The Study of Variable Block Size DP-DPCM Image Coding Algorithm for Medical Image Compression

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ABSTRACT

This thesis is research into improvement of compression for medical image data. The Double Predictor Differential Pulse Code Modulation(DP-DPCM) algorithm used in general images was modified to increase the image transmission speed and signal-to-noise ratio(SNR).The Quadtree segmentation algorithm was adopted in dividing medical images into regions having widely differing perceptual importance. The detail regions of a given image were segmented into blocks with smaller block size, and the background regions of the image were assigned larger block size for each block. Using this rule, we preprocess the image compression as image segmentation. After the pre-processing of Quadtree segmentation, the differential values between the nearby pixels of each much image block are reduced. Therefore, a decrease in the distribution range of prediction error was obtained as well as reduction in the bit rate and quantization levels. In this study, we consider the effect is error free and noiseless in the transmission channel. The conventional DPCM image coding system is easily affect by a larger fed-back quantization error while being transmitted over the channel. The DP-DPCM system can reduce the effect of the fed-back quantization error and does not increase the system complexity. With medical images, however, we are concerned with the diagnostic information and compression ratio. We selected one quadtree block and a high bit rate for simulation. The results are available as a reconstruction image that is acceptable at the low bit rate. Another simulation for the selected quadtree block is using a variable bit rate, where we set the lowest bit rate (1bpp) to saving more bits and transmission time. For medical image compression and reconstruction quality in this system is more flexible in clinical situations. The system performance results of the proposed variable block size DPDPCM image encoder/decoder system are closer to the general image and are better than conventional DPCM.

Keywords : Double Predictor Differential Pulse Code Modulation (DP-DPCM) ; Quadtree segmentation ; bit rate ; background ; detail ; signal-to-noise ratio (SNR)

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