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The Efficacy of Personal Computer (PC) AI Image Enhancer Software on Low and High Contrast PA Chest Radiograph: An Experimental Study

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Introduction: Medical imaging is critical in modern healthcare because it provides diagnostic information about internal anatomical structures. Chest radiographs (CXR) are commonly used to assess thoracic anatomy, although visualisation issues continue, particularly in low-contrast CXRs. This study compares the effectiveness of various personal computer (PC) AI image enhancer software in visualising the anatomy of high and low-contrast PA CXRs. **Methods:** An experimental investigation was undertaken using five PC AI image enhancer programs to visualise the thoracic anatomy. Experts examined the radiographs using visual grading analysis (VGA), which involves visualising 16 common chest anatomical features. Nine radiological experts assessed the VGAs. The data was examined using SPSS version 20 and a non-parametric technique called the Wilcoxon Signed Rank technique. **Results:** High-contrast CXR improves anatomical visualisation significantly ($p < 0.05$), particularly in the hilum ($p = 0.03$), descending thoracic aorta ($p = 0.04$), and right heart border ($p = 0.05$). Significant improvements were observed in low-contrast CXR structures such as the carina ($p = 0.05$) and costophrenic angles ($p = 0.05$). **Conclusions:** The findings highlight the effectiveness of AI software deep learning in visualising anatomical elements in CXR. Future research should concentrate on improving AI algorithms for consistent performance across different X-ray examinations and studying radiological diagnostic acceptability. This work requires additional clinical testing on a population to determine the feasibility of transferring this preliminary study to a clinical environment of radiological image viewing.

Keywords: artificial intelligence, image enhancement, radiography