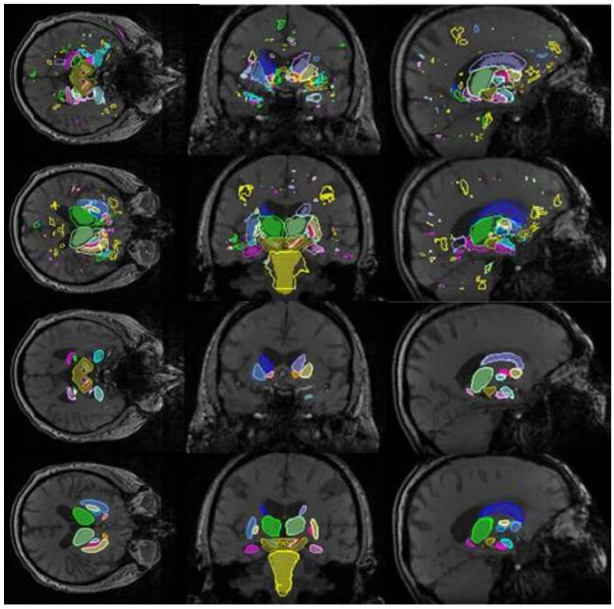
Department of Electrical Engineering
Technion—Israel Institute of Technology
Signal Acquisition Modeling and Processing Lab - המעבדה לחישה מידול ועיבוד אותות

High Resolution Beamforming using Deep Learning

Supervisor: Regev Cohen regev.cohen@campus.technion.ac.il

Diagnostic sonography allows visualization of body tissues, by radiating them with acoustic energy pulses. As the pulse propagates, echoes are scattered by density and propagation-velocity perturbations in the tissue, and detected by the transducer elements. Averaging the detected signals, after their alignment with appropriate time-varying delays, allows localization of the scattering structures, while improving the signal-to-noise ratio (SNR). The latter process is referred to as beamforming.



Standard beamforming is a generic process, performed without exploiting the knowledge of the medium being scanned. Often, it results with poor images due to low resolution or technician's movement. This makes it difficult for the doctor to give a reliable diagnosis.

In this project, we aim to develop an organ-based beamformer using deep learning nets. Selecting an area and applying the corresponding learned beamformer will allow the doctor to view the region of interest with high resolution. The project will include the study of the basics ultrasound imaging and designing CNNs.

Required background:
Introduction to Digital Signal Processing (044198)
Learning System (046195)
Tensor Flow – Advantage

סרקו ?Beamforming