Embodiments of the present invention enable recognition of performance required for decoding more accurately.

Solution to Problem

[0008a]

According to a first aspect of the present invention, there is provided an image encoding apparatus including: an encoding unit configured to encode image data; a subsample information generating unit configured to generate subsample information of an image of the image data, the subsample information including hint information used as a reference for decoding processing of a subsample, which is a partial region which can be independently decoded; and a file generating unit configured to generate a file including encoded data of the image data generated by the encoding unit and management information of the encoded data, and arrange the subsample information generated by the subsample information generating unit in the management information, wherein the subsample information generating unit generates subsample information including a hint data type indicating a type of hint information included in the subsample information, a sample count indicating the number of continuous samples associated with the subsample information, and the hint information, and wherein the hint information includes a level indicating a degree of load of decoding processing of the subsample.

[0008b]

According to a second aspect of the present invention, there is provided an image encoding method including: encoding image data; generating subsample information of an image of the image data, the subsample information including hint information used as a reference for decoding processing of a subsample, which is a partial region which can be independently decoded; and generating a file including generated encoded data of the image data and management information of the encoded data and arranging the generated subsample information in the management information, wherein the subsample information generating unit generates subsample information including a hint data type indicating a type of hint information included in the subsample information, a sample count indicating the number of continuous samples associated with the subsample information, and the hint information, and wherein the hint information includes a level indicating a degree of load of decoding processing of the subsample.

[0008c]

According to a third aspect of the present invention, there is provided an image encoding apparatus including: an encoding unit configured to encode image data; a subsample information generating unit configured to generate subsample information of an image of the image data, the subsample information including hint information used as a reference for decoding processing of a subsample, which is a partial region which can be independently decoded; and a file generating unit configured to generate a file including encoded data of the image data generated by the encoding unit and management information of the encoded data, and arrange the subsample information generated by the subsample information generating

unit in the management information, wherein the subsample information generating unit generates subsample information including a hint data type indicating a type of hint information included in the subsample information, a sample count indicating the number of continuous samples associated with the subsample information, and identification information of a group to which the subsample belongs, and wherein the subsample information generating unit further generates subsample information including a hint data type indicating a type of hint information included in the subsample information, a sample count indicating the number of continuous samples associated with the subsample information, and hint information including a level indicating a degree of load of decoding processing of a group of a subsample.

[0008d]

According to a fourth aspect of the present invention, there is provided an image encoding apparatus including: an encoding unit configured to encode image data; a subsample information generating unit configured to generate subsample information of an image of the image data, the subsample information including hint information used as a reference for decoding processing of a subsample, which is a partial region which can be independently decoded; and a file generating unit configured to generate a file including encoded data of the image data generated by the encoding unit and management information of the encoded data, and arrange the subsample information generated by the subsample information generating unit in the management information, wherein the subsample information generating unit generates subsample information including a hint data type indicating a type of hint information included in the subsample information, a sample count indicating the number of continuous samples associated with the subsample information, identification information of a subsample belonging to a group, and hint information of the group, and wherein the hint information includes a level indicating a degree of load of decoding processing of the group.

[0009]

Disclosed herein is an information processing apparatus including: a file generating unit configured to generate a file of an MP4 file format, in which information specifying a plurality of NAL units corresponding to a partial image which can be independently decoded in a whole image is stored in moov and the encoded partial image is stored in mdat; and a transmitting unit configured to transmit the file generated by the file generating unit.

[0010]

The information specifying the plurality of NAL units can include information indicating a group of the plurality of NAL units corresponding to the partial image.

[0011]

The information specifying the plurality of NAL units can include information indicating the number of the plurality of NAL units corresponding to the partial image.

[0012]

The information specifying the plurality of NAL units can include information indicating a first NAL unit among the NAL units corresponding to the partial image.

[0013]

The information specifying the plurality of NAL units can include information indicating all the NAL units corresponding to the partial image.

[0014]

The information specifying the plurality of NAL units can be defined using VisualSampleGroupEntry in the moov.

[0015]

In the file, a plurality of pieces of information for mapping the plurality of NAL units can be further stored.

[0016]

The partial image can be Tile in high efficiency video coding (HEVC).

[0017]

Disclosed herein is an information processing method including: generating a file of an MP4 file format, in which information specifying a plurality of NAL units corresponding to a partial image which can be independently decoded in a whole image is stored in moov and the encoded partial image is stored in mdat; and transmitting the generated file.

[0018]

Disclosed herein is an information processing apparatus including: a file reproducing unit configured to reproduce a file of an MP4 file format, in which information specifying a plurality of NAL units corresponding to a partial image which can be independently decoded in a whole image is stored in moov and the encoded partial image is stored in mdat.

[0019]

The information specifying the plurality of NAL units can include information indicating a group of the plurality of NAL units corresponding to the partial image.

[0020]

The information specifying the plurality of NAL units can include information indicating the number of the plurality of NAL units corresponding to the partial image.

[0021]

The information specifying the plurality of NAL units can include information indicating a first NAL unit among the NAL units corresponding to the partial image.

[0022]

The information specifying the plurality of NAL units can include information indicating all the NAL units corresponding to the partial image.

[0023]

The information specifying the plurality of NAL units can be defined using VisualSampleGroupEntry in the moov.

[0024]

In the file, a plurality of pieces of information for mapping the plurality of NAL units can be further stored.

[0025]

The partial image can be Tile in high efficiency video coding (HEVC).

[0026]

In the file, information indicating a location of the partial image in the whole image, information indicating a size of the partial image and the information specifying the plurality of NAL units can be stored in VisualSampleGroupEntry. The file reproducing unit can select a partial image which is desired to be reproduced based on the information indicating the location of the partial image in the whole image and the information indicating the size of the partial image, and acquire data of the partial image which is desired to be reproduced based on the information specifying the plurality of NAL units and generate a bit stream.

[0027]

In the file, information indicating a location of the partial image in the whole image, information indicating a size of the partial image and the information specifying the plurality of NAL units can be stored in VisualSampleGroupEntry. The file reproducing unit can select a region which is desired to be reproduced based on the information indicating the location of the partial image in the whole image and the information indicating the size of the partial image, and acquire data of a partial image corresponding to the region which is desired to be reproduced based on the information specifying the plurality of NAL units and generate a bit stream.

[0028]

In the file, information indicating a location of the partial image in the whole image, information indicating a size of the partial image and the information specifying the plurality of NAL units can be stored in TileRegionGroupEntry. The file reproducing unit can select a tile which is desired to be reproduced based on the information indicating the location of the partial image in the whole image and the information indicating the size of the partial image, acquire a track corresponding to the selected tile which is desired to be reproduced based on the information specifying the plurality of NAL units, and generate a bit stream of a partial image corresponding to the acquired track.

[0029]

In the file, information indicating a location of the partial image in the whole image, information indicating a size of the partial image and the information specifying the plurality of NAL units can be stored in TileRegionGroupEntry. The file reproducing unit can select a region which is desired to be reproduced based on the information indicating the location of the partial image in the whole image and the information indicating the size of the partial image, acquire a plurality of tracks corresponding to the selected region which is desired to be reproduced based on the information specifying the plurality of NAL units, and generate a bit stream of a partial image corresponding to the acquired plurality of tracks.

[0030]

Disclosed herein is a decoding unit configured to decode a bit stream of the partial image reproduced and generated by the file reproducing unit.

[0031]

Disclosed herein is an information processing method including: reproducing a file of an MP4 file format, in which information specifying a plurality of NAL units corresponding to a partial image which can be independently decoded in a whole image is stored in moov and the encoded partial image is stored in mdat.

[0032]

Disclosed herein is a file of an MP4 file format, in which information specifying a plurality of NAL units corresponding to a partial image which can be independently decoded in a whole image is stored in moov and the encoded partial image is stored in mdat, is generated, and the generated file is transmitted.

[0033]

Disclosed herein is a file of an MP4 file format, in which information specifying a plurality of NAL units corresponding to a partial image which can be independently decoded in a whole image is stored in moov and the encoded partial image is stored in mdat, is reproduced.

Advantageous Effects of Invention

[0034]

According to embodiments of the present invention, it is possible to encode and decode an image. Particularly, it is possible to recognize performance required for decoding more accurately.

Brief Description of Drawings

[0035]

[FIG. 1] FIG. 1 is a diagram for explaining an example of application for performing partial display.

[FIG. 2] FIG. 2 is a diagram for explaining another example of the application for performing partial display.

[FIG. 3] FIG. 3 is a diagram for explaining an example of definition of a subsample.

[FIG. 4] FIG. 4 is a diagram for explaining outline of an MP4 file format.

[FIG. 5] FIG. 5 is a diagram for explaining outline of an MP4 file format.

[FIG. 6] FIG. 6 is a diagram for explaining outline of an MP4 file format.

[FIG. 7] FIG. 7 is a diagram illustrating an extension example of a sample table box.

[FIG. 8] FIG. 8 is a diagram illustrating an example of a subsample hint information box.

[FIG. 9] FIG. 9 is a diagram illustrating an example of semantics of independent.

[FIG. 10] FIG. 10 is a diagram illustrating an example of a group of subsamples.

[FIG. 11] FIG. 11 is a diagram illustrating another example of the subsample hint information box.

[FIG. 12] FIG. 12 is a diagram illustrating another example of the subsample hint information box.

[FIG. 13] FIG. 13 is a diagram illustrating still another example of the subsample hint information box.

[FIG. 14] FIG. 14 is a diagram for explaining outline of an MP4 file format.

CLAIMS

1. An image encoding apparatus comprising:

an encoding unit configured to encode image data;

a subsample information generating unit configured to generate subsample information of an image of the image data, the subsample information including hint information used as a reference for decoding processing of a subsample, which is a partial region which can be independently decoded; and

a file generating unit configured to generate a file including encoded data of the image data generated by the encoding unit and management information of the encoded data, and arrange the subsample information generated by the subsample information generating unit in the management information,

wherein the subsample information generating unit generates subsample information including a hint data type indicating a type of hint information included in the subsample information, a sample count indicating the number of continuous samples associated with the subsample information, and the hint information, and

wherein the hint information includes a level indicating a degree of load of decoding processing of the subsample.

2. The image encoding apparatus according to claim 1,

wherein the hint information further includes header information of the encoded data of the subsample.

3. The image encoding apparatus according to claim 1, wherein the subsample information generating unit further generates subsample information including information indicating a size and a location of a subsample.

4. The image encoding apparatus according to claim 1, wherein the subsample information generating unit further generates subsample information including information indicating that a subsample can be independently decoded.

5. The image encoding apparatus according to claim 1, wherein the subsample information generating unit further generates subsample information including information for grouping NAL units constituting a sample.

6. The image encoding apparatus according to claim 1, wherein the file generating unit arranges the subsample information as a subsample hint information box (SubsampleHint Information Box) different from a subsample information box (Subsample Information Box) of a sample table box (Sample Table Box) of the management information.

7. The image encoding apparatus according to claim 1, wherein the file generating unit arranges the subsample information in a sample group description box (Sample Group Description Box) of a sample table box (Sample Table Box) of the management information as a visual sample group entry (VisualSampleGroupEntry), and arranges information designating a sample to which the subsample information is applied in a sample to group box (Sample To Group Box).

8. The image encoding apparatus according to claim 1, wherein the subsample is a tile (Tile) in high efficiency video coding (HEVC).

9. An image encoding apparatus comprising:

an encoding unit configured to encode image data;

a subsample information generating unit configured to generate subsample information of an image of the image data, the subsample information including hint information used as a reference for decoding processing of a subsample, which is a partial region which can be independently decoded; and

a file generating unit configured to generate a file including encoded data of the image data generated by the encoding unit and management information of the encoded data, and arrange the subsample information generated by the subsample information generating unit in the management information,

wherein the subsample information generating unit generates subsample information including a hint data type indicating a type of hint information included in the subsample information, a sample count indicating the number of continuous samples associated with the subsample information, and identification information of a group to which the subsample belongs, and

wherein the subsample information generating unit further generates subsample information including a hint data type indicating a type of hint information included in the subsample information, a sample count indicating the number of continuous samples

associated with the subsample information, and hint information including a level indicating a degree of load of decoding processing of a group of a subsample.

10. The image encoding apparatus according to claim 9,

wherein the hint information further includes header information of encoded data of a group of a subsample.

11. An image encoding apparatus comprising:

an encoding unit configured to encode image data;

a subsample information generating unit configured to generate subsample information of an image of the image data, the subsample information including hint information used as a reference for decoding processing of a subsample, which is a partial region which can be independently decoded; and

a file generating unit configured to generate a file including encoded data of the image data generated by the encoding unit and management information of the encoded data, and arrange the subsample information generated by the subsample information generating unit in the management information,

wherein the subsample information generating unit generates subsample information including a hint data type indicating a type of hint information included in the subsample information, a sample count indicating the number of continuous samples associated with the subsample information, identification information of a subsample belonging to a group, and hint information of the group, and

wherein the hint information includes a level indicating a degree of load of decoding processing of the group.

12. The image encoding apparatus according to claim 11,

wherein the hint information further includes header information of encoded data of the group.

13. An image encoding method comprising:

encoding image data;

generating subsample information of an image of the image data, the subsample information including hint information used as a reference for decoding processing of a

subsample, which is a partial region which can be independently decoded; and

generating a file including generated encoded data of the image data and management information of the encoded data and arranging the generated subsample information in the management information,

wherein the subsample information generating unit generates subsample information including a hint data type indicating a type of hint information included in the subsample information, a sample count indicating the number of continuous samples associated with the subsample information, and the hint information, and

wherein the hint information includes a level indicating a degree of load of decoding processing of the subsample.