World Academy of Science, Engineering and Technology
International Journal of Biomedical and Biological Engineering
Vol:9, No:06, 2015

Performance Comparison of Tablet Devices and Medical Diagnostic Display Devices Using Digital Object Patterns in PACS Environment

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Abstract : Tablet devices have been introduced into the medical environment in recent years. The performance of display can be varied based on the use of different hardware specifications and types of display technologies. Therefore, the differences between tablet devices and medical diagnostic LCDs have to be verified to ensure that image quality is not jeopardized for clinical diagnosis in a picture archiving and communication system (PACS). In this study, a set of randomized object test patterns (ROTPs) were developed, which included randomly located spheres in abdominal CT images. Five radiologists were asked to independently review the CT images on different generations of iPads and a diagnostic monochrome medical LCD monitor. Receiver operating characteristic (ROC) analysis was performed by using a five-point rating scale, and the average area under curve (AUC) and average reading time (ART) were calculated. The AUC values for the second generation iPad, iPad mini, iPad Air, and monochrome medical monitor were 0.712, 0.717, 0.725, and 0.740, respectively. The differences between iPads were not significant. The ARTs were 177 min and 127 min for iPad mini and medical LCD monitor, respectively. A significant difference appeared ($p = 0.04$). The results show that the iPads were slightly inferior to the monochrome medical LCD monitor. However, tablet devices possess advantages in portability and versatility, which can improve the convenience of rapid diagnosis and teleradiology. With advances in display technology, the applicability of tablet devices and mobile devices may be more diversified in PACS.

Keywords : tablet devices, PACS, receiver operating characteristic, LCD monitor
Conference Title : ICME 2015 : International Conference on Medical Engineering
Conference Location : Venice, Italy
Conference Dates : June 22-23, 2015