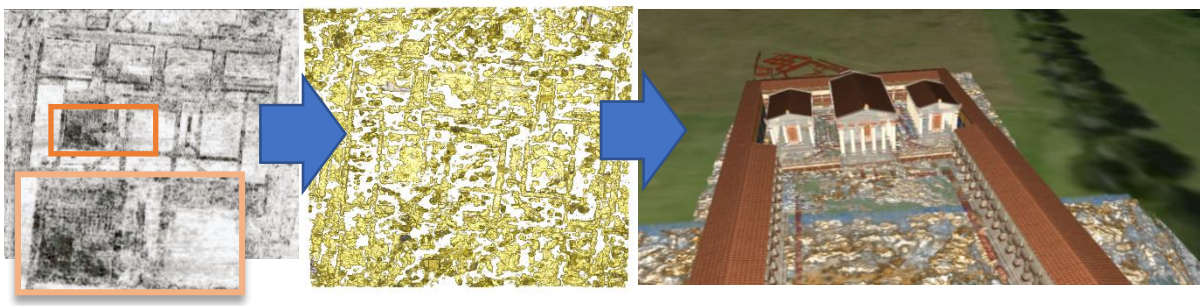

GPU-based image processing of archaeological 3D GPR data

Master thesis

Topic

Ground penetrating radar (GPR) allows to record 3D data of near-surface soil regions in a non-invasive way. In archaeology, it is an invaluable tool for the non-destructive exploration of archaeological monuments and other manmade structures buried in the ground. State-of-the art mobile multi-channel GPR recording setups enable archaeologists to record square kilometres at approx. 5 cm of spatial resolution, which leads to huge datasets.

The archaeological interpretation of such datasets is challenging for a number of reasons, including dataset size, low resolution, and soil humidity. Structures of interests degrade over time due to, e.g. erosion and human intervention. High radar reflectivity variations hampers the applicability of 3D volume visualisation techniques.

The aim of this thesis will be to identify methods, e.g. filters, classification and segmentation algorithms from other fields like medical image processing or remote sensing, capable of emphasizing structures of archaeological interest for 3D visualisation in exploration, archaeological interpretation and virtual exhibitions through literature research and practical experiments with datasets.

Moreover, a GPU-based software toolbox for efficient processing of practical datasets (approx. 10 GB) featuring selected algorithms should be implemented.

Qualifications

- Experience in C++ (optional CUDA, OpenCL, ITK, OpenCV, OpenVDB/GVDB)
- Interest in 3D image processing

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