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Abstract
In the last decade, discrete wavelet transform (DWT) has proven to be a useful technique for a wide range of applications including signal analysis, signal compression, pattern recognition, biomedicine, and numerical analysis. Since DWT has excellent features of energy compaction and inherent scalability, it has been applied extensively in the field of image and video compression.

Because the traditional DWT is composed of filters, the VLSI implementation complexity is very high. In 1996, a new technique, lifting-based discrete wavelet transform, is proposed. The advantages of the lifting-based DWT are lower implementation complexity and less hardware resources. The lifting-based DWT is also used in the newest image standard JPEG2000.

In this thesis, the 1-D and 2-D DWT architectures are proposed. In the first part, we propose multi-level DWT architectures to achieve higher hardware utilization. In the second part, we use 9/7 filters and implement the lifting discrete wavelet transform processing used in JPEG2000 image compression standard. Also, a specila design is adopted to process the boundary distortion problem.
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