

[0009]

However, in the above-described technology, the gain control and the filter processing for reproducing the change in frequency characteristics and volume corresponding to the distance from the listening position to the audio object are predetermined.

[0010]

Therefore, when a content creator desires to reproduce a sense of distance based on the change in frequency characteristics and volume in a different way therefrom, such a sense of distance cannot be reproduced. That is, it is not possible to realize sense-of-distance control based on the intention of the content creator.

[0011]

Embodiments of the present invention disclose the sense-of-distance control based on the intention of the content creator.

SOLUTIONS TO PROBLEMS

[0012]

According to a first aspect of the present invention, there is provided an encoding device including: an object encoding unit configured to encode audio data of an object; a metadata encoding unit configured to encode metadata including position information of the object; a sense-of-distance control information determination unit configured to determine sense-of-distance control information for sense-of-distance control processing to be performed on the audio data which is set by a content creator and reproduces a sense of distance from a listening position to the object, the sense-of-distance control information including (i) configuration information indicating one or more signal processing steps, performed in combination to add the sense of distance to a sound of the object, and (ii) control rule information indicating a

parameter, obtained by parameterizing a control rule which is set by the content creator for each of the signal processing steps, the parameter changing according to the distance from the listening position to the object; a sense-of-distance control information encoding unit configured to encode the sense-of-distance control information; and a multiplexer configured to multiplex the coded audio data, the coded metadata, and the coded sense-of-distance control information to generate coded data.

[0013]

Disclosed herein is a method or a that includes the steps of: encoding audio data of an object; encoding metadata including position information of the object; determining sense-of-distance control information for sense-of-distance control processing to be performed on the audio data; encoding the sense-of-distance control information; and multiplexing the coded audio data, the coded metadata, and the coded sense-of-distance control information to generate coded data.

[0014]

In the first aspect of the present invention, the audio data of the object is encoded, the metadata including the position information of the object is encoded, the sense-of-distance control information for the sense-of-distance control processing to be performed on the audio data is determined, the sense-of-distance control information is encoded, and the coded audio data, the coded metadata, and the coded sense-of-distance control information are multiplexed to generate the coded data.

[0015]

According to a second aspect of the present invention A decoding device including: a demultiplexer configured to demultiplex coded data to extract coded audio data of an object, coded metadata including position information of the object, and coded sense-of-distance control information for

sense-of-distance control processing to be performed on the audio data which is set by a content creator and reproduces a sense of distance from a listening position to the object, the sense-of-distance control information including (i) configuration information indicating one or more signal processing steps, performed in combination to add the sense of distance to a sound of the object, and (ii) control rule information indicating a parameter, obtained by parameterizing a control rule which is set by the content creator for each of the signal processing steps, the parameter changing according to the distance from the listening position to the object; an object decoding unit configured to decode the coded audio data; a metadata decoding unit configured to decode the coded metadata; a sense-of-distance control information decoding unit configured to decode the coded sense-of-distance control information; a sense-of-distance control processing unit configured to perform the sense-of-distance control processing on the audio data of the object on a basis of the sense-of-distance control information; and a rendering processing unit configured to perform rendering processing on a basis of the audio data obtained by the sense-of-distance control processing and the metadata to generate reproduction audio data for reproducing a sound of the object.

[0016]

Disclosed herein is a decoding method or a program that includes the steps of: demultiplexing coded data to extract coded audio data of an object, coded metadata including position information of the object, and coded sense-of-distance control information for sense-of-distance control processing to be performed on the audio data; decoding the coded audio data; decoding the coded metadata; decoding the coded sense-of-distance control information; performing the sense-of-distance control processing on the audio data of the object on the basis of the sense-of-distance control

information; and performing rendering processing on the basis of the audio data obtained by the sense-of-distance control processing and the metadata to generate reproduction audio data for reproducing a sound of the object.

[0017]

In the second aspect of the present invention, the coded data is demultiplexed to extract the coded audio data of the object, the coded metadata including the position information of the object, and the coded sense-of-distance control information for the sense-of-distance control processing to be performed on the audio data, the coded audio data is decoded, the coded metadata is decoded, the coded sense-of-distance control information is decoded, the sense-of-distance control processing is performed on the audio data of the object on the basis of the sense-of-distance control information, and the rendering processing is performed on the basis of the audio data obtained by the sense-of-distance control processing and the metadata to generate the reproduction audio data for reproducing the sound of the object.

BRIEF DESCRIPTION OF DRAWINGS

[0018]

Fig. 1 is a diagram illustrating a configuration example of an encoding device.

Fig. 2 is a diagram illustrating a configuration example of a decoding device.

Fig. 3 is a diagram illustrating a configuration example of a sense-of-distance control processing unit.

Fig. 4 is a diagram illustrating a configuration example of a reverb processing unit.

Fig. 5 is a diagram for describing an example of a control rule of gain control processing.

Fig. 6 is a diagram for describing an example of a

CLAIMS

1. An encoding device comprising:
 - an object encoding unit configured to encode audio data of an object;
 - a metadata encoding unit configured to encode metadata including position information of the object;
 - a sense-of-distance control information determination unit configured to determine sense-of-distance control information for sense-of-distance control processing to be performed on the audio data which is set by a content creator and reproduces a sense of distance from a listening position to the object, the sense-of-distance control information including
 - (i) configuration information indicating one or more signal processing steps, performed in combination to add the sense of distance to a sound of the object, and
 - (ii) control rule information indicating a parameter, obtained by parameterizing a control rule which is set by the content creator for each of the signal processing steps, the parameter changing according to the distance from the listening position to the object;
 - a sense-of-distance control information encoding unit configured to encode the sense-of-distance control information; and
 - a multiplexer configured to multiplex the coded audio data, the coded metadata, and the coded sense-of-distance control information to generate coded data.

2. The encoding device according to claim 1,
wherein the control rule information is an index
indicating a function or a table for obtaining the
parameter.
3. The encoding device according to any one of the
previous claims,
wherein the sense-of-distance control information
includes configuration information indicating one or more
processing steps which are performed in combination to
realize the sense-of-distance control processing.
4. The encoding device according to claim 3,
wherein the configuration information is information
indicating the one or more processing steps and an order
of performing the one or more processing steps.
5. The encoding device according to claim 3 or 4,
wherein the processing is gain control processing,
filter processing, or reverb processing.
6. The encoding device according to any one of the
previous claims,
wherein the sense-of-distance control information
encoding unit is configured to encode the sense-of-
distance control information for each of a plurality of
the objects.
7. The encoding device according to any one claims 1 to
5,

wherein the sense-of-distance control information encoding unit is configured to encode the sense-of-distance control information for every object group including one or a plurality of the objects.

8. The encoding device according to any one of the previous claims, wherein the parameter comprises a gain value used in the sense-of-distance control processing.

9. A decoding device comprising:

a demultiplexer configured to demultiplex coded data to extract coded audio data of an object, coded metadata including position information of the object, and coded sense-of-distance control information for sense-of-distance control processing to be performed on the audio data which is set by a content creator and reproduces a sense of distance from a listening position to the object, the sense-of-distance control information including

(i) configuration information indicating one or more signal processing steps, performed in combination to add the sense of distance to a sound of the object, and

(ii) control rule information indicating a parameter, obtained by parameterizing a control rule which is set by the content creator for each of the signal processing steps, the parameter changing according to the distance from the listening position to the object;

an object decoding unit configured to decode the coded audio data;

a metadata decoding unit configured to decode the coded metadata;

a sense-of-distance control information decoding unit configured to decode the coded sense-of-distance control information;

a sense-of-distance control processing unit configured to perform the sense-of-distance control processing on the audio data of the object on a basis of the sense-of-distance control information; and

a rendering processing unit configured to perform rendering processing on a basis of the audio data obtained by the sense-of-distance control processing and the metadata to generate reproduction audio data for reproducing a sound of the object.

10. The decoding device according to claim 9,

wherein the sense-of-distance control processing unit is configured to perform the sense-of-distance control processing on a basis of the parameter obtained from control rule information included in the sense-of-distance control information and a listening position.

11. The decoding device according to claim 10,

wherein the parameter changes according to a distance from the listening position to the object.

12. The decoding device according to any one of claims 10 to 11,

wherein the sense-of-distance control processing unit is configured to adjust the parameter according to a reproduction environment of the reproduction audio data.

13. The decoding device according to any one of claims 10 to 12,

wherein the sense-of-distance control processing unit is configured to perform, on a basis of the parameter, the sense-of-distance control processing in which one or more processing steps indicated by the sense-of-distance control information is combined.

14. The decoding device according to claim 13,

wherein the processing is gain control processing, filter processing, or reverb processing.