Bachelor's or Master's Thesis

Point Cloud Data Analysis and Visualization

Are you looking for a Bachelor's or Master's thesis in point cloud data analysis and visualization? Are you interested in scalable machine learning and visualization of point cloud data in a mixed-reality environment? Do you want to get experience in the emerging field of cloud native geospatial data analysis and visualization?

We look forward to you joining us as a Bachelor's or Master's Thesis student (d/f/m) within the Big Geospatial Data Management Group at the Department for Aerospace and Geodesy, TUM School of Engineering and Design. A Supervision in the School of Computation, Information and Technology is also possible.

Location: Ottobrunn/Munich/Remote

Duration: 3 to 6 months, depending on your study program

Your topic:
Cloud computing is increasingly used to manage and analyze data at scale. Emerging trends in this regard are data management approaches that disaggregate storage and compute, especially combining cheap blob storage with columnar file formats for advanced analytics. Whether such architecture can serve as a backend for large-scale point cloud analysis and interactive visualization, towards the goal of a cloud-based mixed reality platform, needs further investigation and evaluation.

This may include:
- Investigating approaches for point cloud visualization in game engines.
- Developing data management and retrieval approaches for visualization.
- Benchmarking the newly developed approach against the state of the art.

Related Work:
- Teuscher, B., & Werner, M. (2025). Point Cloud Data Management for Analytics in a Lakehouse. *AGILE: GIScience Series*, *6*.
- Richter, R., & Döllner, J. (2014). Concepts and techniques for integration, analysis and visualization of massive 3D point clouds. *Computers, Environment and Urban Systems, Volume 45*.

Qualifications:
- Interest in the emerging field of Big (Geospatial) Data
- Advanced programming skills (Python, Rust)
- Experience with 3D data visualization
- Interest and experience in literature-based work with good scientific practice
- Enrolled full-time student in Computer Science, Electrical Engineering, Geo Informatics, or similar
- Fluent English language skills are mandatory

Fluent English language skills are mandatory Applications via Mail with CV and transcript to:

Advisor: M.Sc. Balthasar Teuscher

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