORMATICS

GIS Day PhD Student Workshop

at the ELTE Institute of Cartography and Geoinformatics

20 November (Wednesday) 4PM in Room 7.57

Programme

16:00 Welcoming remarks – Mátyás Gede

16:05 Anusha Kundathil: Investigating Mechanical Stress Responses in Plants: A Hyperspectral and Image-Based Study of Red-Edge and Reflectance Shifts

16:20 Khelali Meriem: Remote Sensing and GIS for Exploring Fire Risk Assessment Maps on August 19, 2022, in El Tarf

16:35 Amani Kinganora Sanga: Remote sensing-based detection of landscape transformations in arid and semi-arid regions of Africa

16:50 Kalamkas Yessimkhanova: Climate zones change in Kazakhstan

17:05 Drisela Kraja: Towards a clearer map: balancing tectonic, geological, and study area layers in GIS

17:20 Zsófia Sárközy: The multi-step process of route planning on terrain

17:35 Mátyás Magyar: Visual historical gazetter of Romania's Nord-Vest development region

17:50 Dániel Balla: What's up in web mapping: available libraries, features, performance

Join us to celebrate geoinformatics!

All participants are invited to bring snacks, light food and drinks for an after-workshop discussion!



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Abstracts

Anusha Kundathil – Investigating Mechanical Stress Responses in Plants: A Hyperspectral and Image-Based Study of Red-Edge and Reflectance Shifts

This study investigates the spectral responses of three plant species—*Monstera pertusum*, *Ficus elastica*, and *Alocasia gageana*—to mechanical shaking as a stressor, using hyperspectral image and ASD (Analytical Spectral Device) hyperspectral data for a comprehensive analysis. The plants were grown under both artificial and natural lighting conditions, maintaining identical environmental parameters across treatments. Reflectance data were collected before and after applying mechanical shaking for 40 seconds, alongside visual imagery, to assess changes in spectral characteristics, particularly focusing on shifts in the red edge, a known indicator of plant stress. Calibration steps were performed on both the spectral and image data, with white and black references and distance calibration to ensure accuracy. In ENVI 5.3, various spectral analysis techniques were applied, including Spectral Angle Mapper (SAM), spectral feature fitting, and other classification methods to explore the differences between pre- and post-shaking spectra. The objective of this research is to deepen our understanding of how mechanical stress affects plant spectral properties, offering valuable insights for stress detection in plant health monitoring and precision agriculture.

Khelali Meriem – Remote Sensing and GIS for Exploring Fire Risk Assessment Maps on August 19, 2022, in El Tarf

In North Africa's Mediterranean basin, Algeria, particularly El Tarf, faces severe forest fires, notably the August 19, 2022 blaze, which has significant ecological and economic impacts. Conventional fire control methods often lack precision and adaptability for complex ecosystems. This study leverages Landsat 8 imagery and ArcGIS to map and assess fire damage in El Tarf, focusing on the ΔNBR and $R_{\Delta NBR}$ metrics to distinguish fresh burn areas from vegetation-free zones accurately. Findings indicate around 8,938 hectares were burned in 2022, underscoring the potential of remote sensing in enhancing fire risk assessment and mitigation strategies.

Amani Kinganora Sanga – Remote sensing-based detection of landscape transformations in arid and semi-arid regions of Africa

Globally the need for studying implications of climatic controls requests an emergency response for preparedness and resilience as they highly affect landscape transformation. This study will be centered on the workflow of examining how rainfall and Land Surface Temperature variability trigger landscape transformation in the arid and semi-arid regions of Africa from 2000 up to 2023. The study will employ statistical models, remote sensing and GIS approaches while analyzing the problem under the study.

Kalamkas Yessimkhanova – Climate zones change in Kazakhstan

This work presents thorough analysis of climate zones on the territory of Kazakhstan. Derived monthly temperature and precipitation data from different datasets used to create climate maps based on the Köppen classification system. These maps are generated using historical and scenario data on the Google Earth Engine platform.



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Drisela Kraja – Towards a clearer map: balancing tectonic, geological, and study area layers in GIS

While designing a comprehensive map that includes tectonic, geological and study area layers of my research, some questions arise:

- What map composition integrates better in these diverse layers of information?
- Should a single map be used to display all these elements?
- How can I ensure that each layer (tectonic, geological, and study area) provides valuable information without overwhelming the map viewer?

Some version of maps are created to explore different designs, but feedback from GIS specialists is needed. The aim is to determine the best approach to create a map with the three layers.

Zsófia Sárközy – The multi-step process of route planning on terrain

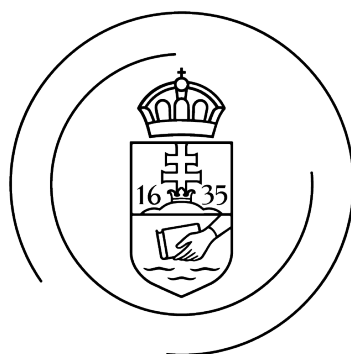
I am working with route-planning in terrain conditions, where routes can lead through any point of the studied area. Main data sources are Lidar point clouds and high-resolution orienteering maps. The process of the route-planning starts with the preparation of the input data: DEM and vegetation cover from Lidar data using OCAD and Global Mapper, road network based on orienteering maps, summarized as a cost raster in QGIS. The route planning is conducted in SAGA: firstly, calculating the accumulated cost surface for the chosen endpoint, then the route to this point from a chosen startpoint. The presented route-planning is a multi-step process on large datasets making the calculation slow and difficult. Some steps can be concatenated in a QGIS plugin, but most of the steps require user intervention.

Mátyás Magyari – Visual historical gazetteer of Romania's Nord-Vest development region

The visual historical gazetteer of Romania's Nord-Vest development region is a partial result of an attempt to visualize historical geospatial information available in various scientific materials on the settlements of modern-day Transylvania. The gazetteer uses webcartographic tools to display the localities documented to exist on the territory of its historically very diverse study area in every year since 1000 AD, along with their contemporary name, legal status and administrative affiliation. The work aims to serve as a user-friendly, yet reliable source material for research concerning the settlements of the development region and their history.

Dániel Balla – What's up in web mapping: available libraries, features, performance

More and more web mapping libraries and tools are available, many of which are free, open source and feature-packed. Let's have a quick look at the libraries at hand, that can be used for creating interactive web maps and visualizing spatial data. Performance of these libraries is being analysed, preparing for a comparative analysis. The ease of use is also an important factor: whether a user can create a web map easily, without extensive programming knowledge. As for open questions and discussion, let's talk about to what degree your projects involve visualizing spatial data / results in a web environment.



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