

ABSTRACT OF THE DISCLOSURE

The invention relates in general to low bit-rate encoding and decoding of information such as audio information. More particularly, the invention relates to computationally efficient adaptive bit allocation and quantization of encoded information useful in high-quality low bit-rate coding systems. In audio applications, a digital split-band encoder splits an input signal into frequency subband signals having bandwidths commensurate with the critical bandwidths of the human auditory system, quantizes the subband signals according to values established by an allocation function, and assembles the quantized subband signals into an encoded signal. The allocation function establishes allocation values in accordance with psychoacoustic principles with allowance for decoding synthesis filter bank spectral distortions. In one embodiment, an allocation function establishes allocation values using a psychoacoustic masking threshold generated by estimating the power spectral density (PSD) of the input signal, generating an excitation pattern by applying a basilar-membrane spreading function to the PSD, adjusting the excitation pattern by an amount equal to a sensitivity function which specifies a signal-to-noise ratio (SNR) sufficient to achieve psychoacoustic masking, comparing the level of the adjusted pattern to the threshold of hearing and generating the psychoacoustic masking threshold which is equal to the larger of the two. An allocation function may allow for decoder synthesis filter bank spectral distortions in any of a number of ways such as by adapting the sensitivity function.

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