Intelligent techniques for stitching multi-scan projections into a coherent 3D volume

Research Problem

This research topic is suggested by my colleagues at Umeå Centre for Molecular Medicine, Umeå University. The problem manifests itself in the complexity of stitching segmented tomographic data coming from two or more separate scans back into 3D space. An example is depicted in Fig.1:

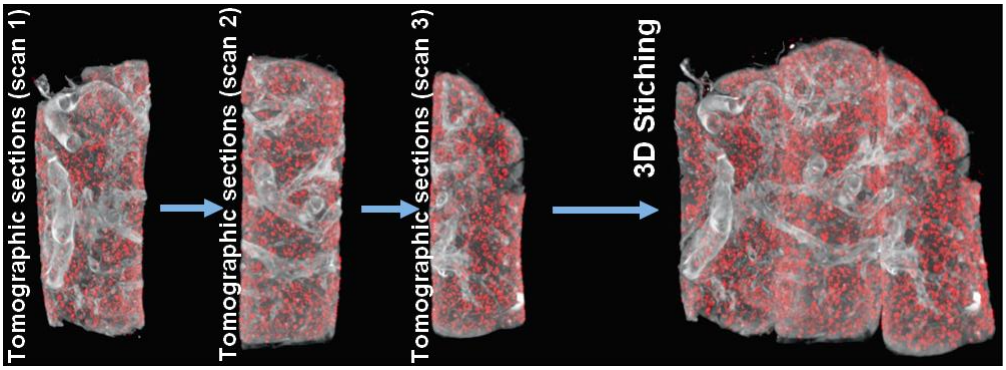

Fig. 1. Schematic overview of the stitching operation applied to the human pancreas. Currently this process is carried out semi-manually (manually overlapping the 3 segments in Imaris®[1]). ©Max Hahn et al. [1].

Method Design

The significant advancement in deep learning in the recent years and its vast applications gives us an optimistic hope that such stitching problem could be tackled efficiently (at least better than the current semi-manual solution). Identifying salient landmarks that can be used as hooks in the stitching algorithm might be easily attained using deep/machine learning.

The data set is available with me, however, my colleagues at Umeå University should be involved.

OBS! This project requires the effort of two ambitious students who are well versed into machine learning.

Contact

If interested in this topic, please get in touch: abbas.cheddad[AT]bth.se

References

[1] Hahn M, Nord C, Eriksson M, Morini F, Alanentalo T, Korsgren O, Ahlgren U. 3D imaging of human organs with micrometer resolution - applied to the endocrine pancreas. Commun Biol. 2021 Sep 10;4(1):1063. doi: 10.1038/s42003-021-02589-x. PMID: 34508173; PMCID: PMC8433206.

[1] *Imaris* is an interactive microscopy 3D image analysis software used by microscopists around the world.