Lossless JBIG2 Coding Performance[*]

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ABSTRACT

The Joint Bi-Level Expert Group (JBIG), an international study group affiliated with the ISO/IEC and ITU-T, has recently completed a committee draft of the JBIG2 standard for lossy and lossless bi-level image compression. JBIG2 encoder designers will have to choose from a wide variety of strategies and bitstream parameters to make their encoders efficient and competitive. In this paper, we study design considerations for a purely lossless encoder. First, we outline the JBIG2 bitstream, focusing on the options and parameters available to an encoder. Then, we present numerous lossless encoder design strategies, including lossy to lossless coding approaches. For each strategy, we determine the compression performance, and the execution times for both encoding and decoding. The strategy that achieved the highest compression performance in our experiment used a double dictionary approach, with a residue cleanup. In this strategy, small and unique symbols were coded as a generic region residue. Only repeated symbols or those used as a basis for soft matches were added to a dictionary, with the remaining symbols embedded as refinements in the symbol region segment. The second dictionary was encoded as a refinement-aggregate dictionary, were dictionary symbols were encoded as refinements of symbols from the first dictionary, or previous entries in the second dictionary. With all other bitstream parameters optimized, this strategy can easily achieve an additional 30% compression over simpler symbol dictionary approaches. Next, we continue the experiment with an evaluation of each of the bitstream options and configuration parameters, and their impact on complexity and compression. We also demonstrate the consequences of choosing incorrect parameters. We conclude with a summary of our compression results, and general recommendations for encoder designers.