

# Hardware Implementation of A Power Efficient Huffman Decoding

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**Abstract.** Data compression plays an important role in multimedia communication. A major compression technique is performed by converting the fixed-length codes to variable-length codes. Huffman coding is demonstrated to be a very efficient coding scheme and has been widely adopted. However, the variable-length codes increase the difficulties of fast decoding. In addition, the variable decoding time is not favorable for real-time multimedia applications, such as video streaming. Ternary content addressable memory (TCAM) is suitable for high-speed search due to its parallel architecture and ability for searching arbitrary-length keys. However, the usage of TCAM is limited because of its high cost and power consumption. This paper introduces a TCAM-based Huffman decoding algorithm for single-side growing Huffman tree (SGH-tree), which has been proposed to reduce the sparsity of traditional Huffman tree. Our scheme is based on the property, which leaves in the SGH-tree are highly concentrated. By extracting and searching the common prefixes of the codewords, the power consumption and the required storage of TCAM can be significantly reduced as well as its cost. In our experiments based on ten real images, the power consumption is reduced to tenth as compared to the original implementation.