

Humeral Head and Scapula Detection in Proton Density Weighted Magnetic Resonance Images Using YOLOv8

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Abstract : Magnetic Resonance Imaging (MRI) is one of the advanced diagnostic tools for evaluating shoulder pathologies. Proton Density (PD)-weighted MRI sequences prove highly effective in detecting edema. However, they are deficient in the anatomical identification of bones due to a trauma-induced decrease in signal-to-noise ratio and blur in the traumatized cortices. Computer-based diagnostic systems require precise segmentation, identification, and localization of anatomical regions in medical imagery. Deep learning-based object detection algorithms exhibit remarkable proficiency in real-time object identification and localization. In this study, the YOLOv8 model was employed to detect humeral head and scapular regions in 665 axial PD-weighted MR images. The YOLOv8 configuration achieved an overall success rate of 99.60% and 89.90% for detecting the humeral head and scapula, respectively, with an intersection over union (IoU) of 0.5. Our findings indicate a significant promise of employing YOLOv8-based detection for the humerus and scapula regions, particularly in the context of PD-weighted images affected by both noise and intensity inhomogeneity.

Keywords : YOLOv8, object detection, humerus, scapula, IRM

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