Appeal decision

Appeal No. 2017-17472

Appellant HUAWEI TECHNOLOGIES CO., LTD.

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The case of appeal against the examiner's decision of refusal of Japanese Patent Application No. 2014-534694, entitled "HIGH THROUGHPUT CODING FOR CABAC IN HEVC" (International Publication No. WO 2013/108639 published on July 25, 2013, National Publication of International Patent Application No. 2015-504256 published on February 5, 2015) has resulted in the following appeal decision.

Conclusion

The appeal of the case was groundless.

Reason

No. 1 History of the procedures and the Invention

1 History of the procedures

The application was originally filed on January 18, 2013 (priority claim under the Paris Convention: January 19, 2012, US, January 27, 2012, US, February 2, 2012, US, April 11, 2012, US, April 26, 2012, US) as an International Patent Application, and the history of the procedures is as follows.

July 17, 2014:	Translation of amendment under Article 34 of Patent Cooperation Treaty
November 8, 2016:	Notice of reasons for refusal
February 13, 2017:	Written amendment, written opinion
March 24, 2017:	Notice of reasons for refusal
May 31, 2017:	Written opinion
July 13, 2017:	Examiner's decision of refusal
July 25, 2017:	Delivery of copy of decision of refusal
November 27, 2017:	Appeal against the examiner's decision of refusal

2 The Invention

The inventions relating to Claims 1 to 3 are specified by matters described in Claims 1 to 3 of the scope of claims, as viewed from the description of the scope of claims which have been amended by the written amendment submitted on February 13, 2017, and the invention relating to Claim 1 is as follows.

A: A method for decoding a bit stream associated with transform coefficients, comprising:

B: 1) a step of obtaining a bit stream; and

C: 2) a step of determining whether to decode level information of a sub-block of a block from the bit stream by use of a first or a second decoding method, on the basis of characteristics of the sub-block,
D: if the characteristics of the sub-block meet a predetermined condition, decoding the level information of the sub-block from the bit stream by using the first decoding method,
E: if the characteristics of the sub-block do not meet the predetermined condition, decoding the level information of the sub-block from the bit stream by using the second decoding method different from the first decoding method,
F: wherein the first decoding method includes bypass coding, and the second decoding method includes regular coding and the bypass coding,
G: the method further comprising: if the predetermined condition is met, decoding at least the sign and level information of any non-zero coefficients of the sub-block whose amplitude is greater than or equal to one, by the bypass coding of the first decoding method respectively;
H: if the predetermined condition is not met, decoding a first flag, which indicates whether or not the amplitude of the non-zero coefficient is greater than one, and a second flag, which indicates whether or not the amplitude of the non-zero coefficient with the amplitude larger than one is greater than two, by the regular coding of the second decoding method respectively,
I: and decoding the sign and level information of any non-zero coefficients whose amplitude is greater than or equal to three, by the bypass coding of the second decoding method respectively,
J: wherein the predetermined condition indicates whether the number of coefficients of the sub-block with amplitude not equal to zero is greater than a preset threshold,
A: the method further comprising:
K: a step of making a determination on the next sub-block of the block in the bit stream on the basis of characteristics of the next sub-block, and performing level-coding of the next sub-block by use of the first decoding method or the second decoding method, on the basis of a result of the above determination on the next sub-block; and
L: a step of repeating the above steps until all the sub-blocks of the block in the bit stream are decoded.

(A: to L: are added by the body. Hereinafter, the constituent components are referred to as "Constituent component A" to "Constituent component L".)

Here we will examine the Constituent component K.

The invention relating to Claim 1, which is a method for decoding all sub-blocks of a block in a bit stream, as with the Constituent components A and L, decodes a sub-block in the steps of the Constituent components C to J. The Constituent component K, which is a step relating to the next sub-block, is considered a step for decoding the next sub-block.

Therefore, the description in the Constituent component K, "performing level-coding of the next sub-block", is obviously an error for "decoding level information of the next sub-block", as is clear from the description in the Constituent component C "whether to decode level information of a sub-block" and the description in the

Constituent components D and E "decoding the level information of the sub-block" (The underlines were added by the body for highlighting; the same applies hereafter.).

As above, the invention relating to Claim 1 (hereinafter referred to as "the Invention") is recognized as follows.

(The Invention)
A: A method for decoding a bit stream associated with transform coefficients, comprising:
B: 1) a step of obtaining a bit stream; and
C: 2) a step of determining whether to decode level information of a sub-block of a block from the bit stream by use of a first or a second decoding method, on the basis of characteristics of the sub-block,
D: if the characteristics of the sub-block meet a predetermined condition, decoding the level information of the sub-block from the bit stream by using the first decoding method,
E: if the characteristics of the sub-block do not meet the predetermined condition, decoding the level information of the sub-block from the bit stream by using the second decoding method different from the first decoding method,
F: wherein the first decoding method includes bypass coding, and the second decoding method includes regular coding and the bypass coding,
G: the method further comprising: if the predetermined condition is met, decoding at least the sign and level information of any non-zero coefficients of the sub-block whose amplitude is greater than or equal to one, by the bypass coding of the first decoding method respectively;
H: if the predetermined condition is not met, decoding a first flag, which indicates whether or not the amplitude of the non-zero coefficient is greater than one, and a second flag, which indicates whether or not the amplitude of the non-zero coefficient with the amplitude larger than one is greater than two, by the regular coding of the second decoding method respectively,
I: and decoding the sign and level information of any non-zero coefficients whose amplitude is greater than or equal to three, by the bypass coding of the second decoding method respectively,
J: wherein the predetermined condition indicates whether the number of coefficients of the sub-block with amplitude not equal to zero is greater than a preset threshold,
A: the method further comprising:
K: a step of making a determination on the next sub-block of the block in the bit stream on the basis of characteristics of the next sub-block, and decoding level information of the next sub-block by use of the first decoding method or the second decoding method, on the basis of a result of the above determination on the next sub-block; and
L: a step of repeating the above steps until all the sub-blocks of the block in the bit stream are decoded.

No. 2 Described matters in the Cited documents and Inventions described in the Cited Documents
1 Regarding the priority date of the Invention
The Invention claims priority as follows.

(a) US Patent Application No. 13/354272 (filed on January 19, 2012)
(b) US Patent Application No. 13/360615 (filed on January 27, 2012)
(c) US Patent Application No. 13/365215 (filed on February 2, 2012)
(d) US Patent Application No. 13/444710 (filed on April 11, 2012)
(e) US Patent Application No. 13/457272 (filed on April 26, 2012)

Hereinafter, the above (a) to (e) are referred to as "Priority claim 1" to "Priority claim 5".

The Priority claim 1 includes the following description about high throughput binarization mode condition.

"High throughput binarization mode condition
[0041] In an example, if a characteristic corresponding to a block of image data is greater than a preset threshold, then the high throughput binarization mode condition is met, e.g. the electronic device 421 may set a high throughput binarization mode indicator, e.g. an HTB mode flag, to a value of 1 (which of course may include changing a default value of the HTB mode flag or leaving the HTB mode flag at a default value, depending on design preference).
[0042] In an example, the electronic device 421 determines whether a bit rate for a coding is greater than a preset threshold. If the bit rate is greater than the preset threshold, then the high throughput binarization mode condition is met. In an example, the preset bit rate threshold corresponds to QP 16 ; however, a preset threshold corresponding to different QP value may be used.
[0043] In an example, the determination (by the electronic device 421) of whether the high throughput binarization mode condition is met is based on whether the transform unit level of a corresponding block of image data is greater than a preset threshold.
[0044] In an example, the determination (by the electronic device 421) of whether the high throughput binarization mode condition is met is based on whether the slice level of a corresponding block of image data is greater than a preset threshold."

As above, the Priority claim 1 includes the following descriptions, as "High Throughput Binarization Mode Condition" corresponding to the "predetermined condition" for selecting the "first decoding method" or the "second decoding method" described in the Constituent components D and E of the Invention,
(A) whether "a bit rate for a coding" is greater than the preset threshold ([0042]),
(B) whether "the transform unit level of a corresponding block of image data" is greater than a preset threshold ([0043]),
(C) whether "the slice level of a corresponding block of image data" is greater than a preset threshold ([0044]). However, there is no description or indication about the "predetermined condition" including "whether the number of coefficients of the sub-block with amplitude not equal to zero is greater than a preset threshold". Therefore, the priority claim based on the Priority claim 1 cannot be approved.

Consequently, the reference date for judgement in applying Article 29 of the Patent Act to the Inventions relating to Claims 1 to 3 is January 27, 2012, which is the priority date of the Priority claim 2 including the Constituent component J.

2 Cited document 1
(1) Described matters in Cited document 1
The document
"Seung-Hwan Kim et al., `Non-CE1: High Throughput Binarization (HTB) method with modified level coding`, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11 8th Meeting: San Jose, CA, USA, 1-10 February, 2012, [JCTVC-H0510],(version1 - date 2012-01-21), <JCTVC-H510.doc>"
(hereinafter referred to as "Cited document 1") which was published before the priority date of the Priority claim 2 and cited in the reasons for refusal of the examiner's decision includes the following matters together with drawings.
(Underlines were added by the body.)

A "Title: Non-CE1: High Throughput Binarization (HTB) method with modified level coding"

B "Abstract
In this contribution, a new efficient high throughput binarization (HTB) method for CABAC is presented. The intention of this approach is to reduce the worst-case complexity of CABAC for low complexity use cases, keeping easy compatibility with the existing CABAC. In addition, the proposed method provides the flexibility between coding performance and throughput efficiency by selectively applying HTB mode for each 4x4 coefficient block. It is reported that the proposed method reduces the number of context adaptively coded bins by 30 % under the common test conditions, and by 60 % in the low QP range (QP1 to 13) where the complexity of CABAC is reportedly more problematic. It is further reported that the proposed approach keep the coding performance loss not significant in high efficiency configurations, by 2.2% (AI_HE), 1.8 % (RA_HE), and 2.1%(LB_HE) in the common test condition."

C "1 Introduction
In HM5, the only entropy coder CABAC provides even better coding efficiency than CAVLC because of its arithmetic coding engine and sophisticated context modeling. However, those efficient coding techniques require large amount of computational complexity and degrade the throughput efficiency especially at higher bitrates condition. It was also noticed that on higher bitrates the portion of transform coefficient data in the generated bitstream has a dominant role. Thus, in order to improve the worst case throughput we need to provide the codec with a higher throughput alternative for low-complexity use cases."

D "The current CABAC consists of three main coding processes (last position, significance map, level coding) for residual coding. Here, last position coding part dose not require much computational complexity and significant throughput problem even in high bitrate coding. For the significance map, it contributes significantly to the coding performance. Hence, considering the coding performance and throughput efficiency, the level coding part shows room for an improvement. Specifically, current level coding consists of four sub-coding processes Greater_than_1, Greater_than_2, Sign, and Absolute-3 and also requires many context model update for the first two

processes (Greater_than_1 and Greater_than_2) in high bitrate coding because many large coefficients are likely to be observed."

E "Therefore, we introduce a new HTB coding mode with simple structure and only bypass coding mode. In order to improve the cording performance of the level coding, we first combined sign and level information, and generate new level information which is adaptively binarized with 5-VLC tables used in CAVLC. The details will be described in the following section."

F "

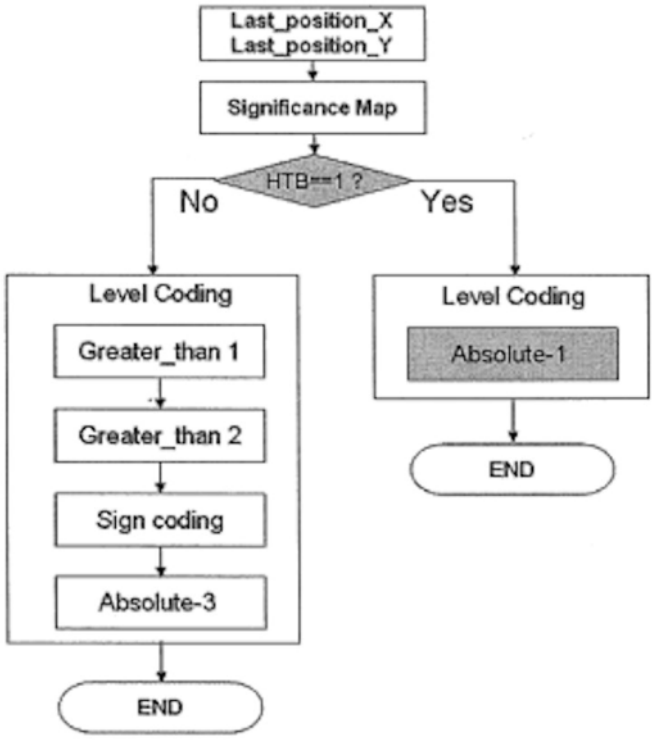

Figure 1 Proposed HTB Structure for CABAC

"

G "2 High Throughput Binarization Coding Method
The proposed HTB coding structure is the same as those of CABAC in last position coding and significance map coding. For the level coding, two binarization modes such as HTB mode (HTB=1) and conventional coding mode (HTB==0) are selectively employed based on the number of significant coefficients. Specifically, HTB mode is activated based on the following condition."

H "
If (Number_of_significant_coeffs < TH)
HTB = 0;
Else HTB= l;
where 'TH' represent a given threshold value. In HTB mode, the detailed binarization process consists of two processes. Firstly, as shown in Fig. 2, the 'input' value is

generated based on the coefficient level and the corresponding sign information by equation (1)

Input = (abs (cocff[i]-1)<<1 + sign (1)"

I "Secondly, the 'input' value is binarized through the predefined 5 vlc tables used for level coding in CAVLC. Here, table number 'vlc' is first set to zero and it is monotonically increase based on the following condition;"

J "
. If (input > Table [vlc])vlc++ where Table [vlc] = {3, 5, 13, 27}

Table update is terminated when 'vlc' is equal to four."

K "

sign	Abs (coeff [i])	Input
+	1	0
-	1	1
+	2	2
-	2	3
+	3	4
-	3	5
+	4	6
-	4	7
...	...	...

Figure 2 Mapping Table for 'Input'

"

(2) The invention described in Cited document 1
A Cited document 1 includes "High Throughput Binarization (HTB) method with modified level coding" (Title).

B According to (1) B, F, G, and H, HTB modes and conventional coding mode are selectively employed based on the number of significant coefficients for each 4x4 coefficient block.

C According to (1) G and H, when the number of significant coefficients is smaller than a threshold value, the conventional coding mode is employed, otherwise the HTB mode is employed.

D According to (1) E, the HTB coding mode has only bypass coding mode.

E According to (1) D, the current CABAC, or the conventional coding mode, encodes "Greater_than_1", "Greater_than_2", "Sign", and "Absolute-3".

F According to (1)E, in the HTB mode, sign and level information are bypass-encoded. According to H, the input value is generated based on the coefficient level and the corresponding sign information.

According to (1) K, the formula (1) in (1) H is recognized as an error (underlined portion) for

Input = (abs (cocff[i])-1) <<1 + sign

G According to B, whether to employ the HTB is determined for each 4x4 coefficient block.

H In video coding technology, it is obvious that arithmetic decoding corresponding to arithmetic coding is conducted. It is recognized that the methods for decoding corresponding to the above A to F are also described.

In the technical field of Cited document 1, it is natural to obtain a bit stream for decoding.

It is natural to repeat decoding until all 4x4 coefficient blocks are decoded.

In decoding, "Greater_than_1", "Greater_than_2", "Sign", and "Absolute-3" are decoded in the conventional coding mode.

I Consequently, it can be recognized that Cited document 1 includes the following invention (hereinafter referred to as "Cited invention").

(Cited invention)
i: A method for decoding comprising:
a: obtaining a bit stream;
b: deciding whether to employ HTB mode or conventional coding mode, based on the number of significant coefficients for each 4x4 coefficient block;
c: employing the conventional coding mode for decoding when the number of significant coefficients is smaller than a threshold value, otherwise employing the HTB mode for decoding,
d: wherein the HTB mode has only bypass coding mode;
e: when the number of significant coefficients is smaller than the threshold value, decoding "Greater_than_1", "Greater_than_2", "Sign", and "Absolute-3" in the conventional coding mode;
f: otherwise bypass-encoding the sign and level information, wherein the bypass-encoding of the sign and level information is binarized using an input value (Input) generated by
Input = (abs (cocff[i])-1)<<1 + sign;
g: determining whether to employ the HTB for each 4x4 coefficient block;
h: and repeating decoding until all 4x4 coefficient blocks are decoded.

a: to i: are added for identifying the constituents. Hereinafter the constituents are referred to as "Constituent (a)" to "Constituent (i)".

3 Cited document 2
(1) Described matters in Cited document 2

The document
"Jani Lainema et al., `Single entropy coder for HEVC with a high throughput binarization mode`, Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11 7th Meeting: Geneva, CH, 21-30 November, 2011, [JCTVC-G569], (version 4 - date 2011-11-28),<JCTVC-G569_r1.doc> whole document, <JCTVC-G569 WD text.doc> pp.41-45,71,72,149-151,179" (hereinafter referred to as "Cited document 2") which was cited in the reasons for refusal of the examiner's decision includes the following matters together with drawings.

A "

Table 9-46 – Syntax elements and associated types of binarization, maxBinIdxCtx, ctxIdxTable, and ctxIdxOffset

Syntax element		Type of binarization	maxBinIdx Ctx	ctxIdxTable	ctxIdxOffset
significant_coeff_flag	I	FL, cMax = 1	0	Table 9-41	0
	P		0	Table 9-42	0
	B		0	Table 9-43	0
coeff_abs_level_greater1_flag	I	FL, cMax = 1	0	Table 9-44	0
	P		0	Table 9-44	60
	B		0	Table 9-44	120
coeff_abs_level_greater2_flag	I	FL, cMax = 1	0	Table 9-45	0
	P		0	Table 9-45	60
	B		0	Table 9-45	120
coeff_abs_level_minus3	all	prefix and suffix as specified in subclause 9.3.2.9	prefix: na suffix: na	prefix: na suffix: na	prefix: na, (uses Decode Bypass) suffix: na, (uses Decode Bypass)
coeff_sign_flag	all	FL, cMax = 1	na	na	na, (uses Decode Bypass)

[Ed. (BB): The TU binarization for last_significant_coeff_x and last_significant_coeff_y is using 0s and a terminating 1 instead of using 1s and a terminating 0.]

" (<JCTVC-G569 WD text.doc>p.179)

B "

coeff_abs_level_minus3[n] is the absolute value of a transform coefficient level minus 3 at the scanning position n. The value of coeff_abs_level_minus3 is constrained by the limits in subclause XX.

When coeff_abs_level_minus3[n] is not present, it is inferred as follows.

- If coeff_abs_level_greater1_flag[n] is equal to 0, coeff_abs_level_minus3[n] is inferred to be equal to −2.
- Otherwise (coeff_abs_level_greater1_flag[n] is equal to 1), coeff_abs_level_minus3[n] is inferred to be equal to −1.

coeff_sign_flag[n] specifies the sign of a transform coefficient level for the scanning position n as follows.

- If coeff_sign_flag[n] is equal to 0, the corresponding transform coefficient level has a positive value.
- Otherwise (coeff_sign_flag[n] is equal to 1), the corresponding transform coefficient level has a negative value.

When coeff_sign_flag[n] is not present, it is inferred to be equal to 0.

" (<JCTVC-G569 WD text.doc>p.71)

No. 3 Comparison

1 Comparison

The Invention and the Cited invention are compared.

(1) Constituent component B is compared with Constituent (a).

Constituent (a) can be considered as a "step of obtaining a bit stream", and corresponds to Constituent component B.

(2) Constituent component C is compared with Constituents (b) and (c).

The "4x4 coefficient block" in Constituent (b) corresponds to the "sub-block" in Constituent component C. "The number of significant coefficients for each 4x4 coefficient block" in Constituent (b) corresponds to the "characteristics of the sub-block" in Constituent component C.

Considering "employing the HTB mode for decoding" and "employing the conventional coding mode for decoding" in Constituent (c) and the descriptions in Constituents (d) to (f), it can be said that the "HTB mode" and the "conventional coding mode" in Constituent (b) correspond to the "second decoding method" and "first decoding method" in Constituent component C, respectively.

Thus, Constituent component C and Constituent (b) are coincident with each other in terms of a "step of determining whether to decode level information of a sub-block of a block from the bit stream by use of a first or a second decoding method, on the basis of characteristics of the sub-block".

(3) Constituent components D, E, and F are compared with Constituent (c).

The description in Constituent component D "if the characteristics of the sub-block meet a predetermined condition" means "when the number of coefficients of the sub-block with amplitude not equal to zero is greater than a preset threshold", in view of Constituent component J. The description in Constituent component E "if the characteristics of the sub-block do not meet the predetermined condition" means "when the number of coefficients of the sub-block with amplitude not equal to zero is greater than a preset threshold", in view of Constituent component J.

"The number of significant coefficients" in Constituent (c) corresponds to "the number of coefficients of the sub-block with amplitude not equal to zero" in Constituent component J. The "threshold" in Constituent (c) corresponds to the "preset threshold" in Constituent component J.

The description in Constituent (c) "when the number of significant coefficients is smaller than a threshold value" corresponds to the description in Constituent component E "if the characteristics of the sub-block do not meet the predetermined condition". The description in Constituent (c) "otherwise" corresponds to the description in Constituent component D "if the characteristics of the sub-block meet a predetermined condition".

The descriptions in Constituent (c) "employing the HTB mode for decoding" and " employing the conventional coding mode for decoding" correspond to the description in Constituent component D "decoding the level information of the sub-block from the bit stream by using the first decoding method" and the description in Constituent component E "decoding the level information of the sub-block from the bit stream by using the second decoding method different from the first decoding method", respectively, in view of Constituents (d) to (f).

Thus, Constituent components D, E, and J and Constituent (c) are coincident with each other in terms of
"if the characteristics of the sub-block do not meet the predetermined condition, decoding the level information of the sub-block from the bit stream by using the second decoding method different from the first decoding method,
if the characteristics of the sub-block do not meet the predetermined condition, decoding the level information of the sub-block from the bit stream by using the second decoding method different from the first decoding method,
wherein the predetermined condition indicates whether the number of coefficients of the sub-block with amplitude not equal to zero is greater than a preset threshold".

(4) Constituent component F is compared with Constituents (c) and (d).

Constituent (d) includes the description "the HTB mode has only bypass coding mode". As described in the above (2), it can be said the "HTB mode" is the "first decoding method". Thus, Constituent (d) is considered to include "the first decoding method including bypass coding" in Constituent component F.

Constituent (c) includes the description "employing the conventional coding mode for decoding". As described in the above (2), it can be said that the "conventional coding mode" is the "second decoding method". It can also be said that the "conventional coding mode", which is a regular coding mode, is the "regular coding".

Thus, Constituent (c) is coincident with Constituent component F in terms of "the second decoding method including regular coding".

However, as for the "second decoding method", there is a difference between the Invention including "the bypass coding", and the Cited invention which does not include "the bypass coding".

(5) Constituent component G is compared with Constituents (f), (c), and (d).

As described in the above (3), since the "otherwise" in Constituent (c) corresponds to the description in Constituent component D "if the characteristics of the sub-block meet a predetermined condition", the description in Constituent (f) "otherwise" corresponds to the description in Constituent component G "if the predetermined condition is met".

Constituent (f) includes the description "bypass-encoding the sign and level information, wherein the bypass-encoding of the sign and level information is
binarized using an input value (Input) generated by
Input = (abs (cocff[i])-1)<<1 + sign",
and Constituent (c) includes the description "employing the HTB mode for decoding". Therefore, it can be said that Constituent (f) is considered to include "decoding at least the sign and level information of any non-zero coefficients of the sub-block whose amplitude is greater than or equal to one, by the bypass coding of the first decoding method respectively".

Thus, Constituent component G and Constituents (f), (c), and (d) are coincident with each other in terms of "if the predetermined condition is met, decoding at least the sign and level information of any non-zero coefficients of the sub-block

whose amplitude is greater than or equal to one, by the bypass coding of the first decoding method respectively".

The appellant alleges in the request for appeal that, as shown in FIG. 1, Level Coding in the HTB mode does not include Sign coding. However, as described above, the HTB mode in the Cited invention decodes the sign and level information by bypass coding. Thus, the appellant's allegation cannot be accepted.

(6) Constituent component H is compared with Constituent (e).

As described in the above (3), the description in Constituent (c) "when the number of significant coefficients is smaller than a threshold value" corresponds to the description in Constituent component E "if the characteristics of the sub-block do not meet the predetermined condition". Therefore, the description in Constituent (e) "when the number of significant coefficients is smaller than the threshold value" corresponds to the description in Constituent component H "if the predetermined condition is not met".

The description in Constituent (e) "decoding "Greater_than_1", "Greater_than_2", ... in the conventional coding mode" is coincident with Constituent component H in terms of "decoding a first flag, which indicates whether or not the amplitude of the non-zero coefficient is greater than one, and a second flag, which indicates whether or not the amplitude of the non-zero coefficient with the amplitude larger than one is greater than two, by the regular coding of the second decoding method respectively".

Thus, Constituent component H and Constituent (e) are coincident with each other in terms of "if the predetermined condition is not met, decoding a first flag, which indicates whether or not the amplitude of the non-zero coefficient is greater than one, and a second flag, which indicates whether or not the amplitude of the non-zero coefficient with the amplitude larger than one is greater than two, by the regular coding of the second decoding method respectively".

(7) Constituent component I is compared with Constituent (e).

Constituent (e) is coincident with Constituent component I in terms of "decoding the sign and level information of any non-zero coefficients whose amplitude is greater than or equal to three, by the second decoding method respectively." However, as for the description "by the second decoding method respectively", there is a difference between the Invention including the description "by the bypass coding of the second decoding method respectively", and the Cited invention which does not include the description "by the bypass coding of the second decoding method respectively" (The underlines were added by the body for highlighting).

(8) Constituent component K is compared with Constituent (g).

Constituent component K is recognized to prescribe that the next sub-block is processed in the same way as Constituent components A to J.

Since Constituent (g) includes the description "determining whether to employ the HTB for each 4x4 coefficient block", the Cited invention also determines whether to employ the HTB for each 4x4 coefficient block which corresponds to the sub-block, and executes processing of Constituents (a) to (f). Thus, it can be said that the Cited

invention includes "a step of making a determination on the next sub-block of the block in the bit stream on the basis of characteristics of the next sub-block, and decoding level information of the next sub-block by use of the first decoding method or the second decoding method, on the basis of a result of the above determination on the next sub-block", as well as the Invention.

(9) Constituent component L is compared with Constituent (h).

Constituent (h), which includes the description "repeating decoding until all 4x4 coefficient blocks are decoded", is coincident with Constituent component L in terms of including the "step of repeating the above steps until all the sub-blocks of the block in the bit stream are decoded".

(10) Constituent component A is compared with Constituent (i).

In view of Constituents (a) to (h), it can be said Constituent (i) "a method for decoding" is "a method for decoding a bit stream associated with transform coefficients", and is coincident with Constituent component A.

2 Corresponding Features and Different Features

As described above, the Corresponding Features and the Different Features between the Invention and the Cited invention are as follows.

(Corresponding Features)

A method for decoding a bit stream associated with transform coefficients, comprising:

1) a step of obtaining a bit stream; and

2) a step of determining whether to decode level information of a sub-block of a block from the bit stream by use of a first or a second decoding method, on the basis of characteristics of the sub-block,

if the characteristics of the sub-block meet a predetermined condition, decoding the level information of the sub-block from the bit stream by using the first decoding method,

if the characteristics of the sub-block do not meet the predetermined condition, decoding the level information of the sub-block from the bit stream by using the second decoding method different from the first decoding method,

wherein the first decoding method includes bypass coding, and the second decoding method includes regular coding,

the method further comprising: if the predetermined condition is met, decoding at least the sign and level information of any non-zero coefficients of the sub-block whose amplitude is greater than or equal to one, by the bypass coding of the first decoding method respectively;

if the predetermined condition is not met, decoding a first flag, which indicates whether or not the amplitude of the non-zero coefficient is greater than one, and a second flag, which indicates whether or not the amplitude of the non-zero coefficient with the amplitude larger than one is greater than two, by the regular coding of the second decoding method respectively,

and decoding the sign and level information of any non-zero coefficients whose amplitude is greater than or equal to three, by the second decoding method respectively,

wherein the predetermined condition indicates whether the number of coefficients of the sub-block with amplitude not equal to zero is greater than a preset threshold,

the method further comprising:

a step of making a determination on the next sub-block of the block in the bit stream on the basis of characteristics of the next sub-block, and decoding level information of the next sub-block by use of the first decoding method or the second decoding method, on the basis of a result of the above determination on the next sub-block; and

a step of repeating the above steps until all the sub-blocks of the block in the bit stream are decoded.

(Different Feature 1)

As for the "second decoding method", the Invention includes "the bypass coding", while the Cited invention does not include "the bypass coding".

(Different Feature 2)

As for the description "by the second decoding method respectively" in "decoding the sign and level information of any non-zero coefficients whose amplitude is greater than or equal to three, by the second decoding method respectively", the Invention includes the description "by the bypass coding of the second decoding method respectively", while the Cited invention does not include the description "by the bypass coding of the second decoding method respectively".

No. 4 Judgment

Cited document 2 is a document which describes CABAC published before Cited document 1, and discloses that coeff_sign_flag and coeff_abs_level_minus3 are decoded by Bypass, according to the column of coeff_sign_flag and coeff_abs_level_minus3 in Table 9-46 (No. 2 2(1)) in Cited document 2. The coeff_sign_flag and coeff_abs_level_minus3 correspond to the Sign and Absolute-3, respectively. Although not specified in Cited document 1, it is recognized to be well known that CABAC includes "decoding including the bypass coding" and "decoding the sign and level information of any non-zero coefficients whose amplitude is greater than or equal to three, by bypass coding of the decoding method respectively", as described in Cited document 2.

Therefore, a person skilled in the art could easily conceive of applying the above well-known arts to the Cited document so that the second decoding method includes the bypass coding and that the sign and level information of any non-zero coefficients whose amplitude is greater than or equal to three may be decoded by the bypass coding of the second decoding method respectively.

The appellant alleges in the request for appeal that the "coeff_abs_level_minus3" disclosed in Cited document 2 is defined as an absolute value (the absolute of a transform coefficient level mainus 3) obtained by subtracting 3 from

transform coefficient level and is technically different from the "sign and level information of any non-zero coefficients whose amplitude is greater than or equal to three".

However, the transform coefficient level can be of positive and negative values. An absolute value of a numerical value obtained by subtracting 3 from the transform coefficient level cannot be recognized to be technically significant. Considering that the sign of the coefficient is represented by Sign in CABAC, it can be recognized that the "coeff_abs_level_minus3" disclosed in Cited document 2 is a value obtained by subtracting 3 from an absolute value of the transform coefficient level.

Thus, the appellant's allegation cannot be accepted.

As described above, the Invention could be easily invented by a person skilled in the art on the basis of the Cited invention and well-known arts.

No. 5 Closing

As described above, the invention relating to Claim 1 could be easily invented by a person skilled in the art on the basis of the invention described in Cited document 1 and the technology described in Cited document 2. The appellant should not be granted a patent for the Invention under the provisions of Article 29(2) of the Patent Act.

Thus, the application should be rejected without examining other claims.

Therefore, the appeal decision shall be made as described in the conclusion.

March 8, 2019

Chief administrative judge: SHIMIZU, Masakazu
Administrative judge: KOIKE, Masahiko
Administrative judge: KASHIMOTO, Tsuyoshi