Metal Artifact Reduction in Low-Dose Dental CBCT

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ABSTRACT

This talk presents a beam hardening artifact correction method for low-dose dental cone beam computerized tomography (CBCT). In dental CBCT applications, it is important to improve the quality of maxillofacial imaging, where soft tissue details are not required. Compared to standard CT, the additional difficulty of dental CBCT comes from the problems caused by offset detector, FOV truncation, and low signal-to-noise ratio due to low X-ray irradiation. To address these problems, we proposed a method that primarily performs a sinogram adjustment in the direction of enhancing data consistency, considering the situation according to the FOV truncation and offset detector. This sinogram correction algorithm significantly reduces beam hardening artifacts caused by high-density materials such as teeth, bones, and metal implants, while tending to amplify special types of noise. To suppress such noise, a deep convolutional neural network is complementarily used, where CT images adjusted by the sinogram correction are used as the input of the neural network. If time is permitted, the photon starvation issue would be discussed.