Uniform and non-uniform optimum scalar quantizers performances : a comparative study

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Abstrak

This aim of this paper is to investigates source coding, the representation of information source output by finite R bits/symbol.

The performance of optimum quantizers subject to an entropy constraint is studied. The definitive work in this area is best

summarized by the Shannon?s source coding theorem, that is, a source with entropy H can be encoded with arbitrarily small error probability at any rate R (bits/source output) as long as R>H. Conversely, If R<H , the error probability will be pushed away from zero, independent of the complexity of the encoder and the decoder employed. The main object ive of designers/engineers, in this context, is to design

the optimum code. Unfortunately, the rate-distortion theorem does not provide the recipe for such a design. The Theorem does, however, provide the theoretical limit so that we know how close you are to

the optimum. The full understanding of the theorem also helps in setting the direction to achieve such an optimum. In this

research, we have investigated the performances of two practical scalar quantizers (e.g. a Lloyd-Max quantizer with our uniformly defined one) and also a well known entropy coding scheme, i.e.., Huffman coding against their theoretically attainable optimum performance due to Shannon?s limit R. It is shown that out uniform quantizer could result in substantial performance improvements. The performance improvements are more noticeable at higher bit rates.