LOTUS : An accompanying toolbox for the article "OPEN PLATFORM FOR ULTRASOUND LOCALIZATION MICROSCOPY: PERFORMANCE ASSESSMENT OF LOCALIZATION ALGORITHMS"

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ACADEMIC REFERENCES TO BE CITED

Details of the code published in 2020 article by Heiles, Chavignon, Hingot, Lopez, Teston and Couture. Open Platform for Ultrasound Localization Microscopy: performance assessment of localization algorithms General description of super-resolution in: Couture et al., Ultrasound localization microscopy and super-resolution: A state of the art, IEEE UFFC 2018

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ABSTRACT

Ultrasound Localization Microscopy (ULM) is an ultrasound imaging technique that relies on the acoustic response of sub-wavelength ultrasound scatterers to map the microcirculation with an order of magnitude increase in resolution. Initially demonstrated in vitro, this technique has matured and sees implementation in vivo for vascular imaging of organs, and tumors in both animal models and humans. The performance of the localization algorithm greatly defines the quality of vascular mapping. We compiled and implemented a collection of ultrasound localization algorithms and devised three datasets in silico and in vivo to compare their performance through 18 metrics. We also present two novel algorithms designed to increase speed and performance. By openly providing a complete package to perform ULM with the algorithms, the datasets used, and the metrics, we aim to give researchers a tool to identify the optimal localization algorithm for their usage, benchmark their software and enhance the overall image quality in the field while uncovering its limits.

This article provides all materials and post-processing scripts and functions.

1. MINIMUM REQUIREMENTS

LOTUS software integrates MATLAB Runtime R2020b (9.9) (MathWorks). We recommend using Microsoft Windows 10 (version 1803 or higher), with 4 GB RAM minimum, and 5 GB of free space.

2. INSTALLATION

1) Launch the installer LOTUS_v1_1_installer.exe 2) Follow the installers' instructions 3) Restart your computer 4) LOTUS should be now available for use in the start-up menu

3. USE

Please refer to the User Guide for a step by step explanation

4. DISCLAIMER