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William David Hall* (whall@csustan.edu), c/o Dr. Kenneth R. Hoover, Department of Mathematics - CSU Stanislaus, One Univeristy Circle, Turlock, CA 95382, and **Jonathan Brown**.
A Sufficient Condition for the Optimality of Huffman Encoding. Preliminary report.

Huffman encoding, developed by David Huffman in 1952, is a very useful tool for lowering the number of bits per pixel (bpp) needed to store an image. It is often applied to images after the discrete wavelet transform. In 1948, Claude Shannon showed that the number of bpp needed to store an image using a lossless compression scheme has a lower bound called the entropy of the image. A natural question is when will Huffman encoding be optimal? In other words, when will the number of bpp needed to store an image after Huffman encoding equal the entropy of the image? In this talk, we present a sufficient condition for this to occur. If the relative frequencies of the values of the pixels follow a certain increasing sequence, then the bpp needed to store the image after Huffman encoding will equal the entropy of the image. (Received September 22, 2009)