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Datasheet for the decision of 4 October 2023

Case Number: T 1092/19 - 3.5.04

Application Number: 12804513.5

Publication Number: 2728867

IPC: H04N7/26

Language of the proceedings: EN

Title of invention:
IMAGE DECODING METHOD, IMAGE ENCODING METHOD, IMAGE DECODING DEVICE, IMAGE ENCODING DEVICE, AND IMAGE ENCODING/DECODING DEVICE

Applicant:
Sun Patent Trust

Headword:

Relevant legal provisions:
EPC Art. 56
RPBA 2020 Art. 13(2)

Keyword:
Inventive step - main request (no) - auxiliary request (no)
Amendment after summons - exceptional circumstances (yes)

Decisions cited:

Catchword:

Europäisches Patentamt
European Patent Office
Office européen des brevets

Beschwerdekammern

Boards of Appeal

Chambres de recours

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Case Number: T 1092/19 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 4 October 2023

Appellant: (Applicant)	Sun Patent Trust 450 Lexington Avenue, 38th Floor New York, NY 10017 (US)
Representative:	Grünecker Patent- und Rechtsanwälte PartG mbB Leopoldstraße 4 80802 München (DE)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 22 November 2018 refusing European patent application No. 12804513.5 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chair	B. Willems
Members:	F. Sanahuja
	G. Decker

Summary of Facts and Submissions

I. The appeal is against the examining division's decision to refuse European patent application No. 12 804 513.5. This application is a Euro-PCT application within the meaning of Article 153(2) EPC. The underlying international application with publication number WO 2013/001765 A1 was accorded 22 June 2012 as the filing date.

II. The application claims priority from the following US provisional application for a patent ("previous application P1"):

P1 US 61/501,954

The filing date of P1 was 28 June 2011.

III. The documents cited in the decision under appeal included the following:

D1 T. Wiegand et al., "WD3: Working Draft 3 of High-Efficiency Video Coding", Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, 5th Meeting, Geneva, CH, 16 to 23 March 2011, document no. JCTVC-E603, ver. 7, server date: 15 June 2011, XP055146641

IV. The application was refused on the ground that the subject-matter of claims 1 to 4 of the sole request pending at that time lacked inventive step over the disclosure of document D1 combined with the common general knowledge of the person skilled in the art

(Article 56 EPC).

V. The applicant ("appellant") filed notice of appeal. With its statement of grounds of appeal, the appellant submitted arguments to support its opinion that the subject-matter of the claims that had formed the basis of the decision under appeal was new and involved an inventive step.

VI. In the statement of grounds of appeal, the appellant requested that the decision under appeal be set aside and that a communication under Rule 71(3) EPC be issued on the basis of the set of claims that had formed the basis of the decision under appeal. As an auxiliary measure, the appellant requested that oral proceedings be held.

VII. A summons to oral proceedings was issued on 13 July 2022. In a communication under Article 15(1) RPBA 2020 the board introduced the following document into the appeal proceedings

D8 H. Sasai and T. Nishi, "Modified Context Derivation for Complexity reduction", Joint Collaborative Team on Video Coding (JCT-VC) of ITU-T SG16 WP3 and ISO/IEC JTC1/SC29/WG11, 6th Meeting, Torino, IT, 14 to 22 July 2011, document no. JCTVC-F429, server date: 1 July 2011, XP030009452

and gave, *inter alia*, the following preliminary opinion.

(a) The subject-matter of method claim 1 and the corresponding apparatus claim 4 lacked inventive step over the disclosure of document D1 combined

with the common general knowledge of the person skilled in the art (Article 56 EPC).

(b) Should the priority be considered invalid because the person skilled in the art could not derive the specific combination of features present in the claims directly and unambiguously, using common general knowledge, from the previous application as a whole, the disclosure of document D8 might be prejudicial to the patentability of the claimed subject-matter.

VIII. With its letter dated 4 September 2023, the appellant filed claims of an auxiliary request. The appellant submitted that the auxiliary request had been prepared to address the substantial priority issues raised in the board's communication. It provided arguments to support its opinion that the priority from the previous application P1 was validly claimed, and that the subject-matter of the claims was inventive.

IX. On 4 October 2023, the board held oral proceedings.

The appellant's final requests were that the decision under appeal be set aside and that a European patent be granted on the basis of the claims of the main request filed with the statement of grounds of appeal, or alternatively, on the basis of the claims of the auxiliary request filed with the letter dated 4 September 2023.

The board understands the request that a patent be granted on the basis of the claims of the main request filed with the statement of grounds of appeal to be a request that a patent be granted on the basis of the claims that had formed the basis of the decision under

appeal, since that was the sole claim request referred to in the statement of grounds of appeal.

At the end of the oral proceedings, the chair announced the board's decision.

X. Claim 1 of the **main request** reads as follows:

"A decoding method for decoding a control parameter for controlling decoding of an image, the decoding method comprising:

determining a context for a current block in the image, from among a plurality of contexts;

performing arithmetic decoding on a bitstream corresponding to the current block using the determined context,

obtaining the control parameter to be used for decoding the current block by inversely binarizing a binary sequence obtained by arithmetic decoding of the bitstream;

characterized in that the determining further includes:

determining a context for a split flag by using both of hierarchical depths for a left block and an upper block;

determining a context for a skip flag by using both of decoded skip flags for the left and the upper block; and

determining a fixed predetermined context for a residual flag without using any of the decoded residual

flags for the left block and the upper block; wherein

the left block is a neighboring block to the left of the current block, and the upper block is a neighboring block on top of the current block;

the split flag indicates whether or not the current block is partitioned into a plurality of blocks;

the skip flag indicates whether or not the current block is to be skipped; and

the residual flag indicates whether or not luma residual data and chroma residual data are included in the current block."

XI. Claim 1 of the **auxiliary request** differs from claim 1 of the main request in that the definitions of the split flag and the residual flag are defined as follows (with additions being underlined and omissions being ~~struck through~~):

"the split flag indicates whether or not the current block is partitioned into ~~a plurality of~~ blocks with half horizontal and vertical size;"

"the residual flag indicates whether or not ~~luma~~ residual data ~~and chroma residual data are~~ is present for ~~included in~~ the current block."

Reasons for the Decision

1. The appeal is admissible.

2. *The invention*

2.1 The invention relates to coding of video sequences, and in particular to determining a context for each of a plurality of syntax elements for arithmetic coding.

For the syntax element indicating whether or not the current block is partitioned into a plurality of blocks (split flag) and the syntax element indicating whether or not the current block is to be skipped (skip flag), the context is determined on the basis of information for the left block and the upper block of the top-left luma sample of the current block.

For the syntax element indicating whether or not luma residual data and chroma residual data are included in the current block (residual flag), a fixed context is determined, i.e. without using any of the decoded residual flags for the left block or the upper block.

3. *Main request - inventive step (Article 56 EPC)*

3.1 An invention is to be considered as involving an inventive step if, having regard to the state of the art, it is not obvious to a person skilled in the art (Article 56 EPC).

3.2 In the following, the board applies the "problem-solution approach" to assess whether the subject-matter of claim 1 involves an inventive step (see Case Law of the Boards of Appeal of the European Patent Office, 10th edition, 2022, "Case Law", I.D.2).

According to the case law of the boards of appeal, when neither the implementation nor the testing of an approach suggested by the prior art involves any

particular technical difficulties, the consideration that the skilled person would have at least adopted a "try and see" attitude is a reason for denying inventive step.

In such situations the concept of "reasonable expectation of success" does not apply. The skilled person would prefer to verify whether the potential solution they had conceived worked, rather than abandon the project because success was not certain ("try and see" approach) (see Case Law, I.D.7.2).

3.3 The examining division identified document D1 as the closest prior art for assessing inventive step (see point 15.1 of the decision under appeal). The appellant did not dispute this, and the board agrees with the examining division.

3.4 It is common ground that document D1 discloses a decoding method including determining a context for arithmetic decoding of syntax elements, including a split flag, a skip flag and a residual flag. The context for each of these syntax elements is determined using information of neighbouring blocks, including a left block and an upper block (see point 15.1 of the decision under appeal and page 3, third-to-last paragraph of the statement of grounds of appeal).

3.5 The appellant acknowledged that the subject-matter of claim 1 differed from the disclosure of document D1 by the feature of determining a fixed predetermined context for the residual flag without using any of the decoded residual flags for the left block and the upper block (see point 15.1 of the decision under appeal and page 3, second-to-last paragraph of the statement of

grounds of appeal).

3.6 During the oral proceedings before the board, the appellant contested the board's preliminary view expressed in its communication under Article 15(1) RPBA 2020 that the technical effect of the distinguishing feature was that of reducing the memory usage when deriving the context of the residual flag while maintaining coding efficiency. In the appellant's view, it was not apparent that using fixed contexts in arithmetic coding necessarily implied using less memory. The values of syntax elements of neighbouring blocks that had to be stored for context selection in adaptive arithmetic coding might have to be stored for other coding operations anyway.

The appellant submitted that using a fixed context reduced the complexity of arithmetic coding since no decision had to be taken for selecting one of a plurality of contexts. Therefore, the technical effect of the distinguishing feature was that of reducing the complexity of arithmetic coding while maintaining coding efficiency, and the objective technical problem should be formulated as that of reducing the complexity of arithmetic coding while maintaining coding efficiency.

3.6.1 It is not apparent that the residual flag of neighbouring blocks had to be stored for coding operations other than arithmetic coding. Therefore, the board is not convinced that using a fixed context for coding a difference parameter, rather than selecting one of a number of contexts, does not save memory.

Furthermore, according to the description, using a fixed context "can reduce memory usage while

suppressing the decrease in the BD-rate" (see e.g. paragraph [0220]).

3.6.2 However, in the board's view, the person skilled in the art would also have recognised from the application as filed that using a fixed context reduced the complexity of arithmetic coding in terms of "memory usage" and "processing amount" (see, for instance, paragraph [0221] of the description). Therefore, the board assesses inventive step on the basis of the appellant's identified technical effect and objective technical problem.

3.7 The concept of complexity of an algorithm encompasses a number of factors, including memory storage and processing time. Therefore, in attempting to reduce the complexity of arithmetic coding, the person skilled in the art would have addressed one or more of these factors.

3.8 The board concurs with the examining division's conclusion that the person skilled in the art, starting from D1 and performing a limited number of routine tests according to common general knowledge, would have identified that the residual flag provided good coding efficiency when arithmetically coded with a fixed context. They would thus have selected this coding mode for the residual flag as it requires less memory than deriving a context from neighbouring blocks (see point 15.3 of the decision under appeal). In the board's opinion, the person skilled in the art would also have chosen this coding mode because it required less processing.

3.9 The appellant's argument that there was no leeway in D1 for deviating from the prescribed method for

determining the context for the residual flag (see page 4, second paragraph of the statement of grounds of appeal) did not persuade the board.

According to the appellant, the specific allocation of fixed and adaptive contexts agreed by the standardisation working group would have discouraged the person skilled in the art from modifying them (see page 3, last paragraph to page 4, second paragraph of the letter of reply dated 4 September 2023). They would not have reconsidered the decision of the standardisation working group to decode the residual flag with a context derived from neighbouring blocks only because other syntax elements were decoded using a fixed context (see page 4, third paragraph of the statement of grounds of appeal).

Since document D1 taught away from using a fixed context for the residual flag, the person skilled in the art would have found no incentive to apply a "try and see" approach (see page 3, third full paragraph of the letter of reply dated 4 September 2023).

3.9.1 It is undisputed that document D1 explicitly teaches coding the residual flag with a context determined on the basis of information from neighbouring blocks.

3.9.2 However, document D1 is a working draft of a video coding standard that was under development on the priority date of the present application. A working draft reflects the current stage of development and is expected to incorporate changes and contributions in each version (see e.g. pages 1 to 3 of D1). It cannot be regarded as reflecting the final decisions of a standardisation working group.

In any case, the person skilled in the art is motivated by the desire for further improvement and is not dissuaded from their pursuit by administrative decisions, e.g. those taken by standardisation organisations.

3.9.3 The board considers that the person skilled in the art would have been aware that, as opposed to using fixed contexts, deriving a number of contexts increases memory storage since it requires the storage of information for neighbouring blocks (see also point 15.3 of the decision under appeal), and that selecting a context also increases the processing requirements of arithmetic coding. This can be derived from document D1 (see, for example, Tables 9-49 and 9-50).

Moreover, using a fixed context proved to be efficient for coding a plurality of syntax elements (see D1, Table 9-50).

These two aspects would have encouraged the person skilled in the art to investigate the effect that using fewer or none of the neighbouring blocks for determining the context would have on the coding efficiency (see point 15.3 of the decision under appeal). In this regard, the person skilled in the art would have been in a "try and see" situation and the investigation which they would have performed would have been nothing more than routine experimentation.

3.10 During the oral proceedings before the board, the appellant asserted that a video coding standard evolved towards increased complexity. Therefore, the person skilled in the art would only have made the arithmetic

coding described in Table 9-49 of D1 more complex.

3.10.1 The board notes that the appellant's assertion is not substantiated since there is no evidence on file to support it.

3.10.2 Even if such evidence towards increased complexity had been provided, the board is not convinced that the person skilled in the art, in the context of the problem-solution approach, would only have increased the complexity of arithmetic coding.

In formulating the technical problem, the person skilled in the art is already tasked with reducing the complexity (see point 3.6.2 above). It is thus immaterial in which direction arithmetic coding evolved in the context of drafting video coding standards.

3.11 The appellant argued that identifying and performing empirical tests on only the syntax elements listed in Table 9-50 (rather than on those in the longer list in Table 9-49) was based on hindsight. Without knowledge of the present invention, the person skilled in the art would not have been aware that algorithmic complexity and memory requirements could be improved without affecting coding efficiency (see the paragraph bridging pages 4 and 5 of the statement of grounds of appeal).

3.11.1 Table 9-49 of D1 lists syntax elements which are either coded with a fixed context or with a context derived from neighbouring blocks. Table 9-50 lists only the latter.

As stated in point 3.9.3 above, the board is of the opinion that the person skilled in the art would have been aware of the requirements for deriving a number of

contexts for arithmetic coding. Since a fixed context does not require the storage of information for the neighbouring blocks or a selection from a number of contexts, the board fails to see why the person skilled in the art would have performed empirical experiments on the syntax elements using a fixed context at all when trying to reduce the memory and/or processing requirements of arithmetic coding.

Therefore, the person skilled in the art would have identified the syntax elements for which the storage and processing requirements could be reduced from either of Tables 9-49 or 9-50 without difficulty and would have experimented only on them.

3.11.2 In a "try and see" situation as in the present case, the absence of certitude or even confidence in success would not have deterred the person skilled in the art from verifying whether the potential solution they had conceived worked (see point 3.2 above).

3.12 During the oral proceedings before the board, the appellant submitted that the person skilled in the art would have reduced the number of contexts when attempting to reduce the complexity of the arithmetic coding. However, they would not have overcome the technical prejudice that, for efficient arithmetic coding, the residual flag had to be coded by deriving the context from neighbouring blocks as in D1. They would thus not have arrived at using zero neighbouring blocks, i.e. a fixed context. Moving away from selecting from a number of contexts to a fixed context was a qualitative change that the person skilled in the art would not have made.

Furthermore, the use of adaptive contexts exploited the

correlation among the syntax elements of the current and neighbouring blocks. Thus, the person skilled in the art would have understood from document D1 that the residual flag was correlated with the residual flags of the neighbouring blocks, and would have had no reason to try a fixed context for it.

3.12.1 The board is not convinced that the alleged technical prejudice existed.

The fact that document D1 teaches deriving the context for coding the residual flag using neighbouring blocks cannot be regarded as proof that said prejudice existed. D1 is a working draft of a video coding standard in its early stages. As D1 reflects the standard at an embryonic and still-evolving stage, it cannot be considered to represent the prevailing view held by the experts in the field.

3.12.2 Moreover, the board is not persuaded that the person skilled in the art would have ruled out using a fixed context for the residual flag in their "try and see" approach. Knowing that a fixed context required the least memory and processing resources for arithmetic coding and that it had given good coding results for other syntax elements (see point 3.9.3 above), the person skilled in the art would have experimented on the residual flag with a fixed context, even if success was uncertain, e.g. because of an expected degree of correlation (see also point 3.11.2 above).

3.13 The appellant stated that the invention provided the surprising effect that coding efficiency was not significantly affected if a fixed predetermined context was used for the residual flag (see page 4, third

paragraph of the statement of grounds of appeal).

3.13.1 The board concurs with the examining division's view that, in the "try and see" situation, the person skilled in the art would have identified the syntax elements which provided for efficient coding when coded using a fixed context without exercising an inventive step (see points 15.3 and 16.2 of the decision under appeal).

3.13.2 Furthermore, the alleged surprising effect that the reduction in coding efficiency resulting from applying a fixed context to certain syntax elements is less than expected cannot contribute to inventive step since it would have inevitably followed from performing routine tests and would have been obtained by the person skilled in the art without any inventive effort on their part, as discussed above (see also Case Law, I.D.10.8).

3.14 It is not apparent why the appellant was of the opinion that the person skilled in the art would have had no occasion to conduct a "brute force" approach based on D1 since it did not substantiate its argument (see page 5, first full paragraph of the statement of grounds of appeal).

For the sake of completeness, the board cannot identify any reason that would have deterred the person skilled in the art from conducting the limited amount of experimentation required to arrive at the subject-matter of claim 1 (see point 3.8 above and point 15.3, penultimate paragraph of the decision under appeal).

3.15 Finally, the argument that if it had been straightforward to find the optimum solution for using a fixed context or an adaptive context for the residual flag, then the authors of D1 would have found and disclosed it is not persuasive (see page 3, fourth full paragraph of the letter of reply dated 4 September 2023).

It is not up to the board to evaluate whether the authors of D1 had been trying to solve the objective technical problem, or whether, in trying to solve it, they would have found and disclosed the claimed solution. Instead, when assessing inventive step, the board must consider whether or not the claimed solution, starting from the closest prior art and the objective technical problem, would have been obvious to the person skilled in the art.

3.16 In view of the above, the subject-matter of method claim 1 of the main request lacks inventive step over the disclosure of document D1 combined with the common general knowledge of the person skilled in the art (Article 56 EPC).

4. *Auxiliary request - admittance into the appeal proceedings*

4.1 In response to the board's comments on the validity of the priority claim raised for the first time in the communication under Article 15(1) RPBA 2020, the appellant filed an auxiliary request addressing these comments. The board accepted that this constituted "exceptional circumstances" within the meaning of Article 13(2) RPBA 2020, and admitted the auxiliary request into the proceedings.

5. *Auxiliary request - inventive step (Article 56 EPC)*

5.1 The amendments to claim 1 of the auxiliary request further define the split flag and the residual flag.

5.2 The split flag indicating whether or not the current block is partitioned into blocks with half horizontal and vertical size is disclosed in document D1 (see split_coding_unit_flag in section 7.4.5).

The residual flag indicating whether or not residual data is present for the current block is also disclosed in D1 (see no_residual_data_flag in section 7.4.8).

5.3 Therefore, the comments on inventive step regarding claim 1 of the main request also apply to claim 1 of the auxiliary request.

5.4 In view of the above, the subject-matter of claim 1 of the auxiliary request lacks inventive step over the disclosure of document D1 combined with the common general knowledge of the person skilled in the art (Article 56 EPC).

6. *Conclusion*

6.1 Since the main request and the auxiliary request are not allowable, the appeal is to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chair:

K. Boelicke B. Willems

Decision electronically authenticated