

ECS 193AB Winter/Spring2017

Medical Imaging

***Note this is a student-found project and a team has been formed already.

A professor in the radiology department at UC Davis Medical Center wants to test the effectiveness of a medical imaging procedure in the cases of detecting fevers of unknown origin (FUO). The procedure utilizes nuclear medicine techniques to create images which aim to highlight the location of an infection. Currently, two sets of images are taken after applying In-111 and Tc-99m Sulfur Colloid to the patient. In-111's normal biodistribution is to spleen, liver, bone marrow and site of infection, whereas Tc-99m Sulfur Colloid has a normal biodistribution of liver, spleen, bone marrow, plus renal excretion of unbound Tc-99m which may be found in kidneys and /or bladder. The first set of images In-111 will have the infection while the second set containing Tc-99m will serve as a visual baseline. The professor wants to see if there is a significant difference in diagnosis when the second set of images exists versus when a doctor is only given the first set of images. To test this, the professor would like us to develop a desktop software application with a graphical user-interface which will pull up these images for the user (The observers, doctors) to gauge and record these users' diagnoses for each image displayed.

The professor has required that the software has all of the image manipulation tools available to the doctors in the medical software that is normally used to view them (i.e. Black-White inversion above a threshold, grayscale adjustments, etc.). The images must be pulled from the HERMES server application where the images are stored. These images are in DICOM format, which contains patient record information which will also need to be removed from the file. Additionally, the software must be able to randomize the order images are displayed to an observer, and allow the observer to diagnose images over multiple sessions. Each session must contain some preset training images to familiarize the user with the software prior to the randomized images. The responses of the observer must be recorded somewhere on the system (presumably by database) and ultimately be put in a format which will interface with a software from the university of Chicago to calculate ROC / AUC statistics.

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