

ABSTRACT OF THE DISCLOSURE

The invention relates to computationally efficient sophisticated perceptual models which can provide a basis for adaptive bit allocation and quantization of encoded information useful in high-quality low bit-rate coding systems. In one embodiment, an audio split-band encoder splits an input signal into frequency subband signals, 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 based upon a masking threshold. The masking threshold is established by estimating the power spectral density (PSD) of the input signal, generating an excitation pattern by applying a spreading function to the PSD, adjusting the excitation pattern by an amount equal to a signal-to-noise ratio (SNR) offset sufficient to achieve psychoacoustic masking, comparing the level of the adjusted pattern to the threshold of hearing and generating a masking threshold which is equal to the larger of the two. The spreading function may be implemented by applying one or more non-recursive filters to the input signal PSD. In forward-adaptive coding systems, allocation values are explicitly conveyed to a decoder by information assembled into the encoded signal. In backward-adaptive coding systems, allocation values are implicitly conveyed to a decoder by information assembled into the encoded signal from which a decoder allocation value may derived the allocation values. In hybrid-adaptive coding systems, basic allocation values are conveyed implicitly with modified allocation values conveyed explicitly.

