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应用

针对MPEG的去块效应技术的研究及其VLSI实现

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摘要：

现今随着数据压缩的广泛应用，以及MPEG视频编解码的普遍使用，块效应噪声也随之而来。为了消除块效应、提高视频质量，许多去块效应的算法[2-12]被人们所提出，然而大部分算法的运算量都很大，不适合应用在视频处理芯片上。针对这个问题，H.-S. Kong等人[13]提出了一种新的自适应后处理算法，该算法既能有效消除块效应又大幅度地降低了运算量，然而对图像边缘信息保护不够。本文在H.-S. Kong等人[13]的算法的基础上，提出了一种针对MPEG视频流的去方块后处理方法。该方法以方块边缘（水平或垂直）附近各两个4×4区域作为滤波处理的分类依据，通过对该两个区域的像素点的值进行计算，将块边缘分为平滑渐变区域、亮度阶跃区域以及复杂纹理区域，并根据这三种区域对图像边缘信息影响程度的大小，而决定采取强滤波、弱滤波或者不滤波等处理方式。这种方法一方面较好地提取了块效应噪声，一方面又保护了图像的边缘信号，而且计算量较小，满足视频处理芯片低复杂度的去噪要求，通过VLSI实现后有着很好的应用前景。

关键词： 方块效应；区域分类；自适应滤波

Research and VLSI Implementation on De-blocking Method for MPEG

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Abstract:

Data compression has developed for decades, it is used in many different areas, one of which is image processing. MPEG as we all know, is the name of a working group focusing on image processing technology, and it is also one of the popular standard among all image compression. The video encoding/decoding of MPEG has great compression percentage which can keep a good image quality at the same time. So it is widely used in image processing field. But meanwhile, blocking artifact noise comes along with compression as an unsatisfying “extra-effect”. In order to suppress the blocking artifact and improving the quality of images or video, many algorithms of de-blocking are proposed these years. However, most of existing algorithms are not suitable for the implementation on video-processing chips, because their great amount computation would eventually lead to high cost in chips. To balance the computation and cost when integrating into single chip, the adaptive post-processing algorithm is proposed by H.-S. Kong et al. This algorithm can effectively reduce the blocking artifact as well as reduce the computation. But it is insufficient to preserve the edge information of images. Based on the algorithm that H.-S. Kong et al proposed, a post-processing de-blocking algorithm for MPEG video stream is brought to all in this paper. This method processes filtering based on the classification, which takes the circumscription of the two 4 by 4 areas near the block borderlines(vertical or horizontal). It determines the result out of three classification by calculating the pixels value of the two 4 by 4 areas during the procedure, which are smooth gradual changing area, luminance step area and complex texture area. Then it decides proper solution to use among strong filter, weak filter and non-filter according to the classification. This method offers a better solution to the problem of de-blocking while preserving edge information, and yet has a smaller calculating amount to meet the low complexity image de-noising requirement of video-processing chips. It has a good applications perspective on VLSI implementation.

Keywords: Blocking artifact Region classification;Adaptive filter

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