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D E C I S I O N
of 2 March 2005

Case Number: T 1045/03 - 3.5.1

Application Number: 95107849.2

Publication Number: 0680004

IPC: G06K 9/00, AG1B 5/117

Language of the proceedings: EN

Title of invention:
Process for matching fingerprints

Patentee:
SAGEM SA

Opponent:
Giesecke & Devrient GmbH

Headword:
Matching fingerprints/SAGEM

Relevant legal provisions:
EPC Art. 54, 56
RPBA Art. 10b(3)

Keyword:
"Inventive step - main request (no)"
"Auxiliary request -late filed (not admissible)"

Decisions cited:
-

Catchword:
-

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Case Number: T 1045/03 - 3.5.1

D E C I S I O N
of the Technical Board of Appeal 3.5.1
of 2 March 2005

Appellant: (Opponent)
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Representative:
-

Respondent: (Proprietor of the patent)
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Decision under appeal:
Decision of the Opposition Division of the European Patent Office posted 6 August 2003 rejecting the opposition filed against European patent No. 0680004 pursuant to Article 102(2) EPC.

Composition of the Board:

Chairman: S. V. Steinbrener
Members: K. J. K. Bumes
G. E. Weiss

Summary of Facts and Submissions

I. The appeal lies from the Opposition Division's decision to reject the appellant's opposition against European patent EP-B1-0 680 004 (denoted "B1" hereinafter).

The appellant requests that the decision under appeal be set aside and the patent be revoked for obviousness in view of

E1: EP-A-0 098 152

E2: WO-A-87/07058

II. The respondent patentee's main request is for dismissal of the appeal. On an auxiliary basis, the respondent requests that the decision under appeal be set aside and the patent be maintained on the basis of an amended claim submitted at the oral proceedings before the Board.

The (only) claim as granted reads (B1, page 16):

"1. A method for the automatic identification of fingerprints in which minutiae of a search print to be identified are matched with respect to their respective coordinates of location and angle, i.e., direction, against the coordinates of the location and angle of minutiae of each of a plurality of file prints in a database of fingerprints, in order to obtain a matching score indicative of the degree of matching between said search print and one or more of said file prints, comprising the steps of

(1) separately for at least one minutia in said search print, identifying whether it is a ridge ending or a bifurcation;

(2) separately for at least one minutia in each of said file prints, identifying whether it is a ridge ending or a bifurcation; and charactesised [sic] by

(3) for each file print compared against said search print, incrementing said matching score thereby obtained by a predetermined amount whenever the respective pairs of file print and search print minutiae being compared are identified as both ridge endings or bifurcations."

The amended claim reads (with added features emphasised by the Board):

"1. A method for the automatic identification of fingerprints in which minutiae of a search print to be identified are matched with respect to their respective coordinates of location and angle, i.e., direction, against the coordinates of the location and angle of minutiae of each of a plurality of file prints in a database of fingerprints, in order to obtain a matching score indicative of the degree of matching between said search print and one or more of said file prints, comprising the steps of

(1) separately for at least one minutia in said search print, identifying whether it is a ridge ending or a bifurcation;

(2) separately for at least one minutia in each of said file prints, identifying whether it is a ridge ending or a bifurcation; and charactesised [sic] by

precomputing generalized search minutia by precomputing the new coordinates of the search minutiae for given prerotation,

for each file print compared against said search print, incrementing said matching score thereby obtained by a predetermined amount whenever the respective pairs of *the* file print and search print minutiae being compared *and* [sic] identified as both ridge endings or bifurcations, *by completing for each file fingerprint the following operations:*

(a) for each minutia f with coordinates (x_f, y_f, a_f) of the file fingerprint currently being processed, and
(b) for each generalized search minutia a with coordinates (x_s, y_s) and pre-rotation angle A_k, located in line a_f of the search buffer:

1) compute the translation (X, Y) necessary to fit (x_s, y_s) onto (x_f, y_f);
2) increment two counter means (means 131 in Fig. 23) corresponding to: (i) the pre-rotation A_k and (ii) the translation (X, Y);
3) for each of the two arrays of counter means (131), update, if necessary, the maximum value in another counter means (means 135 in Fig. 23) and its corresponding 'coordinates' (A, X, Y) for the most frequent transformation encountered; (b2) activate the 'end of run' signal."

III. During the oral proceedings before the Board, the parties presented their positions essentially as follows.

A. The appellant's position

(a) With respect to the main request, the appellant gave claim 1 a broad interpretation which when read on E1 left only the problem of how to use the type of a fingerprint minutia in order to build a match score (E1, Figure 9, step A12) expressing the likelihood of identity between a search fingerprint (to be identified) and a plurality of stored file fingerprints (of known identities). While E1 did not set out in detail how the minutia type was to be considered in the match score, the extensive reliance of E1 on minutia types (Q_i) would not make sense if the minutia type was to be ignored in the match score. It was obvious to a skilled person that a higher match score was justified by coincident types of a minutia pair than by differing types.

The appellant conceded that E2 related to fingerprint verification rather than identification but qualified E2 as relevant to claim 1 because each of the claimed features was workable in a situation where a person's finger was to be compared with up to ten fingerprints of known identity (stored on the person's ID card, for example). According to E2, the location, orientation and type of a minutia had to be taken into account when trying to establish a match. If the skilled person had any doubt about the composition of a match score according to E1, he would be taught by E2 that the minutia type had to enter into the calculation of the

match score. The size of the file print database (e.g. N >> 10) did not establish any difference in principle.

According to the wording of the claim and the description of the patent, the claim was not restricted to a specific sequence of operation of the identification process. Hence, no argument in favour of inventive step could be based on any specific sequence.

(b) With respect to the auxiliary request, the appellant considered the amended claim as late-filed and surprising because the amendment was unrelated to the preceding discussion of the main request. As the amending features had been extracted from the description (in the absence of any dependent claim), the appellant considered remittal to the Opposition Division to be appropriate if the Board contemplated admitting the amended request; the appellant would need an opportunity to perform a supplementary search.

B. The respondent's position

(a) With respect to the main request, the respondent relied on a narrow interpretation of the claim implying a specific sequence of conducting the match process: A small number of search minutiae (e.g. one or three) were to be compared to a corresponding number of minutiae of a first file print, then to minutiae of a second file print, ..., finally to minutiae of an N-th file print. In a subsequent iteration, another small number of search minutiae were to be evaluated etc. In each iteration, the match score of each file print was increased when the minutia types of a minutia pair were the same. No threshold value was involved in the middle

of that process, whereas E1 taught the use of a threshold value (Figure 9, step A13) and END marks (Figure 16(a), box B3; Figure 29, box C5) which indicated that the process according to E1 was designed to be terminated once a reliable fingerprint identity had been established. The purpose of the patent differed from the purpose of E1, and that difference translated into different concepts. The purpose of the patent was not to establish an identity (between the search print and one particular file print at a time) but to build a degree of matching between the search print and (all) the file prints in the database. That kind of sequential operation lent itself to fast processing by hardware components available at the filing date of the application underlying the patent.

The teaching of E2 would be disregarded by the skilled person because E2 dealt with comparing a known fingerprint to a very limited number of stored fingerprints.

(b) With respect to the auxiliary request, the respondent considered its late filing as justified by the preceding discussion which had revealed a need for more precision in the claim and might result in a fresh objection (lack of novelty). The amendment was meant to define the discussed subject-matter in greater detail and was supported by original disclosure (e.g. paragraphs [0061] and [0079] of B1, corresponding to page 7 [lines 7 to 13] and page 11 [lines 4 to 21] of EP-A1-0 680 004). The amendment related to a preferred embodiment which the application presented as advantageous and, thus, had to be anticipated by the appellant.

C. At the end of the oral proceedings, the chairman pronounced the Board's decision.

Reasons for the Decision

Main request

1. It is common ground that E1 represents the closest prior art as reflected by the preamble of claim 1 and acknowledged in the introductory portion of the patent (B1, [0010]).

According to E1, a search fingerprint (of unknown identity) is to be recognised from among a plurality of file fingerprints (of known identities), see e.g. E1, page 1, lines 11 to 16. A degree of match between a search fingerprint and a file fingerprint is established (page 3, lines 14/15) by comparing minutia pairs (e.g. Figure 9, steps A3, A8, A10; page 34, paragraph 2). Minutiae are details (e.g. endings, bifurcations) of a fingerprint ridge (page 10, line 26 to page 11, line 6). The difference between the abrupt endings, the bifurcations, and the like is referred to as a difference between types of minutiae or minutia types (page 11, lines 6 to 8).

In the matching process of E1, the position (or location), the direction (or angle), and a local feature (the type) of a minutia are taken into account (page 1, line 22 to page 2, line 6; page 12, paragraph 2; page 25, paragraph 2; page 34, lines 12 to 28). The minutia type of the i-th minutia Mi is termed "Q_i", with

"Q_{iS}" relating to the search fingerprint and "Q_{iF}" relating to the file fingerprint. The minutia type Q_i forms part of the data set which defines a fingerprint (e.g. Figure 10; page 17, line 26 to page 18, line 15; Figure 14, 15, 16, 18, 19, 25). The memory field for Q_{z+1} is used as an end mark to indicate the end of a list of data sets (e.g. page 18, lines 12 to 15).

The degree of matching between the search fingerprint and one of the file fingerprints is expressed by a match score (Figure 9, step A12; page 76, line 12 to page 77, line 16). If the match score obtained for the file fingerprint under consideration meets a threshold, that file fingerprint is added to a list of candidate fingerprints (page 77, lines 3 to 6). Other file fingerprints having match scores above the threshold will also be stored in the candidate list so that the file fingerprint having the highest match score can be determined in the end (page 77, lines 6 to 14).

2. While E1 implies that the minutia type is used in some way to perform the comparison between the search fingerprint and the file fingerprints, the Board concurs with the parties in considering E1 as incomplete with respect to the exact manner in which the minutia type Q_i is used in the process of building the match score.

2.1 In other words, the claimed method is regarded as novel because the claim defines specifically that the contribution of a pair of minutiae to the match score of the current file fingerprint is incremented if their types coincide (i.e. if they are both endings or bifurcations).

2.2 Conversely, the Board does not see any novelty with respect to a specific operating sequence. The claim wording does not rule out the operating sequence of E1 where the search fingerprint is compared to one file fingerprint (to build the match score thereof), then to the next file fingerprint (to build the match score thereof), etc. A different operating sequence (all match scores are built in parallel) may be covered by the claim but is not the only claim interpretation possible (and does not appear to be supported by the disclosed embodiments either).

3. The problem solved by the novel feature mentioned in point 2.1 can be formulated as *how* to introduce the minuta type - which is one of the local features to be taken into account when matching two fingerprints (E1, page 25, lines 3 to 10) - into the match score of E1.

4. One immediately obvious and logical manner of making the match score dependent on the minutia type is by completely disregarding a minutia pair if their types differ, i.e. if one of the minutiae is an ending while the other one is a bifurcation. Using such a straightforward approach, the matching score would be incremented by counting only minutia pairs of corresponding types. In the Board's view, that basic solution is covered by the wording of the claim even though the description suggests a more sophisticated scheme (with common types triggering a bonus contribution beyond a standard value, see B1, [0114]).

While other solutions may be conceivable, picking the most straightforward one does not amount to a selection invention.

5. Hence, the method of claim 1 (main request) does not involve an inventive step from the teaching of E1 in the light of common general knowledge, contrary to the requirements of Articles 52(1) and 56 EPC.

Auxiliary request

6. The amendment to claim 1 was introduced at a very late stage, namely just before the chairman wanted to repeat the requests and close the debate.

6.1 The Board has no doubt about the original basis of the amendment but does not see any convincing reason for the late submission of the auxiliary request:
- The subject-matter of the amendment (transformation of minutia coordinates) is not related to the subject-matter of the main request (scoring of minutia characteristics).
- The ground for opposition against the main request (obviousness) has not changed.
- As the amendment has been extracted from the description (in the absence of any dependent claim), the appellant cannot be fairly expected to address the auxiliary request *ad hoc* if the focus changes to a different problem; the fact that the long description qualifies a number of features as advantageous does not require the appellant to prepare to amendments unrelated to the previous main topic.

6.2 As the amendment raised issues which the Board and the other party could not reasonably be expected to deal with at the oral proceedings, the Board did not admit the auxiliary request into the proceedings (Article 10b(3) of the Rules of Procedure of the Boards of Appeal).

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The patent is revoked.

The Registrar: The Chairman:

M. Kiehl S. V. Steinbrener