

Purpose:

A key component of an effective MRI quality control program is radio frequency (RF) coil testing. Coil testing includes the assessment of SNR, uniformity, and ghosting. Performing RF coil analysis can be very time consuming due to the quantity of coils being assessed and the large number of ROI's that need to be drawn to obtain the coil performance data. Analysis of acquired data is extremely repetitious, follows a strict set of rules, and therefore, may be amenable to automation.

Methods:

Software was written using MATLAB (R2009b, The MathWorks, Inc.), a technical computing language. A graphical user interface provided an easy to use structure for the end user to analyze annual coil test images. The algorithm locates the image closest to the isocenter and will automatically place the 8 ROI's needed to perform the annual coil assessment as directed by the ACR MR Accreditation Program. Results are displayed in the GUI and exportable to text or a preformatted Excel Spreadsheet for inclusion in an annual physics report.

Results:

The program has been benchmarked against three physicists and demonstrates an increase in precision of 3% for SNR, 1% for uniformity, and 5% for ghosting. Furthermore, the program eliminates the variance of subsequent measurements of an identical image. Whereas, the measurements of a single physicist varied by 5% for SNR, 1% for uniformity, and 14% for ghosting. Additionally, the average time to process a coil was decreased from 4 minutes manually to less than 8 seconds.

Conclusions:

The preliminary results demonstrate that automation has the potential to eliminate some of the inherent variability of test results due to manual measurement. Higher precision may facilitate increased sensitivity of the tests for assessment of subtle changes in system performance that may indicate a change in system performance or impending equipment failure.