

Fast Intra-Frame Mode Selection for H.264

The emerging H.264 video coding standard is able to achieve remarkable video quality using a number of new, but compute-intensive, video coding techniques. One of these new techniques is intra-frame coding, in which the blocks or macroblock in an intra-coded macroblock can be predicted from previously coded blocks/macroblocks, so that only their difference information needs to be encoded. Since the intra modes for neighboring blocks/macroblocks are highly correlated, and intra-frame prediction is moderately compute intensive, we propose a fast mode-selection heuristic for H.264 intra-frame prediction based on the mode correlations between neighboring blocks. Using a set of training video inputs, the fast mode selection technique first generates a correlation table, which predicts the best mode(s), from the set of nine possible 4x4 luminance modes, based on the modes used in the 2-4 neighboring blocks above and to the left of the current block. Then an error threshold is used to determine whether that prediction mode is acceptable or an alternate mode should be used. This paper presents two heuristic approaches, exploring the performance and tradeoffs of each with respect to speed, bit rate, and image quality for video sequences with various characteristics.

Keywords: H.264, video encoding, intra-frame prediction, correlation-based heuristic