

What is claimed is:

1. A method of updating a parameter for entropy decoding of a transformation coefficient level, the method comprising:

parsing transformation coefficient level syntax elements indicating sizes of transformation coefficients included in a transformation unit, from a bit stream;

determining whether to renew a previous parameter by comparing a size of a previous transformation coefficient that is restored before a current transformation coefficient, with a predetermined critical value obtained based on the previous parameter that is used in de-binarization of a previous transformation coefficient level syntax element indicating the size of the previous transformation coefficient;

obtaining a parameter used in de-binarization of a current transformation coefficient level syntax element indicating a size of the current transformation coefficient by renewing or maintaining the previous parameter based on a result of the determining; and

obtaining the size of the current transformation coefficient by de-binarizing the current transformation coefficient level syntax element by using the obtained parameter,

wherein the predetermined critical value is set to have a value proportional to the previous parameter, and when the previous parameter is renewed, the renewed parameter has a value that gradually increases compared to the previous parameter.

2. The method of claim 1, wherein when a size of a transformation coefficient is  $absCoeff$ , a syntax element indicating whether the transformation coefficient has a value greater than 1 is  $coeff\_abs\_level\_greater1\_flag$ , and a syntax element indicating whether the transformation coefficient has a value greater than 2 is  $coeff\_abs\_level\_greater2\_flag$ , and when a basic level value determined according to the equation  $baseLevel = 1 + coeff\_abs\_level\_greater1\_flag + coeff\_abs\_level\_greater2\_flag$  is  $baseLevel$ , a transformation coefficient level syntax element indicates a size of  $(abs - baseLevel)$  which is a difference between the size of the transformation coefficient and the determined basic level value  $baseLevel$ .

3. The method of claim 1, wherein in the determining whether to renew the previous parameter, when the size of the previous transformation coefficient is

cLastAbsCoeff, and the previous parameter is cLastRiceParam, the critical value  $th$  obtained based on the equation:  $th=3*(1<<cLastRiceParam)$  is compared with the previous parameter cLastRiceParam; and when cLastAbsCoeff is greater than  $th$ , it is determined to renew the previous parameter; and when cLastAbsCoeff is not greater than  $th$ , it is determined to maintain the previous parameter.

4. The method of claim 3, wherein in the obtaining of a parameter, when it is determined to renew the previous parameter, the previous parameter is renewed by increasing the previous parameter by 1 within a predetermined range.

5. The method of claim 4, wherein the renewed parameter does not exceed a value of 4.

6. The method of claim 1, wherein the obtaining the size of the current transformation coefficient comprises:

sorting bit strings of syntax elements of the current transformation coefficient into a prefix bit string and a suffix bit string based on a predetermined parameter determined by using the obtained parameter; and

restoring transformation coefficient level syntax elements of the current transformation coefficient by applying a previously set de-binarization method for each of the prefix bit string and the suffix bit string.

7. The method of claim 6, wherein when the size of the current transformation coefficient is `coeff_abs_level_remaining`, the obtained parameter is cRiceParam, and the predetermined parameter is cTrMax, the parameter cTrMax is determined according to the equation:  $cTrMax=4<<cRiceParam$ , and the prefix bit string corresponds to a bit string obtained by binarizing a value corresponding to  $\text{Min}(cTrMax, \text{coeff\_abs\_level\_remaining})$  by using a truncated unary binarization method, and the suffix bit string corresponds to a bit string obtained by binarizing a value corresponding to  $(\text{coeff\_abs\_level\_remaining}-cTrMax)$  by using a k-th exponential Golomb method, the k is equal to  $(cRiceParam+1)$ .

8. An apparatus for entropy decoding a transformation coefficient level, the apparatus comprising:

a parsing unit that parses transformation coefficient level syntax elements indicating sizes of transformation coefficients included in a transformation unit, from a bit stream;

5 a parameter determining unit that determines whether to renew a previous parameter by comparing a size of a previous transformation coefficient that is restored before a current transformation coefficient, with a predetermined critical value obtained based on the previous parameter that is used in de-binarization of a previous transformation coefficient level syntax element indicating a size of the previous transformation coefficient, and that obtains a parameter used in  
10 de-binarization of a current transformation coefficient level syntax element indicating a size of the current transformation coefficient by renewing or maintaining the previous parameter based on a result of the determination;

15 a syntax element restoring unit that obtains the size of the current transformation coefficient by de-binarizing the current transformation coefficient level syntax element by using the obtained parameter,

wherein the predetermined critical value is set to have a value proportional to the previous parameter, and when the previous parameter is renewed, the renewed parameter has a value that gradually increases compared to the previous parameter.

20 9. A method of updating a parameter for entropy encoding of a transformation coefficient level, the method comprising:

25 obtaining, in a predetermined scanning order, transformation coefficient level syntax elements indicating sizes of transformation coefficients included in a transformation unit;

30 determining whether to renew a previous parameter by comparing a size of a previous transformation coefficient that is encoded before a current transformation coefficient, with a predetermined critical value obtained based on the previous parameter that is used in binarization of a previous transformation coefficient level syntax element indicating the size of the previous transformation coefficient;

obtaining a parameter used in binarization of a current transformation coefficient level syntax element indicating a size of the current transformation coefficient by renewing or maintaining the previous parameter based on a result of the determination; and

outputting a bit string corresponding to a transformation coefficient level syntax element of the current transformation coefficient by binarizing the transformation coefficient level syntax element of the current transformation coefficient by using the obtained parameter,

5 wherein the predetermined critical value is set to have a value proportional to the previous parameter, and when the previous parameter is renewed, the renewed parameter has a value that gradually increases compared to the previous parameter.

10 10. The method of claim 9, wherein when a size of a transformation coefficient is  $absCoeff$ , a syntax element indicating whether the transformation coefficient has a value greater than 1 is  $coeff\_abs\_level\_greater1\_flag$ , and a syntax element indicating whether the transformation coefficient has a value greater than 2 is  $coeff\_abs\_level\_greather2\_flag$ , and when a basic level value determined according to the equation  $baseLevel = 1 + coeff\_abs\_level\_greather1\_flag +$   
15  $coeff\_abs\_level\_greather2\_flag$  is  $baseLevel$ , a transformation coefficient level syntax element indicates a size of  $(abs - baseLevel)$  which is a difference between the size of the transformation coefficient  $absCoeff$  and the determined basic level value  $baseLevel$ .

20 11. The method of claim 9, wherein in the determining whether to renew the previous parameter, when the size of the previous transformation coefficient is  $cLastAbsCoeff$ , and the previous parameter is  $cLastRiceParam$ , the critical value  $th$  obtained based on the equation:  $th = 3 * (1 < cLastRiceParam)$  is compared with the previous parameter  $cLastRiceParam$ ; and when  $cLastAbsCoeff$  is greater than  $th$ , it  
25 is determined to renew the previous parameter; and when  $cLastAbsCoeff$  is not greater than  $th$ , it is determined to maintain the previous parameter.

30 12. The method of claim 11, wherein in the obtaining of a parameter, when it is determined to renew the previous parameter, the previous parameter is renewed by increasing the previous parameter by 1 within a predetermined range.

13. The method of claim 9, wherein the outputting a bit string comprises:  
sorting the current transformation coefficient level syntax element into a prefix  
and a suffix based on a predetermined parameter determined by using the obtained

parameter; and

generating a prefix bit string and a suffix bit string by applying a binarization method that is previously set with respect to each of the prefix bit string and the suffix bit string and outputting bit strings corresponding to the transformation coefficient level syntax element of the current transformation coefficient.

14. The method of claim 13, wherein when the size of the current transformation coefficient is `coeff_abs_level_remaining`, the obtained parameter is `cRiceParam`, and the predetermined parameter is `cTrMax`, the parameter `cTrMax` is determined according to the equation:  $cTrMax = 4 \ll cRiceParam$ , and the prefix bit string corresponds to a bit string obtained by binarizing a value corresponding to  $\text{Min}(cTrMax, \text{coeff\_abs\_level\_remaining})$  by using a truncated unary binarization method, and the suffix bit string corresponds to a bit string obtained by binarizing a value corresponding to  $(\text{coeff\_abs\_level\_remaining} - cTrMax)$  by using a k-th exponential Golomb method, the k is equal to  $(cRiceParam + 1)$ .

15. An apparatus for entropy encoding a transformation coefficient level, the apparatus comprising:

a parameter determining unit that obtains, in a predetermined scanning order, transformation coefficient level syntax elements indicating sizes of transformation coefficients included in a transformation unit, determines whether to renew a previous parameter by comparing a size of a previous transformation coefficient that is encoded before a current transformation coefficient, with a predetermined critical value obtained based on the previous parameter that is used in binarization of a previous transformation coefficient level syntax element indicating the size of the previous transformation coefficient, and obtains a parameter used in binarization of a current transformation coefficient level syntax element indicating a size of the current transformation coefficient by renewing or maintaining the previous parameter based on a result of the determination;

a bit string generating unit that outputs bit strings corresponding to the transformation coefficient level syntax element of the current transformation coefficient by binarizing the transformation coefficient level syntax elements of the current transformation coefficient by using the obtained parameter,

wherein the predetermined critical value is set to have a value proportional to

the previous parameter, and when the previous parameter is renewed, the renewed parameter has a value that gradually increases compared to the previous parameter.

## **Claims**

1. A method of decoding video, the method comprising:

obtaining bit strings corresponding to current transformation coefficient level information by arithmetic decoding a bitstream based on a context model;

determining a current binarization parameter by updating or maintaining a previous binarization parameter based on a comparison of a predetermined value and a size of a previous transformation coefficient;

obtaining the current transformation coefficient level information by performing de-binarization of the bit strings using the determined current binarization parameter; and

generating a size of a current transformation coefficient using the current transformation coefficient level information,

wherein the predetermined value is proportional to the previous binarization parameter, and when the previous binarization parameter is determined to be updated, the current binarization parameter is determined as a value obtained by adding  $n$  to the previous binarization parameter, where  $n$  is integer, and  $n$  is equal to or greater than 1.