BESCHWERDEKAMMERN DES EUROPÄISCHEN PATENTAMTS

BOARDS OF APPEAL OF THE EUROPEAN PATENT OFFICE

CHAMBRES DE RECOURS DE L'OFFICE EUROPEEN DES BREVETS

Internal distribution code:
(A) [ ] Publication in OJ
(B) [ ] To Chairmen and Members
(C) [X] To Chairmen
(D) [ ] No distribution

# D E C I S I O N
## of 7 August 2003

**Case Number:** T 1050/00 - 3.5.1

**Application Number:** 94303869.5

**Publication Number:** 0627859

**IPC:** H04N 7/13

**Language of the proceedings:** EN

**Title of invention:**
Hierarchial encoding and/or decoding of digital video signals

**Applicant:**
SONY CORPORATION

**Opponent:**
-

**Headword:**
Hierarchial encoding/SONY

**Relevant legal provisions:**
EPC Art. 52(1), 56

**Keyword:**
"Inventive step (main and auxiliary request, no)"
"Inadmissible request"

**Decisions cited:**
T 0633/97

**Catchword:**
-

**Case Number:** T 1050/00 - 3.5.1

# D E C I S I O N
**of the Technical Board of Appeal 3.5.1**
**of 7 August 2003**

**Appellant:** SONY CORPORATION
7-35 Kitashinagawa 6-chome
Shinagawa-ku
Tokyo 141 (JP)

**Representative:** Pilch, Adam John Michael
D. YOUNG & CO.,
21 New Fetter Lane
London EC4A 1DA (GB)

**Decision under appeal:** **Decision of the Examining Division of the European Patent Office posted 23 May 2000 refusing European application No. 94303869.5 pursuant to Article 97(1) EPC.**

**Composition of the Board:**

**Chairman:** S. V. Steinbrener
**Members:** A. S. Clelland
M. J. Vogel

## Summary of Facts and Submissions

I. This is an appeal against the decision by the Examining Division to refuse European patent application No. 94 303 869.5 on the ground that the subject-matter of all four independent claims lacked an inventive step in view of the disclosure of the following document:

D1: Optical Engineering, vol. 28, No. 7, July 1989, Bellingham, WA, US, pages 708 to 716, L. Wang and M. Goldberg, "Reduced-difference pyramid: a data structure for progressive image transmission".

It was also held that the subject-matter of independent claim 1 was obvious having regard to the teaching of the following document:

D2: IEEE Transactions on computers, vol. C-28, No. 11, November 1979, New York, US, pages 871 to 874, K.R. Sloan Jr. and S.L. Tanimoto, "Progressive refinement of raster images".

II. The applicant (appellant) appealed, requesting that the examining division's decision be set aside and a patent granted on the basis of the documents on file (main request) or on the basis of a revised set of claims filed with the statement of grounds (auxiliary request). An auxiliary request was also made for oral proceedings.

III. In a summons to oral proceedings the Board gave its provisional opinion that the wording of independent claims 1 and 10 of both requests was ambiguous and unclear. It did not appear that the claims covered the second embodiment disclosed in the application. The

Board also expressed doubts as to whether the subject-matter of the independent claims, insofar as it could be understood, was novel and inventive having regard to the disclosures of D1 and D2.

IV. In a submission in response the appellant maintained the existing requests and filed claims of a second auxiliary request.

V. In the course of the oral proceedings, held before the Board on 7 August 2003, the appellant withdrew all previous requests and filed three sets of claims of revised main, first auxiliary and second auxiliary requests. It was requested that a patent be granted on the basis of one of these requests.

VI. The second auxiliary request was filed at the end of the oral proceedings, immediately before the Board's deliberations. The Board, after preliminary deliberation, refused to admit the request.

VII. Both admissible requests include four independent claims, directed to an apparatus for encoding; an apparatus for decoding; a method of encoding and a method of decoding. Claim 1 of the main request reads as follows:

"1. An apparatus for encoding an input digital video signal comprising a plurality of pixel data signals (a,b,c,d) to produce at least a first hierarchical data signal comprising a plurality of first hierarchy pixel data signals (a,b,c) representing a first video signal having a resolution that is equal to that of said input digital video signal and a second hierarchical data

signal comprising a number of second hierarchy pixel data signals (m1,m2,m3,m4;M1,M2,M3,M4;M) representing a second video signal having a resolution that is lower than that of said first video signal, the apparatus comprising:

means (2) for receiving said input digital video signal and for generating said second hierarchical data signal, each second hierarchy pixel data signal (m1) being an average of 'N' of said plurality of said pixel data signals (a,b,c,d); and

means (7,8) for outputting said second hierarchical data signal and for outputting said plurality of first hierarchy pixel data signals, wherein said plurality of first hierarchy pixel data signals comprises said plurality of pixel data signals in which every 'Nth' of said plurality of pixel data signals has been omitted."

VIII. Claim 1 of the first auxiliary request differs from that of the main request only in that the reference to the second hierarchy pixel data signal (m1) being an average of 'N' pixel data signals is further restricted to refer to a **weighted** average.

IX. At the oral proceedings the appellant argued essentially as follows.

The statement in claim 1 of both requests that "said plurality of first hierarchy pixel data signals comprises said plurality of pixel data signals in which every 'Nth' of said plurality of pixel data signals has been omitted" was to be interpreted as meaning that pixels were omitted from all hierarchical levels apart from the last one.

The invention concerned the transmission of several hierarchical video signals without an increase in data rate (termed "data overhead") compared to transmission of the highest resolution video signal. Both D1 and D2 concerned systems exhibiting a data overhead. Moreover the claimed subject-matter differed from the disclosure of D2 in that in the invention pixel values in an upper hierarchical level were derived using a reduction rule, involving finding the average - rather than the sum - of pixel values in a lower hierarchical level. Although D2 disclosed several reduction rules, one example being the calculation of a mean, the document provided no hint in any particular direction. A generalization to deal with any reduction rule was mentioned at page 874, left hand column, lines 12 to 14, but only in the context of pixel selection. As regards D1, this also had a data overhead, the kth hierarchical level requiring 2 more bits than the (k-1)th (page 710, right hand column, lines 14 to 16).

The term "weighted average" in claim 1 of the first auxiliary request was readily understandable to the skilled person, who would arrive at appropriate weightings, even though these were not explicitly disclosed in the application.

The second auxiliary request was directed to the second embodiment of the invention, shown in Figures 4, 5 and 6 of the application.

X. At the end of the oral proceedings the Board announced its decision.

## Reasons for the Decision

1. The appeal meets the requirements set out in Rule 65(1) EPC and is therefore admissible.

2. *The appellant's requests*

2.1 All the requests were submitted for the first time in the course of the oral proceedings.

2.2 The main and first auxiliary requests were based on the previous second auxiliary request and made only comparatively minor changes to claims 1 and 10 of that request. The Board accordingly exercised its discretion to admit these requests at the oral proceedings.

2.3 The claims of the second auxiliary request were based on the claims of the main request but contained extensive amendments. Not all the amendments were clear: for independent claim 7 the appellant merely noted next to lines 4 to 10 of the claim "amend as apparatus claim 3".

2.4 It is observed that in preparation for the oral proceedings the Board had issued a communication which at point 10 took note of the appellant's statement at page 4 of the statement of grounds of appeal that they reserved "the right to file further auxiliary requests for consideration in the event that the Board of Appeal is not prepared to allow either the Main Request or the existing Auxiliary Request". The Board drew attention to the fact that it may disregard amendments which are not submitted in good time prior to oral proceedings

and stated that amendments were to be submitted at the latest one month before the appointed date.

2.5 In view of the late presentation of the second auxiliary request and the extensive nature of the amendments, the Board was not in a position to study the request during the oral proceedings. According to the established case law of the EPO Boards of Appeal, the admission of late-filed requests is a matter of discretion by the Board (see "Case law of the Boards of Appeal of the European Patent Office, 4th edition 2001", page 547 ff). Complex fresh subject matter filed at short notice before or during oral proceedings moreover runs the risk of being not admitted to the proceedings without any consideration of its relevance or allowability (see T 633/97 - Optical members/HERAEUS, not published in OJ EPO, at point 2 of the Reasons).

2.6 The second auxiliary request is consequently rejected as inadmissible.

3. *Interpretation of Claims*

3.1 The Board notes that the feature in claims 1 and 10 of forming an average (main request) or weighted average (auxiliary request) of N pixel data signals is supported by the first embodiment, see column 6, lines 5 to 8 of the published application. However, in the second embodiment, see Figure 5 and the description at column 8, line 57 to column 9, line 49, the second hierarchical pixel data signal $\Delta m1$ is derived by subtraction of the third hierarchical pixel data signal M1. From column 9, lines 14 to 19 and 34 to 36 it can be seen that the differential data forming the second

hierarchical pixel data signal $\Delta m1$ is given by $\Delta m1 = m1 - M1$. Since $m1 = (a + b + c + d)/4$, see column 9, lines 10 to 14, and correspondingly $M1 = (m1 + m2 + m3 + m4)/4$, the data is derived not from N but from $N^2$ pixel data signals. The claims accordingly do not embrace the second embodiment shown in Figures 4, 5 and 6 of the application.

3.2 Hence in interpreting claims 1 and 10 the Board has only relied upon the first embodiment of the invention, shown in Figures 1, 2 and 3.

3.3 The Board has for the sake of argument and in accordance with the appellant's submissions interpreted the statement in claims 1 and 10 that "said plurality of first hierarchy pixel data signals comprises said plurality of pixel data signals in which every 'Nth' of said plurality of pixel data signals has been omitted" in the more restricted sense that pixels are omitted from all hierarchical levels apart from the last one. The Board's conclusions on inventive step apply equally to the broader interpretation in which only the first hierarchy pixel data signals have pixels omitted.

4. *Novelty*

4.1 It was common ground at the oral proceedings that D2 is the single most relevant prior art document. D2 discloses the transmission of a high resolution image over a low-bandwidth link. In order to alleviate delays the image is converted into a series of lower resolution approximations which converge to the final image, the lowest resolution image being transmitted first. The images thus form a hierarchical pyramid data

structure. Pixels of a higher (lower resolution) pyramidal layer are formed from the pixels of the (higher resolution) pyramidal layer below it by applying a reduction rule. D2 gives seven examples of a reduction rule, including a mean and a sum (page 871, right hand column, lines 10 to 13). In the section headed "Omit redundant pixels (sum)" (page 873), D2 explains in the context of a summing reduction rule that the pyramidal data structure contains redundancy, some of the lower layer pixels being derivable from pixels in the higher layers. In the example given a "father" pixel in a higher layer is the sum of four "son" pixels in a lower layer. Hence a receiver having already received the "father" pixel can derive the fourth "son" pixel from the "father" and the remaining 3 "sons". In other words, every $4^{th}$ pixel data signal need not be transmitted and can be omitted.

4.2 The subject-matter of claim 1 according to the main request differs from this disclosure in that each second hierarchy pixel data signal is an average of N of the plurality of pixel data signals (rather than being the sum). Similarly, the subject-matter of claim 1 according to the first auxiliary request differs from this disclosure in each second hierarchy pixel data signal being a weighted average of N of the plurality of pixel data signals.

4.3 Consequently the subject-matter of claim 1 of both requests is novel, Articles 52(1) and 54(1,2) EPC.

5. *Inventive step*

5.1 The appellant argued that compared to the invention the prior art, and particularly D2, required a higher data rate, i.e. had a higher overhead. Without data reduction an image with two hierarchies would have an overhead of 25%, with three hierarchies 31% and so on. Although D2 sought to reduce the overhead by omitting pixels, the information passed to the next hierarchical level was different to what was claimed in the invention; errors were cumulative. The sum rule used in D2 caused the number of bits per pixel to rise with hierarchical level, a data overhead of 8.3% being mentioned (page 874, left hand column, line 9). This fact would prejudice the skilled person faced with the problem of reducing data overhead against use of the D2 disclosure. The aspect of data overhead therefore distinguished the invention from the disclosure of D2.

5.2 The Board does not accept this argument, since both the invention and D2 in practice show a data overhead. D2 states in the context of omitting redundant pixels when using a summing reduction rule that "... each level of the pyramid requires a different number of bits to represent each pixel. When the reduction rule is 2x2, level k-1 requires two more bits per pixel than level k" (page 873, right hand column, lines 19 to 22). In the statement of grounds of appeal at page 3 the appellant gives an example of weighted averaging according to the invention in which the number of bits required to represent the signals grows from 8 to 10 between adjacent hierarchical layers and is consequently rounded down. Thus, in practice, the invention too shows a data overhead.

5.3 The skilled person starting from the disclosure of D2 could be expected to seek to maximise data compression. Although the main embodiment of D2 uses a sum reduction rule, one obvious manner of improving data compression would be to try one of the other six reduction rules mentioned in D2 at page 871, right hand column, line 12. The "mean" reduction rule would give the advantage that it would counter the growth in the number of pixels in each level of the pyramid, albeit with some approximation error. If the skilled person were to provide a mean reduction rule in the D2 arrangement he would arrive at the invention claimed in claims 1 and 10 of the main request.

5.4 The subject-matter of claim 1 of the main request consequently lacks an inventive step, Articles 52(1) and 56 EPC.

5.5 Turning now to the auxiliary request, it appears to the Board that the expression "weighted average" cannot bear the weight which the appellant places on it. The only support in the description is provided by column 11, lines 31 to 34, where it is stated that "a weighted average calculation or the like can be employed". The absence of any supporting detail implies that the skilled person would readily understand what is meant by a weighted average and how to implement it; this was indeed admitted by the appellant in the course of the oral proceedings. In other words, the application assumes that this is part of the common general knowledge of the skilled person. The application contains no hint as to how the weights are

chosen and hence provides no basis for a narrower interpretation of the expression.

5.6 The calculations at page 3 of the statement of grounds, see point 5.2 above, seek to show how weighting can minimise the effect of rounding errors when recovering the "Nth" pixel data signal; however, as has been pointed out by the Board at the oral proceedings, the calculation only appears to minimise errors for one specific pixel data signal, leaving open the question of how weighting can achieve an overall improvement. As noted above, the application is silent on this issue; the first embodiment can however be seen as including a specific form of weighting in accordance with claim 1 of the auxiliary request.

5.7 Since the provision of weighting per se does not give rise to the advantage claimed by the appellant and the application as a whole contains no further details of the necessary parameters, the claimed subject-matter does not in substance differ from that of the main request. Accordingly, the Board holds that the subject-matter of claim 1 of the first auxiliary request lacks an inventive step, Articles 52(1) and 56 EPC.

6. There being no further admissible requests, it follows that the appeal must be dismissed.

## Order

**For these reasons it is decided that:**

The appeal is dismissed.

The Registrar: The Chairman:


M. Kiehl S. V. Steinbrener