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(57) Abstract :  
 Skeletal age is useful in the diagnosis of growth disorders. A child's skeletal age and their chronological age should match if they are healthy. If developmental issues are identified at an early age, they can be treated more effectively. The subjective Tanner-Whitehouse test is the most widely used method for evaluating the discrepancy between bone and chronological ages by analysing radiographs of the hands. There is significant intra-observer bias within the medical staff with this technique due to years of experience. To aid less-experienced clinicians, we offer an automated bone age prediction method that combines image registration with hand X-ray photos. It uses an advanced residual separable convolution model to optimise its regression network. The regressor network needs a 299/299 picture to forecast bone age using three Xception network modules. To ensure uniformity and consistency, images will undergo preliminary processing by separate convolutional neural networks. There are three stages involved in picture registration: (a) separating the hands from the rest of the image; (b) rotating the hands around four keypoints of interest; and (c) setting alignment to centre the region of interest. MobileNet V1 is used for the keypoint regressor in angle alignment, whereas DeepLab V3 Plus is used for hand segmentation. In each scenario, an individual convolution serves as the principal operator. To avoid underfitting, synthetic data are generated by manually adjusting camera settings, including rotation, magnification, and shearing. In terms of mean absolute error (8.200 months) and mean squared error, the proposed method has the lowest values, as shown by the experimental findings (121.902 months). Thus, a bone age predictor with an error of less than a year is a valuable tool for offering a second opinion. Considering that male and female skeletons are constructed differently, this study might have produced more precise predictions had it taken gender into account.

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