An Evolution-based Tabu Search Approach to Codebook Design

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ABSTRACT

This paper presents an evolution-based tabu search approach (ETSA) to design codebooks with smaller distortion values in vector quantization. In the ETSA, there is no need for users to determine the size of a tabu memory and to specifically define a set of tabu restrictions and a set of aspiration criteria. During iterations, only the best solution visited is memorized as a tabu point in the search space and the distance from each trial solution to the tabu point is an important factor in the fitness evaluation. In population competition, the new fitness function plays the roles of the tabu restrictions and the aspiration criteria. Based on the new fitness function and a parallel evolutionary mechanism, the ETSA can prevent premature convergence and eventually find a good solution. Seven grayscale images are used to test the performance of the ETSA. Experimental results show that the ETSA performs better than several existing algorithms in terms of the distortion and robustness measures.

Keywords: Codebook design; Evolutionary algorithm; Evolution-based tabu search; Image coding; Vector quantization.