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Suk-Ja Yoon

Chonnam National University, Republic of Korea

Interpretation of osteoporosis using convolutional neural network on dental panoramic radiography

This study aimed to evaluate the diagnostic performance of convolutional neural network in the detection of osteoporosis on panoramic radiographs, through comparing it with the interpretation by oral and maxillofacial radiologists. Two oral and maxillofacial radiologists with more than 10 years of experience reviewed the panoramic radiographs of 1,268 women (mean (\pm SD) age: 52.5 \pm 22.3 years) and made a diagnosis of osteoporosis when cortical erosion or thinning of the mandibular inferior cortex was observed. Among the subjects, 635 had no osteoporosis (mean (\pm SD) age: 32.8 \pm SD 12.1 years) and 633 had osteoporosis (72.2 \pm 8.5 years). All panoramic radiographs were analyzed using two methods, single-column and double-column convolutional neural network. Among the radiographs, 200 panoramic radiographs (patients' mean (\pm SD) age: 63.9 \pm 10.7 years) were used for testing the performance of convolutional neural network in interpreting osteoporosis. The interpretation of osteoporosis by single-column and double-column convolutional neural network was compared with that by oral and maxillofacial radiologists. The sensitivity of single column convolutional neural network in interpreting osteoporosis was 96.0%, with a specificity of 89.0%, positive predictive value of 95.0% and negative predictive value of 89.9%. The sensitivity of double-column convolutional neural network was 100%, with a specificity of 97.0%, positive predictive value of 99.0% and negative predictive value of 98.0%. The convolutional neural network showed high accuracy in interpreting osteoporosis on panoramic radiograph.

Biography

Suk-Ja Yoon has completed her PhD from Chonnam National University. She is the Director of Department of Oral and Maxillofacial Radiology, Chonnam National University Dental Hospital. She has published more than 30 papers in reputed journals and has been serving as an Editorial Board Member of repute.

yoofnfr@jnu.ac.kr