Project 15 Documentation

Part I. Simulation Using Molecular Optical Simulation Environment (MOSE)

Purpose: to use Monte Carlo simulation via MOSE for virtual source to produce the corresponding CCD camera image, by solving the forward problem. Then the CCD camera output will be used for source reconstruction using the SARRP's BLT code.

MOSE Input: Parameter file defining mouse and source

- MOSE input needs multiple triangle mesh (.OFF) files defining organ surface, or a single tetrahedral mesh (.MESH) with organ index label for each tetrahedron element
    - If the tetrahedral mesh option is used:
        - Write Matlab function that converts NIRView segmented image (.MHD/.RAW) to tetrahedral mesh (.MESH)
    - If the triangle mesh option is used:
        - Try using MOSE's threshold extraction tool to produce the triangle surface meshes (.OFF) for organs from NIRView segmented image (.MHD/.RAW)
- MOSE input needs the parameter file format (.MSE)
    - Write (.MSE) parameter file, including parameters for plane detector and light source

MOSE Output: CCD detection map from MOSE to SARRP

- MOSE outputs plane detector results in file (.D.CW)
    - Write Matlab function D2TIF.m to convert (.D.CW) file to the format (.tif) used in SARRP code. D2TIF.m takes in two arguments. The first argument is a string containing the full path of the input .D.CW files. The second argument is a string that contains the full path of the output directory to which the .TIF files will be written.

BLT Input: Mouse Body

- Normally the BLT reconstruction implementation takes in a segmented CT image and generates the mesh using the iso2mesh.m function. Since that image is unavailable for the digimouse used in the MOSE monte carlo simulation, I will modify the BLT reconstruction to take in a the digimouse tetrahedron mesh instead.

Organ Type Key

Code Name

1. Adipose
2. Bone
3. Bowel
4. Brain
5. Heart
6. Kidney

7. Liver
8. Lung
9. Stomach

Part II. Atlas-Based Segmentation

TBD.