

[CLAIMS]

~~{Claim 1}~~

1. An image coding method of coding an input block included in an image, the image coding method comprising:

5 generating a predicted block by predicting the input block;
 calculating a residual block by subtracting the predicted block from the input block;

 calculating quantized coefficients by performing transform and quantization on the residual block;

10 calculating a coded residual block by performing inverse quantization and inverse transform on the quantized coefficients;

 generating a temporary coded block by adding the coded residual block to the predicted block;

 determining whether or not an offset process for correcting an error included in the temporary coded block is required, ~~to generate;~~

15 generating first flag information indicating a result of the determination, the error being caused by the quantization in the calculating of quantized coefficients;

 executing the offset process on the temporary coded block
20 when it is determined in the determining that the offset process is required; and

 performing variable-length coding on the quantized coefficients and the first flag information,

25 wherein the offset process is executed to add an offset value to a value of a pixel included in the temporary coded block,

in the determining, whether an offset value for a previously-coded block adjacent to the input block or the offset value newly calculated for the temporary coded block is used in the offset process to be executed on the temporary coded block is further
30 determined to generate second flag information indicating a result of the determination,

in the executing, the offset process is executed on the temporary coded block using the offset value indicated by the second flag information, and

35 in the performing, variable-length coding is further performed on the second flag information.

~~[Claim 2]~~

~~—— The image coding method according to Claim 1,~~
~~—— wherein the offset process is executed to add an offset value to~~
~~a value of a pixel included in the temporary coded block,~~
5 ~~—— in the determining, whether an offset value for a~~
~~previously coded block adjacent to the input block or the offset value~~
~~newly calculated for the temporary coded block is used in the offset~~
~~process to be executed on the temporary coded block is further~~
~~determined to generate second flag information indicating a result of~~
10 ~~the determination,~~
~~—— in the executing, the offset process is executed on the~~
~~temporary coded block using the offset value indicated by the second~~
~~flag information, and~~
~~—— in the performing, variable length coding is further performed~~
15 ~~on the second flag information.~~

~~[Claim 3]~~

2. The image coding method according to one of Claims 1 and 2,
wherein, in the executing, the offset process is executed
20 selectively on a pixel (i) that is one of pixels included in the
temporary coded block and (ii) that corresponds to a pixel included in
the input block and having a value included in a predetermined range
where subjective color distortion is apparent.

25 ~~[Claim 4]~~

3. The image coding method according to Claim ~~3~~2,
wherein, in the determining, when each of values of all pixels
included in the input block is outside the predetermined range, it is
determined that the offset process is not required to be executed on
30 the temporary coded block that corresponds to the input block.

~~[Claim 5]~~

4. The image coding method according to any one of Claims 1 to
43,
35 wherein each of the values of the pixels included in the input
block is expressed in a YUV format.

~~{Claim 6}~~

5. The image coding method according to any one of Claims 1 to 5.4,

wherein the image coding method (i) switches between a coding process based on a first standard and a coding process based on a second standard, (ii) performs the determining, the executing, and the performing, as the coding process based on the first standard, and (iii) codes an identifier indicating a standard of a coding process.

10 ~~{Claim 7}~~

6. An image decoding method of decoding a bitstream to generate a decoded block, the image decoding method comprising:

obtaining quantized coefficients and first flag information that indicates whether or not an offset process is required, by performing variable-length decoding on the bitstream;

obtaining a decoded residual block by performing inverse quantization and inverse transform on the quantized coefficients;

generating a predicted block by predicting the decoded block;

generating a temporary decoded block by adding the decoded residual block to the predicted block; and

generating the decoded block by executing, on the temporary decoded block, the offset process for correcting an error that is caused by quantization and is included in the temporary decoded block, when the first flag information indicates that the offset process is required,

wherein the offset process is executed to add an offset value to a value of a pixel included in the temporary decoded block,

in the obtaining of quantized coefficients and first flag information, second flag information is further obtained, the second flag information indicating whether the offset value for a previously-decoded block adjacent to the decoded block or the offset value newly calculated for the temporary decoded block is used in the offset process to be executed on the temporary decoded block, and

in the generating of the decoded block, the offset process is executed on the temporary decoded block using the offset value indicated by the second flag information.

~~[Claim 8]~~

~~— The image decoding method according to Claim 7,~~
~~— wherein the offset process is executed to add an offset value to~~
~~a value of a pixel included in the temporary decoded block,~~
5 ~~— in the obtaining of quantized coefficients and first flag~~
~~information, second flag information is further obtained, the second~~
~~flag information indicating whether the offset value for a~~
~~previously decoded block adjacent to the decoded block or the offset~~
~~value newly calculated for the temporary decoded block is used in the~~
10 ~~offset process to be executed on the temporary decoded block, and~~
~~— in the generating of the decoded block, the offset process is~~
~~executed on the temporary decoded block using the offset value~~
~~indicated by the second flag information.~~

15 ~~[Claim 9]~~

7. The image decoding method according to one of Claims 7 and
8 Claim 6,

wherein each of values of pixels included in the decoded block
is expressed in a YUV format.

20

~~[Claim 10]~~

8. The image decoding method according to any one of Claims 7
6 to 9 7,

wherein the image decoding method (i) switches between a
25 decoding process based on a first standard and a decoding process
based on a second standard, according to an identifier that is
included in the bitstream and indicates the first standard or the
second standard and (ii) performs, as the decoding process based on
the first standard, the performing and the executing when the
30 identifier indicates the first standard.

~~[Claim 11]~~

9. An image coding apparatus that codes an input block included
in an image, the image coding apparatus comprising:

35 a prediction unit configured to generate a predicted block by
predicting the input block;

a calculation unit configured to calculate a residual block by subtracting the predicted block from the input block;

5 a transform-quantization unit configured to calculate quantized coefficients by performing transform and quantization on the residual block;

an inverse quantization-transform unit configured to calculate a coded residual block by performing inverse quantization and inverse transform on the quantized coefficients;

10 a generation unit configured to generate a temporary coded block by adding the coded residual block to the predicted block;

a determination unit configured to determine whether or not an offset process for correcting an error included in the temporary coded block is required, to generate first flag information indicating a result of the determination, the error being caused by the
15 quantization performed by the transform-quantization unit;

an offset processing unit configured to execute the offset process on the temporary coded block when it is determined by the determination unit that the offset process is required; and

20 a variable-length coding unit configured to perform variable-length coding on the quantized coefficients and the first flag information,

wherein the offset processing unit is configured to add an offset value to a value of a pixel included in the temporary coded block,

25 the determination unit is configured to generate second flag information, the second flag information indicating whether the offset value for a previously-coded block adjacent to the input block or the offset value newly calculated for the temporary coded block is used in the offset process to be executed on the temporary coded
30 block,

the offset processing unit is configured to execute the offset process on the temporary coded block using the offset value indicated by the second flag information, and

35 the variable-length coding unit is configured to perform variable-coding on the second flag information.

~~[Claim 12]~~

10. An image decoding apparatus that decodes a bitstream to generate a decoded block, the image decoding apparatus comprising:

a variable-length decoding unit configured to obtain quantized coefficients and first flag information that indicates whether or not an offset process is required, by performing variable-length decoding on the bitstream;

an obtainment unit configured to obtain a decoded residual block by performing inverse quantization and inverse transform on the quantized coefficients;

a prediction unit configured to generate a predicted block by predicting the decoded block;

a generation unit configured to generate a temporary decoded block by adding the decoded residual block to the predicted block; and

an offset processing unit configured to generate the decoded block by executing, on the temporary decoded block, the offset process for correcting an error that is caused by quantization and is included in the temporary decoded block, when the first flag information indicates that the offset process is required,

wherein the offset processing unit is configured to execute to add an offset value to a value of a pixel included in the temporary decoded block,

the variable-length coding unit is configured to obtain second flag information when obtaining the quantized coefficients and first flag information, the second flag information indicating whether the offset value for a previously-decoded block adjacent to the decoded block or the offset value newly calculated for the temporary decoded block is used in the offset process to be executed on the temporary decoded block, and

the offset processing unit is configured to execute the offset process on the temporary decoded block using the offset value indicated by the second flag information to generate the decoded block.

[~~Claim 13~~]

11. An image coding-decoding apparatus comprising:
the image coding apparatus according to Claim ~~11~~ 9; and
5 the image decoding apparatus according to Claim ~~12~~ 10.