Medical imaging in phantoms with adaptive ultrasound and super-resolution

Motivation

Ultrasound imaging is a low-cost, non-invasive and non-damaging diagnostic tool with diverse applications in medicine. It enables bed-side monitoring of patients with Parkinson's disease, early tumor detection in the female breast or investigation of heart morphology.

The recent advances in ultrasound localization microscopy (ULM) promise to open up even more applications such as improved tumor localization during surgery on patients with pancreatic cancer. Super-resolution ultrasound may be able to differentiate between cancerous and healthy tissues before and during surgery.

Keywords

Ultrasound, deep learning, simulation, medical phantom, Python, NumPy, dask, LaTeX, system identification
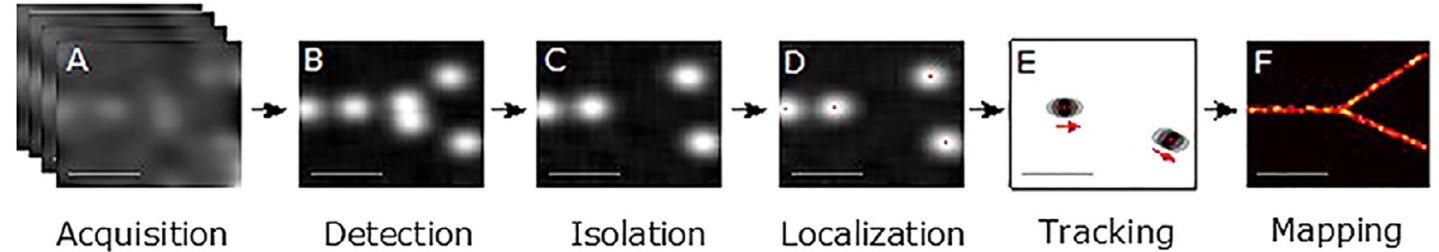
Principle of ultrasound localization microscopy
Christensen-Jeffries et al.
https://doi.org/10.1016/j.ultrasmedbio.2019.11.013
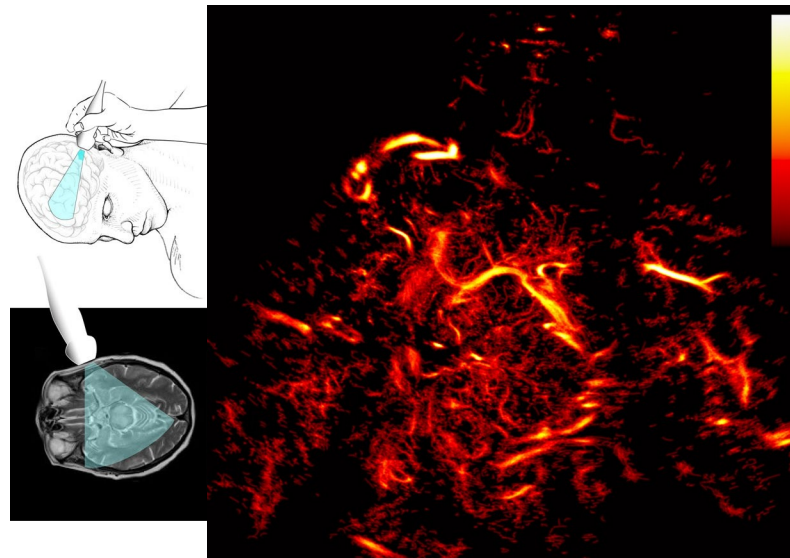
Transcranial ultrafast ULM of brain vasculature in patients
C. Demené et al. https://doi.org/10.1038/s41551-021-00697-x

You might work on...

- Development of an imaging system (or parts thereof) with ultrasound localization microscopy (ULM)

- Numerical / simulative exploration of ULM

- Creation of a medical phantom and experimental exploration of ULM

- Your ideas...!

Results will be documented & discussed in a scientific work and oral presentation.

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