Logarithmic-Based DWT For Medical Images Compression

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Medical imaging is considered one of the most important medical information used in telemedicine to provide a remote clinical consultation. With the continuous increase in the resolution of medical images and number of modalities e.g. Magnetic Resonance Imaging (MRI), X-Ray, Computed Tomography (CT), ultrasound, etc., hospitals require a huge storage capacity. Remote consultation requires transferring the data via the network in a fast and efficient way. This becomes a bottleneck in places that have a limited bandwidth and storage capacities. To handle this information, medical image compression is considered as an efficient solution for the limited bandwidth and storage problems. Hence the medical image compression represents a big challenge today. Furthermore since medical image contains a sensitive information, it is essential that compressed image preserves the sufficient quality that is essential for radiologists to ensure correct diagnosis. Modern image compression algorithms such as JPEG 2000 uses discrete wavelet transform (DWT) image quality and compression ratio.

We propose a novel study of using logarithmic DWT for medical images [1]-[2]. The DWT is computed based on logarithmic number system (LNS) arithmetic as an alternative to floating point (FLP). We investigate the impact of changing the arithmetic on the image quality. We propose two compression schemes to improve the image quality. The proposed schemes have been applied to many medical images modalities and it is found that it achieves a significant improvement in image quality compared to the classical compression scheme. The structural similarity index (SSIM) is used to assess the two proposed schemes.

References:

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