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Datasheet for the decision of 10 December 2024

Case Number: T 1632/22 - 3.5.06

Application Number: 17205980.0

Publication Number: 3333768

IPC: G06K9/00

Language of the proceedings: EN

Title of invention:
METHOD AND APPARATUS FOR DETECTING TARGET

Applicant:
Samsung Electronics Co., Ltd.

Headword:
Liveness detection/SAMSUNG

Relevant legal provisions:
EPC Art. 56
RPBA 2020 Art. 13, 11

Keyword:
Inventive step - over the sole prior art cited in the decision (yes)
Remittal - special reasons for remittal (yes)

Decisions cited:
T 1742/12, T 1294/16, T 0261/19, T 1737/21, T 0454/23, T 0646/22

BGH X ZR 60/19
UPC_CFI_501/2023

Catchword:
On the questions of which skilled person, which prior art and which technical problem to consider when assessing inventive step, see points 19-25 of the reasons.

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Case Number: T 1632/22 - 3.5.06

D E C I S I O N
of Technical Board of Appeal 3.5.06
of 10 December 2024

Appellant: (Applicant)	Samsung Electronics Co., Ltd. 129, Samsung-ro Yeongtong-gu Suwon-si Gyeonggi-do 16677 (KR)
Representative:	Jacobs, Bart Arnold & Siedsma Bezuidenhoutseweg 57 2594 AC The Hague (NL)
Decision under appeal:	**Decision of the Examining Division of the European Patent Office posted on 4 January 2022 refusing European patent application No. 17205980.0 pursuant to Article 97(2) EPC.**

Composition of the Board:

Chairman	M. Müller
Members:	T. Alecu
	K. Kerber-Zubrzycka

Summary of Facts and Submissions

I. The appeal is against the decision of the Examining Division. With the statement of grounds of appeal the Appellant requested that the decision of the Examining Division be set aside and that a patent be granted on the basis of the main request or of one of two auxiliary requests.

II. The main request was identical to the one underlying the decision under appeal, which was refused by the Examining Division for lack of inventive step in view of document

D1: EP 2639731 A2.

III. In a communication accompanying a summons to oral proceedings the Board informed the Appellant of its preliminary opinion that all requests lacked clarity and inventive step.

IV. With the reply to the Board's communication (letter of 11 November 2024) the Appellant filed a third auxiliary request.

V. During oral proceedings the Board decided that the requests filed with the statement of grounds of appeal lacked clarity due to the lack of definition of the feature of *determining the quality type* of an image. Subsequently the Appellant withdrew these requests.

VI. The Appellant thus requested that the decision under appeal be set aside and that a patent be granted on the

basis of a sole request, namely the third auxiliary request submitted with the letter of 11 November 2024.

VII. Claim 1 of that third auxiliary request defines:

A method of determining whether a target in a target image is a true target, thus detecting liveness of the target, the method comprising:

determining (101), from among a plurality of quality types, a quality type of the target image based on at least one quality value of the target image that is determined in correspondence with at least one quality parameter and a quality type classification standard defined for the at least one quality parameter, wherein the at least one quality parameter comprises a photographing parameter of the target image, including at least one of a resolution and an ISO, and an attribute parameter of the target image, including at least one of a color quasi, a contrast, a brightness, a saturation, and a sharpness;

selecting (102), from a database comprising a plurality of convolutional neural networks associated with the plurality of quality types, a convolutional neural network associated with the determined quality type, wherein the database is acquired by determining quality types of a plurality of sample images, and by training the convolutional neural network associated with the corresponding quality type based on sample images of the corresponding quality type;

determining (103) a detection value of the target image, comprising:

inputting the target image to the selected convolutional neural network; and,

acquiring a detection value of the target image from an output of the selected convolutional neural network, wherein the detection value

comprises a probability that the target image is classified as a true sample comprising the true target; and

determining (104) whether a target in the target image is a true target based on the detection value of the target image, wherein the determining comprises comparing the detection value and a preset threshold.

Reasons for the Decision

The application

1. The application relates to liveness detection in relation to authentication, e.g. when unlocking a phone based on a face image (page 1, lines 9 to 12). Starting from the observation that known methods, such as those based on local binary patterns, may not be effective under some conditions (e.g. low light; see the paragraph bridging pages 1 and 2), the application proposes to categorize the images as a function of their "quality" and to use different liveness detectors for each quality type (see e.g. page 2).

1.1 The liveness detectors are neural networks classifying the target images into "*true*" and "*false*" target images. In particular, they may be cascaded neural networks (see the paragraph bridging pages 2 and 3). The quality type of an image may be determined by "*photographic*" parameters, such as ISO values or resolution, and "*attribute*" parameters, e.g. contrast or brightness (see e.g. page 6, lines 18 to 20).

Prior art

2. The Examining Division denied inventive step of the main request, which the current request amends, due to lack of inventive step over D1.

3. Document D1 is concerned with face authentication. It explains that when users try to authenticate themselves in conditions different to the ones where the registration took place, the accuracy may suffer (paragraph 8). To address this problem, D1 proposes the use of different classifiers for different conditions. Conditions include face orientation, accessories worn by user (e.g. glasses), but also illumination conditions and "image quality" (paragraphs 20 and 21). A condition-deriving unit detects the current conditions (paragraph 71) and a corresponding classifier is selected for authentication. The classifiers may be, inter alia, neural networks (paragraph 79).

Third auxiliary request: admittance

4. In its preliminary opinion (point 2) the Board raised, for all requests, a new clarity objection as to the meaning and scope of the term "*quality type*".

4.1 Claim 1 of the current request is based on claim 1 of the previous main request with various minor clarifications, and with an amendment in substance to define the quality parameter used to define the quality type as follows:

"*the at least one quality parameter comprises a photographing parameter of the target image, including at least one of a resolution and an ISO, and an attribute parameter, including at least one of a color*

quasi, a contrast, a brightness, a saturation, and a sharpness".

See the letter of the Appellant of 11 November 2024 for an explanation and basis for the amendments (last paragraph on page 1, first paragraph on page 2, and the first two paragraphs relating to the third auxiliary request on pages 3 and 4).

5. The added definition is, in the Board's view, clear. Hence this amendment overcomes the clarity objection raised in the Board's preliminary opinion. The Board also sees no other issues raised by the amendments.

5.1 In view of this the Board decides to admit this request (Article 13 RPBA).

Inventive step

Differences to D1

6. The third auxiliary request differs in substance from the main request underlying the decision by the addition of the feature discussed above (at point 4.1). The Examining Division considered that claim 1 of that request differed from D1 only by its use, i.e. (face) liveness detection instead of face authentication (decision, reasons 11.1).

7. The Appellant argued that there were further differences between claim 1 of the current request and the teaching of D1.

7.1 In particular, the newly added definition was not disclosed in D1. The quality parameter claimed comprised at least two different types of values, attribute and

photographic. D1 discussed conditions related to the content of the image, for instance lighting, pose etc., which constitute "attribute" parameters in the terms of the present application, but nothing related to the photographic parameters, i.e. parameters related to the photo camera.

7.2 Furthermore, D1 did not disclose a combination of two types of parameters to define a condition used to select a classifier.

8. The Board agrees that this new feature is not disclosed in D1, because D1 does not disclose the use of photographic (i.e. camera-related) parameters, nor does it disclose a condition for classifier selection based on a combination of parameters.

8.1 The Board arrives at this conclusion also because the term "image quality", as used in D1, is too vague to imply any concrete parameters, let alone a class of parameters related to the image acquisition ("photographic").

9. The Appellant also argued that the classifiers of D1 were not classifiers in the sense of the claim (see statement of grounds of appeal, pages 1 to 3), but rather matchers or comparators: D1 did not disclose that they were "*trained to label input data as being a particular user*", but merely that they determined "*whether input features match[ed] registered features*" (middle of page 3). The Appellant made reference to paragraphs 78 and 12 of D1. To corroborate this interpretation the Appellant made further reference to the priority document of D1, arguing that the word "classifier" in D1 is the result of an incorrect translation from Japanese, because the corresponding

term in the priority document "*is more accurately translated as 'identifier' or 'discriminator'*".

10. The Board does not agree. Irrespective of whether the term "classifier" used in D1 is an accurate translation of the Japanese original or whether any of the terms "matcher", "identifier" or "discriminator" is a more appropriate one, the function of what is called a "classifier" in D1 is to produce a binary output, i.e. a label true or false, to indicate whether a particular user is authenticated or not. This makes it a classifier in the sense of the claim.

10.1 Moreover, the passage cited by the Examining Division, namely paragraph 79, clearly states that these classifiers may be neural networks, which are the claimed classifiers.

11. The Appellant further argued that, although D1 specified the selection of a classifier to be used for different conditions, this did not imply that there was a one-to-one relationship between classifiers and conditions as claimed, i.e. one classifier trained for each condition, with training data corresponding to that condition. D1 provided no information on the training of classifiers. It was possible to have multiple classifiers, trained with generic data, but which performed differently for different conditions, and to select the best classifier for the specific condition. This was in accordance with the embodiments of D1: for instance, in paragraph 49 eighteen different conditions were discussed, whereas figure 1 only showed four different classifiers.

12. The Board understands D1 as follows.

12.1 D1 presents problems within the prior art, one being that "*the generalization performance and the identification performance are trade-off [sic]*", in the sense that *the classifier is unable to identify a* user trying *"to perform authentication"* under conditions different from those prevailing at registration (paragraph 8). The solution is, according to D1, that *"the authentication apparatus has multiple classifiers specialized in particular conditions, and selects and uses the multiple classifiers in accordance with the condition*" (paragraph 9, underlining by the Board).

12.2 In the Board's view, the person skilled in the art understands this to mean that there is one specialized classifier for each *"particular condition*", and thus that the claimed *one-to-one* relationship is disclosed by D1.

12.3 It is correct that figure 1 of D1 shows only four classifiers (1a-1d) whereas paragraph 49 mentions many more conditions. However, figure 1 is clearly only schematic. D1 describes figure 1 as depicting "an essential configuration of the authentication apparatus" (see paragraph 42) and does not describe four specific conditions or why there should be four. So figure 1 does not, in the Board's judgment, contradict the one-to-one relationship between (more than 4) conditions and classifiers.

12.4 Regarding training, the Board considers that if one classifier is *specialized* for a particular condition, it is implicit, or at least very obvious, that data for that particular condition will be used to train it.

13. Therefore, the Board sees only two differences between claim 1 and D1 which might support the presence of an

inventive step, namely that the claimed method is used for liveness detection and that it considers also quality parameters other than those disclosed for the "specialized classifiers" of D1.

Obviousness

14. Concerning the first difference, the Examining Division considered that the person skilled in the art would apply the method of D1 to (face) liveness detection, (decision, reasons 11.1). It stated in particular: "*the skilled person would do the same for live[]ness detection and train different CNNs for each quality type*".

15. The Appellant argued in the statement of grounds of appeal (from the bottom of page 3) that there was no incentive in D1 for the skilled person to modify the system "*to perform liveness detection using the same specific method disclosed for authentication*".

15.1 In the Appellant's view, liveness detection and authentication were distinct tasks, so that when the skilled person were to "*[start] from D1 and [look] to implement liveness detection, the straightforward solution*" would be to combine just "*some type of liveness detection*" with the authentication disclosed in D1 "*rather than to perform both assessments using the same system*". In favour of this argument, the Appellant pointed out that the method of D1 "*has authentication-specific advantages discussed in paragraph [0008]*".

15.2 During the oral proceedings, the Appellant also stated that D1 did not qualify as the closest prior art as it

was concerned with authentication rather than with liveness detection.

The Board's view

16. In its first argument (point 15.1) the Appellant relies on what the skilled person would or would not do. The Appellant does not provide a definition of the skilled person, but appears to assume that person to be skilled in image-based authentication, and not to be interested in, or to lack the skills for developing new liveness detection methods.

17. In its second argument above (point 15.2), the Appellant appears to submit that only documents in the "field" of the invention could qualify as "closest" prior art. The skilled person is also not defined.

18. Both arguments appear to assume that for an inventive step objection to be valid only persons skilled in certain arts (specifically the art(s) addressed in the considered piece of prior art) and that only some prior art may be considered (namely ones addressing the same problem as that solved by the claimed invention). Under the Appellant's assumptions the claimed invention might indeed not be obvious.

18.1 However, the Board considers that the Appellant's assumptions are not, in general, justified under the EPC.In order to explain its view, the Board offers a few general observations in the following sections (19 to 24) before returning to the case at hand (from section 25 onwards).

Inventive step requirement under the EPC

19. Article 54 EPC states that *"An invention shall be considered to be new if it does not form part of the state of the art"*, where *"The state of the art shall be held to comprise everything made available to the public by means of a written or oral description, by use, or in any other way, before the date of filing of the European patent application."*

Article 56 EPC states that "*An invention shall 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.*"

20. The novelty requirement provides that no patent can be granted for anything that is already known. The inventive step requirement raises the bar to a patent by also excluding matter which is obvious over what is known. Moreover, to lack inventive step it is not necessary for an invention to be obvious to anyone, it is sufficient for it to be obvious to a person with a degree of skill. The Board considers Article 56 EPC to exclude from patent protection *anything* that is obvious for persons with a suitable skill, in the same way as Article 54 EPC excludes from patent protection *anything* which has already been made available to the public (before the date of filing of the application).

20.1 That which is obvious to the skilled person cannot depend on anything that the skilled person does not know yet. In particular, what is obvious at the filing date of a patent application cannot depend on the content of that patent application. Conversely, an argument that a skilled person *having regard to* some piece of prior art will find something to be obvious

cannot be rebutted on the basis of what the application says.

21. In particular, the application cannot be invoked to limit the prior art under consideration or the expertise of the skilled person (their "art") on the basis of the stated "field of the invention".

21.1 That essentially any piece of prior art can be considered in an inventive step analysis has been stated several times in the case law of the boards of appeal (see e.g. T 1742/12, reasons 6.6, T 1294/16, reasons 4 and 5, and T 261/19, reasons 2.5, and references therein), and that the contents of the patent application cannot determine the obviousness analysis has also been observed in T 454/23 (reasons 2.3), albeit in the context of what are appropriate technical problems to be considered.

21.2 The Board also considers that the definite articles in the phrase "*the* person skilled in *the* art" in Article 56 EPC (likewise in "*l'*homme *du* métier" and "*der* Fachmann") are not meant to limit the relevant "arts" but merely to express the idea, stated above, that an invention already lacks an inventive step if it is obvious to a person with skills in the art of interest, as opposed to a person with no relevant skills.

22. Any successful rebuttal of an inventive step objection must address the obviousness argument directly, without reference to the application. It may explain, in particular,

(a) why the skilled person considered would or would not have *had regard to* (e.g. read) the prior art in question or not, or

(b) what the skilled person having regard to that prior art would or would not have found obvious (e.g. what he or she would or would not have done on the basis of its teachings).

23. It is true, that for a person to find something obvious having regard to a certain piece of prior art, that person needs skills with some relation to the content of this prior art. It is also clear that for a person to find obvious the claimed invention, that person needs skills relating to it.

23.1 Accordingly, it is a matter of efficiency when assessing inventive step to consider only persons skilled in arts related to the claimed invention, and, consequently, only prior art which such a person may have regard to.

23.2 On this account, the Board considers that a person skilled in some art may well *have regard to* prior art from a field which is not, in a narrow sense, his or her "own field". It is reasonable to assume, for instance, that persons skilled in one field will typically keep themselves informed about developments in related fields, and in this sense *have regard* to prior art in related fields.

24. It remains to be answered what a skilled person, having regard to some prior art, finds obvious. The problem-solution approach as used at the EPO requires, for a finding of obviousness, a problem that the skilled person would address. A similar assumption is made in the jurisprudence of the BGH (see, e.g., BGH X ZR 60/19, page 67, point 10) but also in a decision by the UPC (see UPC_CFI_501/2023, page 68, 1.b).

24.1 In the problem-solution approach the problem is derived on the basis of the difference between the prior art and the claimed invention. In the Board's view, this is an efficient way of producing an argument as to why the claimed invention might be obvious. However, it must still be established that the so-derived problem is, in fact, one that the skilled person would have addressed based on the prior art alone. This is to avoid hindsight reasoning, but also to make sure that the problem is an appropriate one irrespective of what the application itself discloses.

25. But the Board considers that the problems derivable by comparison of the claimed invention with the prior are not the only ones that can "validly" be considered in obviousness analysis (and disagrees with the catchword of T 646/22 in this regard). In principle, all problems which the skilled person would have addressed (or been asked to address) based on the prior art alone are valid ones. This view appears to be consistent with the headnote 1 of T 1737/21 which considers that the skilled person would have addressed the problem of working out the details of the teaching of a prior art document.

25.1 Specifically, this Board considers that the skilled person might realise that a piece of prior art can help solve problems he or she must be assumed to be already aware of. In this situation, the problem addressed may not relate to a deficiency of the considered piece of prior art, but rather to the interests of the skilled person (see also T 1294/16, reasons 6).

The present case

26. In the present case, the Board assumes a person skilled in liveness detection methods. The Board considers that such a person is, generally, interested in improving, or finding alternatives to, known liveness detection methods, based on the knowledge that known methods have known pitfalls (as the current application also states; see point 1 above).

26.1 Liveness detection for authentication and authentication are closely related technical areas; the Appellant did not contest this. Therefore, a person skilled in liveness detection will naturally also have regard to prior art from the field of authentication for developments relevant to liveness detection. This includes D1.

27. This skilled person will recognize that the conditions mentioned in D1, e.g. face orientation, accessories worn by user, and in particular illumination conditions (D1, paragraphs 20 and 21) have an influence on liveness detection methods as well.

27.1 The skilled person will also recognize that the solution proposed in D1, i.e classifiers specialized for different conditions can be applied in a straightforward manner for liveness detection, simply by, as the Examining Division stated, "*do[ing] the same*" for liveness detection.

27.2 The Board notes in passing that it is a rather typical method of research to try adapting developments in neighbouring fields to the own area of interest. It is certainly common practice in image processing, in particular when the images are of the same type.

28. Thus, in the Board's judgement, the person skilled in the art in liveness detection would have regard to D1 and would have reason to adapt its solution to liveness detection in a way leading to the invention according to claim 1 of the main request before the Examining Division.

29. The current request differs from that request by defining the quality parameter as a combination of photographic and attribute parameters.

29.1 As already noted (points 7 and 8 above), although D1 discusses "attribute" parameters in the sense of the claim, it does not discuss "photographic" parameters.

29.2 On the basis of D1 alone, the person skilled in the art would therefore not define a condition ("quality parameter") in the way claimed.

30. However, the Board specifically considered a person skilled in the art of liveness detection. There may be reasons related to this specific field to also consider photographic parameters.

30.1 The Board notes that during examination a relatively large number of documents were cited, some of them concerned with liveness detection, but were not discussed in the decision. A positive decision on inventive step cannot be issued before at least these documents have been discussed.

30.2 The Board considers these circumstances to constitute "*special reasons*" in the sense of Article 11 RPBA and remits the case to the Examining Division for further prosecution.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the Examining Division for further prosecution.

The Registrar: The Chairman:

L. Stridde M. Müller

Decision electronically authenticated