AUDIO CODING METHOD AND RELATED APPARATUS

TECHNICAL FIELD

[0002] The present invention relates to audio coding technologies, and specifically, to an audio coding method and a related apparatus.

BACKGROUND

[0003] In an existing audio (for example, music) coding algorithm, at a same bit rate, some audio coding algorithms are limited to a particular coding bandwidth, and are mainly used to code an audio frame having a relatively low bandwidth, and some audio coding algorithms are not limited to a coding bandwidth, and are mainly used to code an audio frame having a relatively high bandwidth. Certainly, both of the two categories of audio coding algorithms have advantages and disadvantages.

[0004] However, in the prior art, during audio frame coding, a fixed coding algorithm is directly used to code an audio frame. In this way, the used audio coding algorithm can hardly ensure fine coding quality or coding efficiency.

SUMMARY

[0005] Embodiments of the present invention provide an audio coding method and a related apparatus, to improve coding quality or coding efficiency of audio frame coding.

[0006] A first aspect of the embodiments of the present invention provides an audio coding method, including:

performing time-frequency transformation processing on a time-domain signal of a current audio frame, to obtain spectral coefficientss of the current audio frame;

acquiring a reference coding parameter of the current audio frame; and

if the acquired reference coding parameter of the current audio frame satisfies a first

[0022] As can be seen, in technical solutions in some embodiments of the present invention, after a reference coding parameter of a current audio frame is acquired, a TCX algorithm or an HQ algorithm is selected based on the acquired reference coding parameter of the current audio frame, to code spectral coefficients of the current audio frame. The reference coding parameter of the current audio frame is associated with a coding algorithm used to code the spectral coefficients of the current audio frame, which helps improve adaptability and matchability between the coding algorithm and the reference coding parameter of the current audio frame, and further helps improve coding quality or coding efficiency of the current audio frame.

BRIEF DESCRIPTION OF DRAWINGS

[0023] To describe the technical solutions in the embodiments of the present invention more clearly, the following briefly introduces the accompanying drawings required for describing the embodiments. Apparently, the accompanying drawings in the following description show merely some embodiments of the present invention, and persons of ordinary skill in the art may still derive other drawings from these accompanying drawings without creative efforts.

[0024] FIG. 1 to FIG. 8 are schematic flowcharts of several audio coding methods according to embodiments of the present invention; and

[0025] FIG. 9 and FIG. 10 are schematic diagrams of two types of audio coders according to embodiments of the present invention.

DESCRIPTION OF EMBODIMENTS

[0026] Embodiments of the present invention provide an audio coding method and a related apparatus, to improve coding quality or coding efficiency of audio frame coding.

[0027] To make persons skilled in the art understand the technical solutions in the present invention better, the following clearly describes the technical solutions in the embodiments of the present invention with reference to the accompanying drawings in the embodiments of the present invention. Apparently, the described embodiments are merely a part rather than all of the embodiments of the present invention. All other embodiments obtained by persons of ordinary skill in the art based on the embodiments of the present invention without creative efforts shall fall within the protection scope of the present invention.

[0028] The following gives detailed descriptions.

[0029] In the specification, claims, and accompanying drawings of the present invention, the

terms "first", "second", "third", "fourth", and so on are intended to distinguish between different objects but are not intended to describe a specific order. In addition, terms "include" and "have" and any variation thereof are intended to cover non-exclusive including. For example, a process, a method, a system, a product, or a device that includes a series of steps or units is not limited to the listed steps or units, but optionally further includes an unlisted step or unit, or optionally further includes another inherent step or unit of the process, the method, the product, or the device.

[0030] The following first introduces the audio coding method provided in the embodiments of the present invention. The audio coding method provided in the embodiments of the present invention may be executed by an audio coder. The audio coder may be any apparatus that needs to collect, store, or transmit an audio signal, for example, a mobile phone, a tablet computer, a personal computer, or a notebook computer.

[0031] In one embodiment of the audio coding method in the present invention, the audio coding method includes: performing time-frequency transformation processing on a time-domain signal of a current audio frame, to obtain spectral coefficients of the current audio frame; acquiring a reference coding parameter of the current audio frame; and if the acquired reference coding parameter of the current audio frame satisfies a first parameter condition, coding the spectral coefficients of the current audio frame based on a transform coded excitation algorithm, or if the acquired reference coding parameter of the current audio frame satisfies a second parameter condition, coding the spectral coefficients of the current audio frame based on a high quality transform coding algorithm.

[0032] Referring to FIG. 1, FIG. 1 is a schematic flowchart of an audio coding method according to an embodiment of the present invention. As shown in FIG. 1, the audio coding method provided in this embodiment of the present invention may include the following content:

[0033] 101: Perform time-frequency transformation processing on a time-domain signal of a current audio frame, to obtain spectral coefficients of the current audio frame.

[0034] The audio frame mentioned in the embodiments of the present invention may be a speech frame or a music frame.

[0035] 102: Acquire a reference coding parameter of the current audio frame.

[0036] 103: If the acquired reference coding parameter of the current audio frame satisfies a first parameter condition, code the spectral coefficients of the current audio frame based on a transform coded excitation (English: transform coded excitation, TCX for short) coding algorithm.

[0037] 104: If the acquired reference coding parameter of the current audio frame satisfies a second parameter condition, code the spectral coefficients of the current audio frame based on a high quality transform coding (English: high quality transform coding, HQ for short) algorithm.

a difference of subtracting the envelope deviation of the spectral coefficients that are located within the subband s and that is of the current audio frame from the envelope deviation of the spectral coefficients that are located within the subband r and that is of the current audio frame is less than a threshold T56 (a value range of the threshold T56 may be, for example, –40 to 40), and the envelope deviation of the spectral coefficients that are located within the subband s and that is of the current audio frame is less than a threshold T57 (the threshold T57 may be, for example, 10, 20, 30, or another value);

a difference of subtracting the envelope deviation of the spectral coefficients that are located within the subband s and that is of the current audio frame from the envelope deviation of the spectral coefficients that are located within the subband r and that is of the current audio frame is greater than a threshold T58 (a value range of the threshold T58 may be, for example, –40 to 40), and the envelope deviation of the spectral coefficients that are located within the subband s and that is of the current audio frame is greater than a threshold T59 (the threshold T59 may be, for example, 10, 20, 30, or another value);

a quotient of dividing the envelope of the spectral coefficients that are located within the subband e and that is of the current audio frame by the envelope of the spectral coefficients that are located within the subband f and that is of the current audio frame is less than a threshold T60 (a value range of the threshold T60 may be, for example, 1 to 3), and the envelope of the spectral coefficients that are located within the subband f and that is of the current audio frame is less than a threshold T61 (the threshold T61 may be, for example, 10, 20, 30, or another value);

a quotient of dividing the envelope of the spectral coefficients that are located within the subband e and that is of the current audio frame by the envelope of the spectral coefficients that are located within the subband f and that is of the current audio frame is greater than a threshold T62 (a value range of the threshold T62 may be, for example, 1 to 3), and the envelope of the spectral coefficients that are located within the subband f and that is of the current audio frame is greater than a threshold T63 (the threshold T63 may be, for example, 10, 20, 30, or another value);

a difference of subtracting the envelope of the spectral coefficients that are located within the subband f and that is of the current audio frame from the envelope of the spectral coefficients that are located within the subband e and that is of the current audio frame is less than a threshold T64 (a value range of the threshold T64 may be, for example, –40 to 40), and the envelope of the spectral coefficients that are located within the subband f and that is of the current audio frame is less than a threshold T65 (the threshold T65 may be, for example, 10, 20, 30, or another value);

a difference of subtracting the envelope of the spectral coefficients that are located

within the subband f and that is of the current audio frame from the envelope of the spectral coefficients that are located within the subband e and that is of the current audio frame is greater than a threshold T66 (a value range of the threshold T66 may be, for example, –40 to 40), and the envelope of the spectral coefficients that are located within the subband f and that is of the current audio frame is greater than a threshold T67 (the threshold T67 may be, for example, 10, 20, 30, or another value);

the quotient of dividing the energy average of the spectral coefficients that are located within the subband i and that is of the current audio frame by the energy average of the spectral coefficients that are located within the subband j and that is of the current audio frame is less than or equal to a threshold T68 (the threshold T68 may be, for example, less than or equal to 0.5, 1, 2, 3, or another value), and the peak-to-average ratio of the spectral coefficients that are located within the subband z and that is of the current audio frame is less than or equal to a threshold T69 (the threshold T69 may be, for example, less than or equal to 1, 2, 3, 5, or another value);

the difference of subtracting the energy average of the spectral coefficients that are located within the subband j and that is of the current audio frame from the energy average of the spectral coefficients that are located within the subband i and that is of the current audio frame is less than or equal to a threshold T70 (the threshold T70 may be, for example, less than or equal to 10, 20, 51, 100, or another value), and the peak-to-average ratio of the spectral coefficients that are located within the subband z and that is of the current audio frame is less than or equal to a threshold T71 (the threshold T71 may be, for example, less than or equal to 1, 2, 3, 5, or another value);

the quotient of dividing the amplitude average of the spectral coefficients that are located within the subband m and that is of the current audio frame by the amplitude average of the spectral coefficients that are located within the subband n and that is of the current audio frame is less than or equal to a threshold T72 (the threshold T72 may be, for example, greater than or equal to 0.5, 1.1, 2, 3, or another value), and the peak-to-average ratio of the spectral coefficients that are located within the subband z and that is of the current audio frame is less than or equal to a threshold T73 (the threshold T73 may be, for example, less than or equal to 1, 2, 3, 5, or another value);

the difference of subtracting the amplitude average of the spectral coefficients that are located within the subband n and that is of the current audio frame from the amplitude average of the spectral coefficients that are located within the subband m and that is of the current audio frame is less than or equal to a threshold T74 (the threshold T74 may be, for example, greater than or equal to 11, 20, 50, 101, or another value), and the peak-to-average ratio of the spectral coefficients

embodiment of the present invention may include the following content:

[0121] 501: Perform time-frequency transformation processing on a time-domain signal of a current audio frame, to obtain spectral coefficients of the current audio frame.

[0122] The audio frame mentioned in the embodiments of the present invention may be a speech frame or a music frame.

[0123] It is assumed that a bandwidth of the time-domain signal of the current audio frame is 16 kHz.

[0124] 502: Acquire a peak-to-average ratio of spectral coefficients that is located within a subband x and that is of the current audio frame and a peak-to-average ratio of spectral coefficients that is located within a subband y and that is of the current audio frame.

[0125] 503: Determine whether a quotient of dividing the peak-to-average ratio of the spectral coefficients that are located within the subband x and that is of the current audio frame by the peak-to-average ratio of the spectral coefficients that are located within the subband y and that is of the current audio frame is greater than or equal to a threshold T46.

[0126] If yes, step 504 is performed; if not, step 505 is performed.

[0127] The threshold T46 may be greater than or equal to 0.5, and the threshold T46, for example, is 0.5, 1, 1.5, 2, 3, or another value.

[0128] For example, a frequency bin range of the subband x may be 0 kHz to 1.6 kHz, 1 kHz to 2.6 kHz, or 1.6 kHz to 3.2 kHz, and a frequency bin range of the subband y may be 6.4 kHz to 8 kHz, 7.4 kHz to 9 kHz, or 4.8 kHz to 6.4 kHz.

[0129] 504: Determine whether the peak-to-average ratio of the spectral coefficients that are located within the subband y and that is of the current audio frame is greater than or equal to a threshold T47.

[0130] If yes, step 506 is performed; if not, step 507 is performed.

[0131] 505: Determine whether the peak-to-average ratio of the spectral coefficients that are located within the subband y and that is of the current audio frame is less than the threshold T47.

[0132] If yes, step 506 is performed; if not, step 507 is performed.

[0133] 506: Code the spectral coefficients of the current audio frame based on a TCX algorithm.

[0134] 507: Code the spectral coefficients of the current audio frame based on an HQ algorithm.

[0135] As can be seen, in solutions of this embodiment, a TCX algorithm or an HQ algorithm is selected mainly based on a peak-to-average ratio of spectral coefficients that is located within a subband x and that is of a current audio frame and a peak-to-average ratio of spectral coefficients that is located within a subband y and that is of the current audio frame, to code spectral coefficients of the current audio frame. The peak-to-average ratio of the spectral coefficients that are located

selected mainly based on a coding rate of a current audio frame, an energy average of spectral coefficients that is located within a subband i and that is of the current audio frame, and an energy average of spectral coefficients that is located within a subband j and that is of the current audio frame, to code spectral coefficients of the current audio frame. The coding rate of the current audio frame, the energy average of the spectral coefficients that are located within the subband i and that is of the current audio frame, and the energy average of the spectral coefficients that are located within the subband j and that is of the current audio frame are associated with a coding algorithm used to code the spectral coefficients of the current audio frame, which helps improve adaptability and matchability between the coding algorithm and a reference coding parameter of the current audio frame, and further helps improve coding quality or coding efficiency of the current audio frame.

[0170] Referring to FIG. 8, FIG. 8 is a schematic flowchart of another audio coding method according to another embodiment of the present invention. In an example shown in FIG. 8, a coding algorithm used to code spectral coefficients of a current audio frame is determined mainly based on an amplitude average of spectral coefficients that is located within a subband m and that is of the current audio frame and an amplitude average of spectral coefficients that is located within a subband n and that is of the current audio frame.

[0171] As shown in FIG. 8, the another audio coding method provided in the another embodiment of the present invention may include the following content:

[0172] 801: Perform time-frequency transformation processing on a time-domain signal of a current audio frame, to obtain spectral coefficients of the current audio frame.

[0173] The audio frame mentioned in the embodiments of the present invention may be a speech frame or a music frame.

[0174] It is assumed that a bandwidth of the time-domain signal of the current audio frame is 16 kHz.

[0175] 802: Acquire an amplitude average of spectral coefficients that is located within a subband m and that is of the current audio frame and an amplitude average of spectral coefficients that is located within a subband n and that is of the current audio frame.

[0176] 803: Determine whether a quotient of dividing the amplitude average of the spectral coefficients that are located within the subband m and that is of the current audio frame by the amplitude average of the spectral coefficients that are located within the subband n and that is of the current audio frame is greater than or equal to a threshold T6.

[0177] If yes, step 804 is performed; if not, step 805 is performed.

[0178] The threshold T6 may be greater than or equal to 0.3, and the threshold T6, for example,

is 0.5, 1, 1.5, 2, 3.2, or another value.

[0179] For example, a frequency bin range of the subband m may be 3.2 kHz to 6.4 kHz, 3.2 kHz to 4.8 kHz, 4.8 kHz to 6.4 kHz, or 0.4 kHz to 6.4 kHz.

[0180] For example, a frequency bin range of the subband n may be 6.4 kHz to 9.6 kHz, 6.4 kHz to 8 kHz, 8 kHz to 9.6 kHz, or 4.8 kHz to 9.6 kHz.

[0181] 804: Code the spectral coefficients of the current audio frame based on a TCX algorithm.

[0182] 805: Code the spectral coefficients of the current audio frame based on an HQ algorithm.

[0183] As can be seen, in solutions of this embodiment, a TCX algorithm or an HQ algorithm is selected mainly based on an amplitude average of spectral coefficients that is located within a subband m and that is of a current audio frame and an amplitude average of spectral coefficients that is located within a subband n and that is of the current audio frame, to code spectral coefficients of the current audio frame. A relationship between the amplitude average of the spectral coefficients that are located within the subband m and that is of the current audio frame and the amplitude average of the spectral coefficients that are located within the subband n and that is of the current audio frame, and a peak-to-average ratio of spectral coefficients that is located within a subband z and that is of the current audio frame are associated with a coding algorithm used to code the spectral coefficients of the current audio frame, which helps improve adaptability and matchability between the coding algorithm and a reference coding parameter of the current audio frame, and further helps improve coding quality or coding efficiency of the current audio frame.

[0184] It may be understood that, exemplary implementation manners in FIG. 2 to FIG. 8 are merely some implementation manners of the present invention. In an actual application, multiple other possible implementation manners may be extended based on related exemplary descriptions in the embodiment corresponding to FIG. 1.

[0185] In some scenarios, the following may be considered during selection of a subband.

[0186] When a similarity between property parameters of spectral coefficients located within two subbands is calculated, two matched subbands may be selected, for example, the two subbands are 0 kHz to 1.6 kHz and 6.4 kHz to 8 kHz. In some scenarios, because a property of spectral coefficients in 0 to 1 kHz differs greatly from a property of spectral coefficients in 1 to 1.6 kHz, the spectrum of 0 kHz to 1.6 kHz may not be selected when the similarity between the property parameters of the spectral coefficients is calculated. For example, spectral coefficients within 1 kHz to 2.6 kHz may be selected to replace spectral coefficients within 0 to 1.6 kHz, to calculate a property parameter of low-frequency spectral coefficients. In this case, if low frequency spectral coefficients within 1 kHz to 2.6 kHz are copied to high frequency, corresponding spectral coefficients are high-frequency spectral coefficients within 7.4 kHz to 9 kHz. When a property parameter of

frequency bin range of the subband f is not limited to the foregoing examples. In some possible implementation manners, the frequency bin range of the subband f may be the same as or similar to the frequency bin range of the subband y.

[0217] The first parameter condition and the second parameter condition may be varied.

[0218] For example, in some possible implementation manners of the present invention, the first parameter condition in this embodiment may be, for example, the first parameter condition in the method embodiment, and the second parameter condition in this embodiment may be, for example, the second parameter condition in the method embodiment. For related descriptions, refer to the records in the method embodiment.

[0219] It may be understood that, functions of each functional module of the audio coder 900 in this embodiment may be specifically implemented according to the methods of the foregoing method embodiments. For a specific implementation process, refer to related description of the foregoing method embodiments, and details are not described herein.

[0220] The audio coder 900 may be any apparatus that needs to collect, store, or transmit an audio signal, for example, a mobile phone, a tablet computer, a personal computer, or a notebook computer.

[0221] As can be seen, in solutions of this embodiment, after acquiring a reference coding parameter of a current audio frame, the audio coder 900 selects a TCX algorithm or an HQ algorithm based on the acquired reference coding parameter of the current audio frame, to code spectral coefficients of the current audio frame. The reference coding parameter of the current audio frame is associated with a coding algorithm used to code the spectral coefficients of the current audio frame, which helps improve adaptability and matchability between the coding algorithm and the reference coding parameter of the current audio frame, and further helps improve coding quality or coding efficiency of the current audio frame.

[0222] Referring to FIG. 10, FIG. 10 is a structural block diagram of an audio coder 1000 according to another embodiment of the present invention.

[0223] The audio coder 1000 may include at least one processor 1001, a memory 1005, and at least one communications bus 1002. The communications bus 1002 is configured to implement connection and communication between the components.

[0224] Optionally, the audio coder 1000 may further include at least one network interface 1004, a user interface 1003, and the like. Optionally, the user interface 1003 includes a display (for example, a touch screen, a liquid crystal display, a holographic imaging device (English: Holographic), or a projector (English: Projector)), a click device (for example, a mouse, a trackball (English: trackball), a touch panel, or a touch screen), a camera, and/or a pickup device.

CLAIMS

1. An audio coding method, comprising:

performing (101) time-frequency transformation processing on a time-domain signal of a current audio frame, to obtain spectral coefficients of the current audio frame;

acquiring (102) a reference coding parameter of the current audio frame; and

if the acquired reference coding parameter of the current audio frame satisfies a first parameter condition, coding (103) the spectral coefficients of the current audio frame based on a transform coded excitation algorithm, or if the acquired reference coding parameter of the current audio frame satisfies a second parameter condition, coding (104) the spectral coefficients of the current audio frame based on a high quality transform coding algorithm.

2. The method accoding to claim 1, wherein the acquired reference coding parameter comprises: a peak-to-average ratio of spectral coefficients that is located within a subband z and that is of the current audio frame, an energy average of spectral coefficients that is located within a subband i and that is of the current audio frame and an energy average of spectral coefficients that is located within a subband j and that is of the current audio frame, and a peak-to-average ratio of spectral coefficients that is located within a subband x and that is of the current audio frame and a peak-to-average ratio of spectral coefficients that is located within a subband y and that is of the current audio frame;

wherein a highest frequency bin of the subband z is greater than a critical frequency bin F1, a value range of the critical frequency bin F1 is 6.4 kHz to 12 kHz;

wherein a highest frequency bin of the subband i is less than the highest frequency bin of the subband j, a highest frequency bin of the subband j is greater than a critical frequency bin F2, and a value range of the critical frequency bin F2 is 4.8 kHz to 8 kHz; and

wherein a highest frequency bin of the subband x is less than or equal to a lowest frequency bin of the subband y.

3. The method according to claim 2, wherein a lowest frequency bin of the subband z is greater than or equal to the critical frequency bin F1, the highest frequency bin of the subband i is less than or equal to a lowest frequency bin of the subband j, or a lowest frequency bin of the subband j is greater than the critical frequency bin F2.

4. The method according to claim 2 or 3, wherein the second parameter condition comprises at least one of the following conditions:

condition I: the quotient of dividing the energy average of the spectral coefficients that are located within the subband i and that is of the current audio frame by the energy average of the

spectral coefficients that are located within the subband j and that is of the current audio frame is less than the threshold T4;

condition II: the peak-to-average ratio of the spectral coefficients that are located within the subband z and that is of the current audio frame is greater than the threshold T2, and the quotient of dividing the energy average of the spectral coefficients that are located within the subband i and that is of the current audio frame by the energy average of the spectral coefficients that are located within the subband j and that is of the current audio frame is less than the threshold T4; or

condition III: the ratio of the peak-to-average ratio of the spectral coefficients that are located within the subband x and that is of the current audio frame to the peak-to-average ratio of the spectral coefficients that are located within the subband y and that is of the current audio frame does not fall within the interval R1.

5. The method according to any one of claims 2 to 4, wherein a frequency bin range of the subband x is 1 kHz to 2.6 kHz, and a frequency bin range of the subband y is 4.8 kHz to 6.4 kHz.

6. The method according to claim 1, wherein the reference coding parameter comprises at least one of the following parameters: a coding rate of the current audio frame; a peak-to-average ratio of spectral coefficients that is located within a subband z and that is of the current audio frame; an envelope deviation of spectral coefficients that is located within a subband w and that is of the current audio frame; an energy average of spectral coefficients that is located within a subband i and that is of the current audio frame and an energy average of spectral coefficients that is located within a subband j and that is of the current audio frame; an amplitude average of spectral coefficients that is located within a subband m and that is of the current audio frame and an amplitude average of spectral coefficients that is located within a subband n and that is of the current audio frame; a peak-to-average ratio of spectral coefficients that is located within a subband x and that is of the current audio frame and a peak-to-average ratio of spectral coefficients that is located within a subband y and that is of the current audio frame; an envelope deviation of spectral coefficients that is located within a subband r and that is of the current audio frame and an envelope deviation of spectral coefficients that is located within a subband s and that is of the current audio frame; an envelope of spectral coefficients that is located within a subband e and that is of the current audio frame and an envelope of spectral coefficients that is located within a subband f and that is of the current audio frame; or a parameter value of spectral correlation between spectral coefficients that is located within a subband p and that is of the current audio frame and spectral coefficients that is located within a subband q and that is of the current audio frame, wherein

a highest frequency bin of the subband z is greater than a critical frequency bin F1; a highest frequency bin of the subband w is greater than the critical frequency bin F1; a highest frequency bin

of the subband j is greater than a critical frequency bin F2; and a highest frequency bin of the subband n is greater than the critical frequency bin F2;

a value range of the critical frequency bin F1 is 6.4 kHz to 12 kHz;

a value range of the critical frequency bin F2 is 4.8 kHz to 8 kHz; and

a highest frequency bin of the subband i is less than the highest frequency bin of the subband j; a highest frequency bin of the subband m is less than the highest frequency bin of the subband n; a highest frequency bin of the subband x is less than or equal to a lowest frequency bin of the subband y; a highest frequency bin of the subband p is less than or equal to a lowest frequency bin of the subband q; a highest frequency bin of the subband r is less than or equal to a lowest frequency bin of the subband s; and a highest frequency bin of the subband e is less than or equal to a lowest frequency bin of the subband f.

7. The method according to claim 6, wherein

at least one of the following conditions is satisfied: a lowest frequency bin of the subband w is greater than or equal to the critical frequency bin F1, a lowest frequency bin of the subband z is greater than or equal to the critical frequency bin F1, the highest frequency bin of the subband i is less than or equal to a lowest frequency bin of the subband j, the highest frequency bin of the subband m is less than or equal to a lowest frequency bin of the subband n, a lowest frequency bin of the subband j is greater than the critical frequency bin F2, or a lowest frequency bin of the subband n is greater than the critical frequency bin F2.

8. The method according to claims 6 or 7, wherein the second parameter condition comprises at least one of the following conditions:

the coding rate of the current audio frame is greater than or equal to the threshold T1;

the peak-to-average ratio of the spectral coefficients that are located within the subband z and that is of the current audio frame is greater than the threshold T2;

the envelope deviation of the spectral coefficients that are located within the subband w and that is of the current audio frame is greater than the threshold T3;

the quotient of dividing the energy average of the spectral coefficients that are located within the subband i and that is of the current audio frame by the energy average of the spectral coefficients that are located within the subband j and that is of the current audio frame is less than the threshold T4;

the difference of subtracting the energy average of the spectral coefficients that are located within the subband j and that is of the current audio frame from the energy average of the spectral coefficients that are located within the subband i and that is of the current audio frame is less than the threshold T5;

the quotient of dividing the amplitude average of the spectral coefficients that are located within the subband m and that is of the current audio frame by the amplitude average of the spectral coefficients that are located within the subband n and that is of the current audio frame is less than the threshold T6;

the difference of subtracting the amplitude average of the spectral coefficients that are located within the subband n and that is of the current audio frame from the amplitude average of the spectral coefficients that are located within the subband m and that is of the current audio frame is less than the threshold T7;

the ratio of the peak-to-average ratio of the spectral coefficients that are located within the subband x and that is of the current audio frame to the peak-to-average ratio of the spectral coefficients that are located within the subband y and that is of the current audio frame does not fall within the interval R1;

the absolute value of the difference between the peak-to-average ratio of the spectral coefficients that are located within the subband x and that is of the current audio frame and the peak-to-average ratio of the spectral coefficients that are located within the subband y and that is of the current audio frame is greater than the threshold T8;

the ratio of the envelope deviation of the spectral coefficients that are located within the subband r and that is of the current audio frame to the envelope deviation of the spectral coefficients that are located within the subband s and that is of the current audio frame does not fall within the interval R2;

the absolute value of the difference between the envelope deviation of the spectral coefficients that are located within the subband r and that is of the current audio frame and the envelope deviation of the spectral coefficients that are located within the subband s and that is of the current audio frame is greater than the threshold T9;

the ratio of the envelope of the spectral coefficients that are located within the subband e and that is of the current audio frame to the envelope of the spectral coefficients that are located within the subband f and that is of the current audio frame does not fall within the interval R3;

the absolute value of the difference between the envelope of the spectral coefficients that are located within the subband e and that is of the current audio frame and the envelope of the spectral coefficients that are located within the subband f and that is of the current audio frame is greater than the threshold T10; or

the parameter value of spectral correlation between the spectral coefficients that are located within the subband p and that is of the current audio frame and the spectral coefficients that are located within the subband q and that is of the current audio frame is less than the threshold T11.

9. An audio coder (900), comprising:

a time-frequency transformation unit (910), configured to perform time-frequency transformation processing on a time-domain signal of a current audio frame, to obtain spectral coefficients of the current audio frame;

an acquiring unit (920), configured to acquire a reference coding parameter of the current audio frame; and

a coding unit (930), configured to: if the reference coding parameter that is acquired by the acquiring unit and that is of the current audio frame satisfies a first parameter condition, code the spectral coefficients of the current audio frame based on a transform coded excitation algorithm, or if the reference coding parameter that is acquired by the acquiring unit and that is of the current audio frame satisfies a second parameter condition, code the spectral coefficients of the current audio frame based on a high quality transform coding algorithm.

10. The audio coder accoding to claim 9, wherein the acquired reference coding parameter comprises: a peak-to-average ratio of spectral coefficients that is located within a subband z and that is of the current audio frame, an energy average of spectral coefficients that is located within a subband i and that is of the current audio frame and an energy average of spectral coefficients that is located within a subband j and that is of the current audio frame, and a peak-to-average ratio of spectral coefficients that is located within a subband x and that is of the current audio frame and a peak-to-average ratio of spectral coefficients that is located within a subband y and that is of the current audio frame;

wherein a highest frequency bin of the subband z is greater than a critical frequency bin F1, a value range of the critical frequency bin F1 is 6.4 kHz to 12 kHz;

wherein a highest frequency bin of the subband i is less than the highest frequency bin of the subband j, a highest frequency bin of the subband j is greater than a critical frequency bin F2, and a value range of the critical frequency bin F2 is 4.8 kHz to 8 kHz; and

wherein a highest frequency bin of the subband x is less than or equal to a lowest frequency bin of the subband y.

11. The audio coder according to claim 10, wherein a lowest frequency bin of the subband z is greater than or equal to the critical frequency bin F1, the highest frequency bin of the subband i is less than or equal to a lowest frequency bin of the subband j, or a lowest frequency bin of the subband j is greater than the critical frequency bin F2.

12. The audio coder according to claim 10 or 11, wherein the second parameter condition comprises at least one of the following conditions:

condition I: the quotient of dividing the energy average of the spectral coefficients that are

located within the subband i and that is of the current audio frame by the energy average of the spectral coefficients that are located within the subband j and that is of the current audio frame is less than the threshold T4;

condition II: the peak-to-average ratio of the spectral coefficients that are located within the subband z and that is of the current audio frame is greater than the threshold T2, and the quotient of dividing the energy average of the spectral coefficients that are located within the subband i and that is of the current audio frame by the energy average of the spectral coefficients that are located within the subband j and that is of the current audio frame is less than the threshold T4; or

condition III: the ratio of the peak-to-average ratio of the spectral coefficients that are located within the subband x and that is of the current audio frame to the peak-to-average ratio of the spectral coefficients that are located within the subband y and that is of the current audio frame does not fall within the interval R1.

13. The audio coder according to any one of claims 10 to 12, wherein a frequency bin range of the subband x is 1 kHz to 2.6 kHz, and a frequency bin range of the subband y is 4.8 kHz to 6.4 kHz.

14. The audio coder according to claim 9, wherein the reference coding parameter comprises at least one of the following parameters: a coding rate of the current audio frame; a peak-to-average ratio of spectral coefficients that is located within a subband z and that is of the current audio frame; an envelope deviation of spectral coefficients that is located within a subband w and that is of the current audio frame; an energy average of spectral coefficients that is located within a subband i and that is of the current audio frame and an energy average of spectral coefficients that is located within a subband j and that is of the current audio frame; an amplitude average of spectral coefficients that is located within a subband m and that is of the current audio frame and an amplitude average of spectral coefficients that is located within a subband n and that is of the current audio frame; a peak-to-average ratio of spectral coefficients that is located within a subband x and that is of the current audio frame and a peak-to-average ratio of spectral coefficients that is located within a subband y and that is of the current audio frame; an envelope of spectral coefficients that is located within a subband e and that is of the current audio frame and an envelope of spectral coefficients that is located within a subband f and that is of the current audio frame; a parameter value of spectral correlation between spectral coefficients that is located within a subband p and that is of the current audio frame and spectral coefficients that is located within a subband q and that is of the current audio frame; or an envelope deviation of spectral coefficients that is located within a subband r and that is of the current audio frame and an envelope deviation of spectral coefficients that is located within a subband s and that is of the current audio frame,

wherein

a highest frequency bin of the subband z is greater than a critical frequency bin F1; a highest frequency bin of the subband w is greater than the critical frequency bin F1; a highest frequency bin of the subband j is greater than a critical frequency bin F2; and a highest frequency bin of the subband n is greater than the critical frequency bin F2;

a value range of the critical frequency bin F1 is 6.4 kHz to 12 kHz;

a value range of the critical frequency bin F2 is 4.8 kHz to 8 kHz; and

a highest frequency bin of the subband i is less than the highest frequency bin of the subband j; a highest frequency bin of the subband m is less than the highest frequency bin of the subband n; a highest frequency bin of the subband x is less than or equal to a lowest frequency bin of the subband y; a highest frequency bin of the subband p is less than or equal to a lowest frequency bin of the subband q; a highest frequency bin of the subband r is less than or equal to a lowest frequency bin of the subband s; and a highest frequency bin of the subband e is less than or equal to a lowest frequency bin of the subband f.

15. The audio coder according to claim 14, wherein

at least one of the following conditions is satisfied: a lowest frequency bin of the subband w is greater than or equal to the critical frequency bin F1, a lowest frequency bin of the subband z is greater than or equal to the critical frequency bin F1, the highest frequency bin of the subband i is less than or equal to a lowest frequency bin of the subband j, the highest frequency bin of the subband m is less than or equal to a lowest frequency bin of the subband n, a lowest frequency bin of the subband j is greater than the critical frequency bin F2, or a lowest frequency bin of the subband n is greater than the critical frequency bin F2.

16. The audio coder according to any one of claims 12 to 14, wherein the second parameter condition comprises at least one of the following conditions:

the coding rate of the current audio frame is greater than or equal to the threshold T1;

the peak-to-average ratio of the spectral coefficients that are located within the subband z and that is of the current audio frame is greater than the threshold T2;

the envelope deviation of the spectral coefficients that are located within the subband w and that is of the current audio frame is greater than the threshold T3;

the quotient of dividing the energy average of the spectral coefficients that are located within the subband i and that is of the current audio frame by the energy average of the spectral coefficients that are located within the subband j and that is of the current audio frame is less than the threshold T4;

the difference of subtracting the energy average of the spectral coefficients that are located

within the subband j and that is of the current audio frame from the energy average of the spectral coefficients that are located within the subband i and that is of the current audio frame is less than the threshold T5;

the quotient of dividing the amplitude average of the spectral coefficients that are located within the subband m and that is of the current audio frame by the amplitude average of the spectral coefficients that are located within the subband n and that is of the current audio frame is less than the threshold T6;

the difference of subtracting the amplitude average of the spectral coefficients that are located within the subband n and that is of the current audio frame from the amplitude average of the spectral coefficients that are located within the subband m and that is of the current audio frame is less than the threshold T7;

the ratio of the peak-to-average ratio of the spectral coefficients that are located within the subband x and that is of the current audio frame to the peak-to-average ratio of the spectral coefficients that are located within the subband y and that is of the current audio frame does not fall within the interval R1;

the absolute value of the difference between the peak-to-average ratio of the spectral coefficients that are located within the subband x and that is of the current audio frame and the peak-to-average ratio of the spectral coefficients that are located within the subband y and that is of the current audio frame is greater than the threshold T8;

the ratio of the envelope deviation of the spectral coefficients that are located within the subband r and that is of the current audio frame to the envelope deviation of the spectral coefficients that are located within the subband s and that is of the current audio frame does not fall within the interval R2;

the absolute value of the difference between the envelope deviation of the spectral coefficients that are located within the subband r and that is of the current audio frame and the envelope deviation of the spectral coefficients that are located within the subband s and that is of the current audio frame is greater than the threshold T9;

the ratio of the envelope of the spectral coefficients that are located within the subband e and that is of the current audio frame to the envelope of the spectral coefficients that are located within the subband f and that is of the current audio frame does not fall within the interval R3;

the absolute value of the difference between the envelope of the spectral coefficients that are located within the subband e and that is of the current audio frame and the envelope of the spectral coefficients that are located within the subband f and that is of the current audio frame is greater than the threshold T10; or

the parameter value of spectral correlation between the spectral coefficients that are located within the subband p and that is of the current audio frame and the spectral coefficients that are located within the subband q and that is of the current audio frame is less than the threshold T11.