A workstation-user interface for softcopy reading of mammograms and CAD

A workstation-user interface was developed and evaluated for interpreting digital mammograms and computer assisted diagnosis (CAD) on CRTs. Hardware included an UltraSPARC 2200 system (dual processor 200 MHz; 512MB RAM; Solaris 2.5.1 operating system), two 20482560, 120 ft-L DR110 monitors (Data Ray Corp), and two display cards (Dome Imaging Systems Inc.). Software development used ANSI C, SPARCworks Visual C++, Motif toolkit, XIL, and Java. The design aimed at a user-friendly interface that simulates film hanging protocols while overcoming the limitations of current display technology for mammography: spatial resolution, luminance, and speed. The system included CAD presentation, image manipulation tools, and a reporting mechanism. The interface was evaluated qualitatively with a questionnaire and quantitatively with an ROC study. ROC results from two readers and 200 mammograms show no significant difference between film and digital reading of mammograms. The interface successfully overcame the limitations of resolution and luminance by using innovative ways to alternate between low and high resolution images and automatic and manual scaling mechanisms. CAD for masses and calcification clusters was also conveniently displayed for consideration. Speed, however, was not adequate for a clinically useful tool. Further hardware/software optimization is necessary for faster image display.