Quantitative Imaging Biomarkers Alliance RSNA

Application for QIBA Round-2 Project Funding

Title of Proposal: Comparative Study of Algorithms for the Measurement of the Volume of Lung Lesions: Assessing the Effects of Software Algorithms on Measurement Variability		
QIBA Committee/Subgroup: Volumetric CT Technical Committee		
NIBIB Task Number(s) which this project addresses: 1-3 and 5-7		
Project Coordinator or Lead Investigator Information:		
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Amount Requested:		

Project Description

QIBA 1A study investigated the bias and variance using CT images of an anthropomorphic phantom and obtained measurements using only one algorithm. However, image processing algorithms have been developed in many organized activities from a number of groups using many different approaches with varying amounts of human interaction and different levels of segmentation success. This study proposes to investigate the effects of different algorithms in bias and variance using reference data sets of both phantoms and patients; in addition, this study proposes to investigate the performance of different methods and degree of automation in the algorithm.

This study can increase knowledge for the QIBA Profile and to provide a context in which multiple parties have incentives to participate. (1) manual analysis in which sites perform required measurement task and manually supply data back to QIBA 3A project personnel and (2) scripted analysis that would apply to multiple data sets to invest in a re-usable infrastructure for large-scale algorithm testing

This project extends other QIBA Volumetric CT committee experiments investigating measurement variability by specifically looking at: (a) the effects of measurement variability due to the measurement-algorithms (b) the effects of the degree of automation and by algorithm method, assessing measurement variability between algorithms (c) apply to multiple data sets by creating a re-usable infrastructure for large-scale algorithm testing. This will allow us to understand variability across algorithms in large datasets.

This project proposes three specific bases to assess the overall variability due to algorithms and by the degree of automation and by the algorithm method:

(1) Manual Data Set: estimate the bias in the test set from the scans of anthropomorphic phantoms

(2) Manual Data set: estimate variability from the test data set from the scans of anthropomorphic phantoms and clinical images

(3) Scripted analysis: set up a statistical code for in a re-usable infrastructure for large-scale algorithm testing