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J-BHI Special Issue on "Neuro-Fuzzy Edge Computations for Next-generation Internet of Medical Things"

Medical imaging technologies, such as Magnetic Resonance Imaging (MRI) and Computer Tomography (CT), have been widely applied to examine, diagnose, and treat various diseases. However, there are some notable issues in medical imaging diagnoses, such as the lack of experienced imaging doctors and the high rate of misdiagnosis. Deep learning has made great breakthroughs in image processing in recent years. People try to utilize deep learning for medical imaging diagnosis. Running deep learning algorithms consumes a lot of computing resources. The existing approach is to transfer the deep learning model to the cloud platform for calculation; however, it will take up many bandwidth resources and cause a long waiting time.

The medical image lesion detection technology combines computers with other high-speed, large-scale integrated digital hardware. The current medical imaging diagnosis requires the doctor's experience to determine. Using image processing technology to analyze and process 2D slice images can assist doctors in qualitative and even qualitative analysis of lesions and other areas of interests, thereby significantly improving the accuracy and reliability of medical diagnosis.

There are sudden changes or discontinuities in intensity at the edge of the image. Hence, the gradient function of the image has a maximum value on the transition boundary. Edge detection is a basic issue in image processing and computer vision. It can retain important frame attributes of the image, and to a large extent, can effectively reduce the amount of image data. The traditional edge detection method constructs an edge detection operator for a neighborhood of pixels in the original image. Traditional differential edge detection algorithms combined with the above procedures can better detect the edge with significant grayscale changes. However, traditional algorithms are more complex in processing, or the image changes are inconsistent due to external reasons, making the grayscale changes of the image at the edge very small. Among the methods to accelerate medical image processing based on edge computing, the local terminal predicts the running time of each neural network layer in the deep learning model to process medical image data through a regression model and determines the segmentation point based on each running time. According to the segmentation point, medical images are processed with neural network layers in the deep learning model that require less computational time. The regression model is periodically updated according to the actual running time of the deep learning model. The MEC server processes medical images in the deep learning model with a longer calculation time of the neural network layer based on the segmentation points.

This special issue discusses the multi-scale edge extraction algorithms of medical images based on neuro-fuzzy algorithms in the medical Internet of Things, aiming to provide assistance for doctors to determine the location and size of lesions or tissues based on images. The topics discussed include but are not limited to:

- Medical image blur edge detection
- Fuzzy edge extraction and detection of medical images
- Accelerated medical image processing based on edge computing
- Medical image processing based on fuzzy mathematics and neural network

- Accelerated neural network layer to process medical image data
- Multi-channel resource allocation for image transmission
- Fusion model and algorithm of multimodal medical image
- Medical information security based on watermark/blockchain
- ECG/EEG/EMG/EOG data analytics
- Auxiliary diagnosis model and algorithm of medical image
- Explainable deep structure in medical image analysis
- Clinical application based on intelligent recognition and analysis of medical images

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- First reviews due: **February 1st, 2022**
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- Final decision: **July 1st, 2022**
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