Claims

1. A method of encoding a signal including at least one of audio and speech, the method comprising:

generating a spectrum of the signal including at least one of audio and speech based on transform from a time domain to a frequency domain;

fractionally estimating, by using a processor, bits to be allocated to a sub-band in a frame of the spectrum, in consideration of allowable bits for the frame;

when the estimated bits of the sub-band are non-zero bits, re-distributing the estimated bits to the sub-band with non-zero bits based on a minimum bit limitation, to allocate the bits to the sub-band;

quantizing spectral data of the sub-band using the allocated bits; and

outputting a bitstream generated based on the quantized spectral data.

2. The method of claim 1, wherein the estimating is performed based on spectral energy of the sub-band.

3. The method of claim 1, wherein the re-distributing comprises setting the allocated bits to zero when the allocated bits are less than predetermined minimum bits set to the sub-band.

4. The method of claim 1, wherein the re-distributing comprises limiting the allocated bits, based on predetermined minimum bits set to the sub-band.

5. The method of claim 1, wherein the re-distributing comprises setting the allocated bits to predetermined minimum bits set to the sub-band, when the allocated bits are less than the predetermined minimum bits.

6. The method of claim 1, wherein the re-distributing is performed based on the allocated bits for higher bands.

7. A non-transitory computer readable medium comprising instructions executable by a computer to cause the computer to:

generate a spectrum of the signal including at least one of audio and speech based on transform from a time domain to a frequency domain;

fractionally estimate bits to be allocated to a sub-band in a frame of the spectrum, in consideration of allowable bits for the frame;

when the estimated bits of the sub-band are non-zero bits, re-distribute the estimated bits to the sub-band with non-zero bits based on a minimum bit limitation, to allocate the bits to the sub-band;

quantize spectral data of the sub-band using the allocated bits; and

output a bitstream generated based on the quantized spectral data.

8. The non-transitory computer readable medium of claim 7, wherein the bits to be allocated to a sub-band is estimated based on spectral energy of the sub-band.

9. The non-transitory computer readable medium of claim 7, wherein the estimated bits are re-distributed by setting the allocated bits to zero when the allocated bits are less than predetermined minimum bits set to the sub-band.

10. The non-transitory computer readable medium of claim 7, wherein the estimated bits are re-distributed by limiting the allocated bits, based on predetermined minimum bits set to the sub-band.

11. The non-transitory computer readable medium of claim 7, wherein the estimated bits are re-distributed by setting the allocated bits to predetermined minimum bits set to the sub-band, when the allocated bits are less than the predetermined minimum bits.

12. The non-transitory computer readable medium of claim 7, wherein the estimated bits are re-distributed based on the allocated bits for higher bands.