Contribution ID: **20**   Type: **Oral**

Development of CT ring artifact removal technology based on Fuzzy system and radial basis function neural

Monday 8 July 2019 15:55 (15 minutes)

Ring artifacts are common phenomena in computer tomography (CT), which can result in the degradation of CT images' diagnostic quality and therefore should be reduced or removed. In the post-processing domain, ring artifacts are transformed into line artifacts through coordinate transformation. Many methods are based on post-processing. However, the results are not obvious in the case of complicated artifacts.

In this study, we first detected the positions of artifacts by proposed specific morphological and enhancement processing. Then we proposed a new fuzzy radial basis function neural network (Fuzzy-RBFNN), as shown in Fig. 1. For an artifact pixel we used six adjacent normal pixels as the input of the neural network, subsequently get the repaired pixels. For training NN, we introduced the gravitational search algorithm (GSA) [1] to train the neural network system. We adopted signal-to-noise ratio (SNR) to evaluate.

Experiments demonstrated that the proposed method removes the artifacts more effectively compared with the other conventional methods [2]. In addition, we trained the system by the well-known error back propagation algorithm (EBPA) to evaluate the performance of GSA. The final experimental results also proved the superiority and effectiveness of GSA.

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Session Classification: Tomography, chair: Christer Frojdh

Track Classification: general