CLAIMS

What is claimed is:

1. A method for audio signal classification, comprising:

obtaining a tonal characteristic parameter of an audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in at least one sub-band; and

determining, according to the obtained tonal characteristic parameter, a type of the audio signal to be classified.

2. The method for audio signal classification according to claim 1, further comprising:

obtaining a spectral tilt characteristic parameter of the audio signal to be classified; and

confirming, according to the obtained spectral tilt characteristic parameter, the determined type of the audio signal to be classified.

3. The method for audio signal classification according to claim 1, wherein if the tonal characteristic parameter in at least one sub-band is: a tonal characteristic parameter in a low-frequency sub-band and a tonal characteristic parameter in a relatively high-frequency sub-band, the determining, according to the obtained characteristic parameter, the type of the audio signal to be classified comprises:

judging whether the tonal characteristic parameter of the audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in the low-frequency sub-band, is greater than a first coefficient, and whether the tonal characteristic parameter in the relatively high-frequency sub-band is smaller than a second coefficient; and

if the tonal characteristic parameter of the audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in the low-frequency sub-band, is greater than the first coefficient, and the tonal characteristic parameter in the relatively high-frequency sub-band is smaller than the second coefficient, determining that the type of the audio signal to be classified is a voice type; if the tonal characteristic parameter of the audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in the low-frequency sub-band, is not greater than the first coefficient, or the tonal characteristic parameter in the relatively high-frequency sub-band is not smaller than the second coefficient, determining that the type of the audio signal to be classified is a music type.

4. The method for audio signal classification according to claim 2, wherein if the tonal characteristic parameter in at least one sub-band is: a tonal characteristic parameter in a low-frequency sub-band and a tonal characteristic parameter in a relatively high-frequency sub-band, the confirming, according to the obtained spectral tilt characteristic parameter, the

determined type of the audio signal to be classified comprises:

when the tonal characteristic parameter of the audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in the low-frequency sub-band, is greater than the first coefficient, and the tonal characteristic parameter in the relatively high-frequency sub-band is smaller than the second coefficient, judging whether the spectral tilt characteristic parameter of the audio signal to be classified is greater than a third coefficient; and

if the spectral tilt characteristic parameter of the audio signal to be classified is greater than the third coefficient, determining that the type of the audio signal to be classified is a voice type; if the spectral tilt characteristic parameter of the audio signal to be classified is not greater than the third coefficient, determining that the audio signal to be classified is a music type.

5. The method for audio signal classification according to claim 1, wherein the obtaining the tonal characteristic parameter of the audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in at least one sub-band comprises:

calculating the tonal characteristic parameter according to the number of tones of the audio signal to be classified, wherein the number of tones of the audio signal to be classified is in at least one sub-band, and the total number of tones of the audio signal to be classified.

6. The method for audio signal classification according to claim 5, wherein the calculating the tonal characteristic parameter according to the number of tones of the audio signal to be classified, wherein the number of tones of the audio signal to be classified is in at least one sub-band, and the total number of tones of the audio signal to be classified comprises:

calculating an average value of the number of sub-band tones of the audio signal to be classified, wherein the number of sub-band tones of the audio signal to be classified is in at least one sub-band;

calculating an average value of the total number of tones of the audio signal to be classified; and

respectively using a ratio between the average value of the number of sub-band tones in at least one sub-band and the average value of the total number of tones as a tonal characteristic parameter of the audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in the corresponding sub-band.

7. The method for audio signal classification according to claim 6, comprising:

presetting the stipulated number of frames for calculation, wherein the calculating the average value of the number of sub-band tones of the audio signal to be classified, wherein the number of sub-band tones of the audio signal to be classified is in at least one sub-band, comprises:

calculating the average value of the number of sub-band tones in one sub-band according to a

relationship between the stipulated number of frames for calculation and a frame number of the audio signal to be classified.

8. The method for audio signal classification according to claim 6, comprising: presetting the stipulated number of frames for calculation, wherein the calculating the average value of the total number of tones of the audio signal to be classified comprises:

calculating the average value of the total number of tones according to a relationship between the stipulated number of frames for calculation and a frame number of the audio signal to be classified.

9. The method for audio signal classification according to claim 2, wherein the obtaining the spectral tilt characteristic parameter of the audio signal to be classified comprises:

calculating a spectral tilt average value of the audio signal to be classified; and

using a mean-square error between a spectral tilt of at least one audio signal and the spectral tilt average value as the spectral tilt characteristic parameter of the audio signal to be classified.

10. The method for audio signal classification according to claim 9, comprising:

presetting the stipulated number of frames for calculation, wherein the calculating the spectral tilt average value of the audio signal to be classified comprises: calculating the spectral tilt average value according to a relationship between the stipulated number of frames for calculation and a frame number of the audio signal to be classified.

11. The method for audio signal classification according to claim 9, comprising:

presetting the stipulated number of frames for calculation, wherein the mean-square error between the spectral tilt of at least one audio signal and the spectral tilt average value comprises: calculating the spectral tilt characteristic parameter according to the stipulated number of frames for calculation and the frame number of the audio signal to be classified.

12. A device for audio signal classification, comprising:

a tone obtaining module, configured to obtain a tonal characteristic parameter of an audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in at least one sub-band; and

a classification module, configured to determine, according to the obtained tonal characteristic parameter, a type of the audio signal to be classified.

13. The device for audio signal classification according to claim 12, further comprising:

a spectral tilt obtaining module, configured to obtain a spectral tilt characteristic parameter of the audio signal to be classified,

wherein the classification module is further configured to confirm, according to the spectral tilt characteristic parameter obtained by the spectral tilt obtaining module, the determined type of the

audio signal to be classified.

14. The device for audio signal classification according to claim 12, wherein when the tonal characteristic parameter in at least one sub-band, wherein the tonal characteristic parameter in at least one sub-band is obtained by the tone obtaining module, is: a tonal characteristic parameter in a low-frequency sub-band and a tonal characteristic parameter in a relatively high-frequency sub-band, the classification module comprises:

a judging unit, configured to judge whether the tonal characteristic parameter of the audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in the low-frequency sub-band, is greater than a first coefficient, and whether the tonal characteristic parameter in the relatively high-frequency sub-band is smaller than a second coefficient; and

a classification unit, configured to determine that the type of audio signal to be classified is a voice type when the judging unit determines that the tonal characteristic parameter of the audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in the low-frequency sub-band, is greater than the first coefficient, and the tonal characteristic parameter in the relatively high-frequency sub-band is smaller than the second coefficient, and determine that the type of the audio signal to be classified is a music type when the judging unit determines that the tonal characteristic parameter of the audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in the low-frequency sub-band, is not greater than the first coefficient, or the tonal characteristic parameter in the relatively high-frequency sub-band is not smaller than the second coefficient.

15. The device for audio signal classification according to claim 13, wherein when the tonal characteristic parameter in at least one sub-band, wherein the tonal characteristic parameter in at least one sub-band is obtained by the tone obtaining module, is: a tonal characteristic parameter in a low-frequency sub-band and a tonal characteristic parameter in a relatively high-frequency sub-band, the classification module comprises:

the judging unit is further configured to judge whether the spectral tilt characteristic parameter of the audio signal is greater than a third coefficient when the tonal characteristic parameter of the audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in the low-frequency sub-band, is greater than the first coefficient, and the tonal characteristic parameter in the relatively high-frequency sub-band is smaller than the second coefficient; and

the classification unit is further configured to determine that the type of the audio signal to be classified is a voice type when the judging unit determines that the spectral tilt characteristic

parameter of the audio signal to be classified is greater than the third coefficient, and determine that the type of the audio signal to be classified is a music type when the judging unit determines that the spectral tilt characteristic parameter of the audio signal to be classified is not greater than the third coefficient.

16. The device for audio signal classification according to claim 12, wherein the tone obtaining module calculates the tonal characteristic parameter according to the number of tones of the audio signal to be classified, wherein the number of tones of the audio signal to be classified is in at least one sub-band, and the total number of tones of the audio signal to be classified.

17. The device for audio signal classification according to claim 12 or 16, wherein the tone obtaining module comprises:

a first calculation unit, configured to calculate an average value of the number of sub-band tones of the audio signal to be classified, wherein the average value of the number of sub-band tones of the audio signal to be classified is in at least one sub-band;

a second calculation unit, configured to calculate an average value of the total number of tones of the audio signal to be classified; and

a tonal characteristic unit, configured to respectively use a ratio between the average value of the number of sub-band tones in at least one sub-band and the average value of the total number of tones as a tonal characteristic parameter of the audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in the corresponding sub-band.

18. The device for audio signal classification according to claim 17, further comprising:

a first setting module, configured to preset the stipulated number of frames for calculation,

wherein the calculating, by the first calculation unit, the average value of the number of sub-band tones of the audio signal to be classified, wherein the average value of the number of sub-band tones of the audio signal to be classified is in at least one sub-band, comprises: calculating the average value of the number of sub-band tones in one sub-band according to a relationship between the stipulated number of the frames for calculation, wherein the stipulated number of the frames for calculation is set by the first setting module, and a frame number of the audio signal to be classified.

19. The device for audio signal classification according to claim 17, further comprising:

a first setting module, configured to preset the stipulated number of frames for calculation,

wherein the calculating, by the second calculation unit, the average value of the total number of tones of the audio signal to be classified comprises: calculating the average value of the total number of tones according to a relationship between the stipulated number of frames for calculation, wherein the stipulated number of the frames for calculation is set by the first setting module, and a

frame number of the audio signal to be classified.

20. The device for audio signal classification according to claim 12, wherein the spectral tilt obtaining module comprises:

a third calculation unit, configured to calculate a spectral tilt average value of the audio signal to be classified; and

a spectral tilt characteristic unit, configured to respectively use a mean-square error between a spectral tilt of at least one audio signal and the spectral tilt average value as the spectral tilt characteristic parameter of the audio signal to be classified.

21. The device for audio signal classification according to claim 20, further comprising:

a second setting module, configured to preset the stipulated number of frames for calculation,

wherein the calculating, by the third calculation unit, the spectral tilt average value of the audio signal to be classified comprises: calculating the spectral tilt average value according to the relationship between the stipulated number of frames for calculation, wherein the stipulated number of frames for calculation is set by the second setting module, and the frame number of the audio signal to be classified.

22. The device for audio signal classification according to claim 20, further comprising:

a second setting module, configured to preset the stipulated number of frames for calculation,

wherein the calculating, by the spectral tilt characteristic unit, the mean-square error between the spectral tilt of at least one audio signal and the spectral tilt average value comprises: calculating the spectral tilt characteristic parameter according to the relationship between the stipulated number of frames for calculation, wherein the stipulated number of frames for calculation is set by the second setting module, and the frame number of the audio signal to be classified.

CLAIMS

1. A method for audio signal classification, **characterized by** comprising:

obtaining a tonal characteristic parameter of an audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is: a tonal characteristic parameter in a low-frequency sub-band and a tonal characteristic parameter in a relatively high-frequency sub-band; wherein the tonal characteristic parameter in a sub-band is a ratio between the average value among a stipulated number of frames of the number of sub-band tones in said sub-band and the average value among a stipulated number of frames of the total number of tones and

determining, according to the obtained tonal characteristic parameter, a type of the audio signal to be classified; wherein the determining, comprises:

judging whether the tonal characteristic parameter of the audio signal to be classified in the low-frequency sub-band is greater than a first coefficient, and whether the tonal characteristic parameter in the relatively high-frequency sub-band is smaller than a second coefficient; and

if the tonal characteristic parameter of the audio signal to be classified in the low-frequency sub-band is greater than the first coefficient, and the tonal characteristic parameter in the relatively high-frequency sub-band is smaller than the second coefficient then determining that the type of the audio signal to be classified is a voice type; if the tonal characteristic parameter of the audio signal to be classified in the low-frequency sub-band is not greater than the first coefficient, or the tonal characteristic parameter in the relatively high-frequency sub-band is not smaller than the second coefficient then determining that the type of the audio signal to be classified is a music type.

2. The method for audio signal classification according to claim 1, further comprising:

obtaining a spectral tilt characteristic parameter of the audio signal to be classified; and

the determining, according to the obtained tonal characteristic parameter, a type of the audio signal to be classified comprises:

determining, according to the obtained tonal characteristic parameter and the obtained spectral tilt characteristic parameter, the type of the audio signal to be classified.

3. The method for audio signal classification according to claim 2, wherein the determined type of the audio signal to be classified comprises:

when the tonal characteristic parameter of the audio signal to be classified in the low-frequency sub-band is greater than the first coefficient, and the tonal characteristic parameter in the

relatively high-frequency sub-band is smaller than the second coefficient, judging whether the spectral tilt characteristic parameter of the audio signal to be classified is greater than a third coefficient; and

if the spectral tilt characteristic parameter of the audio signal to be classified is greater than the third coefficient then determining that the type of the audio signal to be classified is a voice type; if the spectral tilt characteristic parameter of the audio signal to be classified is not greater than the third coefficient then determining that the audio signal to be classified is a music type.

4. The method for audio signal classification according to claim 1, wherein the obtaining the tonal characteristic parameter of the audio signal to be classified is in at least one sub-band comprises:

calculating an average value of the number of sub-band tones of the audio signal to be classified, wherein the number of sub-band tones of the audio signal to be classified is determined in one sub-band;

calculating an average value of the total number of tones of the audio signal to be classified; and

respectively using a ratio between the average value of the number of sub-band tones in said one sub-band and the average value of the total number of tones as a tonal characteristic parameter of the audio signal to be classified.

5. The method for audio signal classification according to claim 4, comprising:

presetting the stipulated number of frames for calculating the average value of the number of sub-band tones in one sub-band according to a relationship between the stipulated number of frames for calculation and a frame number of the audio signal to be classified.

6. The method for audio signal classification according to claim 4, comprising: presetting the stipulated number of frames for calculating the average value of the total number of tones according to a relationship between the stipulated number of frames for calculation and a frame number of the audio signal to be classified.

7. The method for audio signal classification according to claim 2, wherein the obtaining the spectral tilt characteristic parameter of the audio signal to be classified comprises:

calculating a spectral tilt average value of the audio signal to be classified; and

using a mean-square error between a spectral tilt of at least one audio signal and the spectral tilt average value as the spectral tilt characteristic parameter of the audio signal to be classified.

8. The method for audio signal classification according to claim 7, comprising:

presetting the stipulated number of frames for calculating the spectral tilt average value according to a relationship between the stipulated number of frames for calculation and a frame number of the audio signal to be classified.

9. The method for audio signal classification according to claim 7, comprising:

presetting the stipulated number of frames for calculation, wherein the mean-square error between the spectral tilt of at least one audio signal and the spectral tilt average value comprises:

calculating the spectral tilt characteristic parameter according to the stipulated number of frames for calculation and the frame number of the audio signal to be classified.

10. A device for audio signal classification, **characterized by** comprising:

a tone obtaining module, configured to obtain a tonal characteristic parameter of an audio signal to be classified, wherein the tonal characteristic parameter of the audio signal to be classified is in at least one sub-band, the tonal characteristic parameter in at least one sub-band is obtained by the tone obtaining module, is: a tonal characteristic parameter in a low-frequency sub-band and a tonal characteristic parameter in a relatively high-frequency sub-band; wherein the tonal characteristic parameter in a sub-band is a ratio between the average value among a stipulated number of frames of the number of sub-band tones in said sub-band and the average value among a stipulated number of frames of the total number of tones; and

a classification module, configured to determine, according to the obtained tonal characteristic parameter, a type of the audio signal to be classified; wherein the classification module comprises:

a judging unit, configured to judge whether the tonal characteristic parameter of the audio signal to be classified in the low-frequency sub-band, is greater than a first coefficient, and whether the tonal characteristic parameter in the relatively high-frequency sub-band is smaller than a second coefficient; and

a classification unit, configured to determine that the type of audio signal to be classified is a voice type when the judging unit determines that the tonal characteristic parameter of the audio signal to be classified in the low-frequency sub-band is greater than the first coefficient, and the tonal characteristic parameter in the relatively high-frequency sub-band is smaller than the second coefficient, and determine that the type of the audio signal to be classified is a music type when the judging unit determines that the tonal characteristic parameter of the audio signal to be classified in

the low-frequency sub-band is not greater than the first coefficient, or the tonal characteristic parameter in the relatively high-frequency sub-band is not smaller than the second coefficient.

11. The device for audio signal classification according to claim 10, further comprising:

a spectral tilt obtaining module, configured to obtain a spectral tilt characteristic parameter of the audio signal to be classified,

wherein the classification module is further configured to determine, according to the spectral tilt characteristic parameter obtained by the spectral tilt obtaining module, the determined type of the audio signal to be classified.

12. The device for audio signal classification according to claim 11, the judging unit is further configured to judge whether the spectral tilt characteristic parameter of the audio signal is greater than a third coefficient when the tonal characteristic parameter of the audio signal to be classified in the low-frequency sub-band is greater than the first coefficient, and the tonal characteristic parameter in the relatively high-frequency sub-band is smaller than the second coefficient; and

the classification unit is further configured to determine that the type of the audio signal to be classified is a voice type when the judging unit determines that the spectral tilt characteristic parameter of the audio signal to be classified is greater than the third coefficient, and determine that the type of the audio signal to be classified is a music type when the judging unit determines that the spectral tilt characteristic parameter of the audio signal to be classified is not greater than the third coefficient.

13. The device for audio signal classification according to claim 12, wherein the tone obtaining module comprises:

a first calculation unit, configured to calculate an average value of the number of sub-band tones of the audio signal to be classified in one sub-band;

a second calculation unit, configured to calculate an average value of the total number of tones of the audio signal to be classified; and

a tonal characteristic unit, configured to respectively use a ratio between the average value of the number of sub-band tones in said one sub-band and the average value of the total number of tones as a tonal characteristic parameter in a sub-band of the audio signal to be classified.

14. The device for audio signal classification according to claim 13, further comprising:

a first setting module, configured to preset the stipulated number of frames for calculation, wherein the calculating, by the first calculation unit, the average value of the number of sub-band tones of the audio signal to be classified in at least one sub-band, comprises: calculating the average value of the number of sub-band tones in one sub-band according to a relationship between the stipulated number of the frames for calculation, wherein the stipulated number of the frames for calculation is set by the first setting module, and a frame number of the audio signal to be classified.

15. The device for audio signal classification according to claim 13, further comprising:

a first setting module, configured to preset the stipulated number of frames for calculation, wherein the calculating, by the second calculation unit, the average value of the total number of tones of the audio signal to be classified comprises: calculating the average value of the total number of tones according to a relationship between the stipulated number of frames for calculation, wherein the stipulated number of the frames for calculation is set by the first setting module, and a frame number of the audio signal to be classified.

16. The device for audio signal classification according to claim 10, wherein the spectral tilt obtaining module comprises:

a third calculation unit, configured to calculate a spectral tilt average value of the audio signal to be classified; and

a spectral tilt characteristic unit, configured to respectively use a mean-square error between a spectral tilt of at least one audio signal and the spectral tilt average value as the spectral tilt characteristic parameter of the audio signal to be classified.

17. The device for audio signal classification according to claim 16, further comprising:

a second setting module, configured to preset the stipulated number of frames for calculation, wherein the calculating, by the third calculation unit, the spectral tilt average value of the audio signal to be classified comprises: calculating the spectral tilt average value according to the relationship between the stipulated number of frames for calculation ; and the frame number of the audio signal to be classified.

18. The device for audio signal classification according to claim 16, further comprising:

a second setting module, configured to preset the stipulated number of frames for calculation, wherein the calculating, by the spectral tilt characteristic unit, the mean-square error between the spectral tilt of at least one audio signal and the spectral tilt average value comprises: calculating the spectral tilt characteristic parameter according to the relationship between the stipulated number of frames for calculation and the frame number of the audio signal to be classified.