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COMPLEXITY REDUCTION ALGORITHM FOR HIERARCHICAL B-PICTURE OF H.264/SVC

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Abstract. *In this paper, a novel complexity reduction algorithm for hierarchical B-picture of H.264/SVC is proposed. The scalable extension of H.264/AVC achieves high scalability as well as high coding efficiency. However, the exhausted computation complexity becomes the implementation difficulty. Observing some evaluations results, we find that due to the correlation among multi-layers, the search range selection and the mode selection process have much redundancy. In particular, the redundant search range and candidate modes have essential relations with the encoding layers. Using this feature, we propose a novel search range selection and mode selection algorithm which can significantly reduce the redundant search range and candidate modes. Simulation results show that the proposed method can achieve high computation complexity reduction rate with very slight PSNR loss.*
Keywords: H.264, Scalable video coding, Hierarchical B-picture, Search range

1. **Introduction.** In recent years, encoding standard which can achieve scalable video coding (SVC) has increasing requirement due to the diversification of the network environment and the applications. Enhancing to the successful H.264/AVC, a novel scalable extension is standardized as H.264/SVC [1]. A reference software is also developed by the joint video team (JVT) for SVC [2,3]. The objective of H.264/SVC is to enable the generation of a unique bitstream that can adapt to various bit-rate, transmission channel and display capabilities. In H.264/SVC, three scalabilities: spatial scalability, temporal scalability and quality scalability are recommended in the final draft [4-6].

The temporal scalability is a scalability that changes the frame rate according to the network environment and terminal devices. Temporal scalability can be generally enabled by restricting motion compensated prediction to reference pictures with a temporal layer less than or equal to the temporal layer of the picture to be predicted. In H.264/SVC, a hierarchical B-picture structure is inherited from H.264/AVC to achieve temporal scalability. This hierarchical B-picture structure makes a group of pictures (GOP) with the first and the end picture named as key-pictures. These pictures in a GOP are grouped into several encoding layers and encoded by the layer order. The same as traditional H.264/AVC encoder, the encoding process of H.264/SVC is also a complexity intensive process which accounts for the most of total computation complexity.

To improve the coding efficiency, some previous works dedicate in improving the variable length coding methods [7,8]. Some other previous works proposed some efficient GOP structure [9,10]. In these works, adaptive GOP size is selected based on the feature of encoding picture by which the coding efficiency is significantly improved. However,