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D E C I S I O N
of 17 March 2003

Case Number: T 0158/00 - 3.2.2

Application Number: 90917158.9

Publication Number: 0502027

IPC: A61B 6/12

Language of the proceedings: EN

Title of invention:
Method for assisting an investigation of a human breast for a malignancy and apparatus for practicing such method

Applicant:
STEREOMETRIX CORPORATION

Opponent:
-

Headword:
-

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

Keyword:
"Inventive step (yes, after amendments)"
"Clarity (yes)"

Decisions cited:
-

Catchword:
-

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Case Number: T 0158/00 - 3.2.2

D E C I S I O N
of the Technical Board of Appeal 3.2.2
of 17 March 2003

Appellant: STEREOMETRIX CORPORATION
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Decision under appeal: **Decision of the Examining Division of the European Patent Office posted 1 July 1999 refusing European patent application No. 90 917 158.9 pursuant to Article 97(1) EPC.**

Composition of the Board:

Chairman: W. D. Weiß
Members: S. S. Chowdhury
U. J. Tronser

Summary of Facts and Submissions

I. This appeal is against the decision of the examining division dated 1 July 1999 to refuse European patent application No. 90 917 158.9.

The grounds of refusal were that the claims on file before the date of oral proceedings before the examining division did not meet the requirements of Articles 84 and 52(1) EPC, whereas the claims filed at the oral proceedings were not admissible under Rules 71a(2) and 86(3) EPC.

The examining division argued that claim 1 of the set of claims filed at the oral proceedings was even less clear than claim 1 filed on 19 August 1996 and did not clearly meet the requirements of the EPC. Claim 1 of the set of claims hitherto on file was unclear and did not meet the requirements of Article 52(1) EPC having regard to the following documents:

D1: Proceedings of the First International Conference on Image Management and Communication, June 4-8, 1989, Washington, USA; IEEE Computer Society Press New York, USA, pages 128-135, XP201389, Kunio Doi et al.: "Utilisation of Digital Image Data for Computer-Aided Diagnosis"

D2: IEEE Transactions on Biomedical Engineering, vol. BME-26, no. 4, April 1979; W. Spiesberger: "Mammogram Inspection by Computer"

D3: Proceedings of the 5th international Conference on Pattern Recognition, December 1980, pages 624-631; S.H.Fox et al.: "A Computer Analysis of mammographic microcalcifications: global approach"

D4: Encyclopaedia of Medical Devices and Instrumentation, vol. 3, page 1842, Webster, Editor-in-Chief, 1988, John Wiley & Sons.

II. On 31 August 1999 the appellant (applicant) lodged an appeal against the decision and paid the prescribed fee on the same date. On 8 November 1999 a statement of grounds of appeal was filed.

III. The appellant requests that the decision under appeal be set aside and that a patent be granted on the basis of the following documents:

- Claim 1

  page 26 filed by telecopy dated 17 March 2003

  page 27 filed by telecopy dated 3 February 2003

- Claims 2 to 7 filed by telecopy dated 23 January 2003

- Description page 1 as originally filed

- Description page 2 filed by letter dated 15 August 1999

- Description pages 3 and 4 filed by telecopy dated 17 March 2003

- Description pages 4a, 4b, and 4c filed by telecopy dated 23 January 2003

- Description pages 5 to 25 as originally filed

- Drawing sheets 1/40 to 40/40 as originally filed.

IV. Independent claim 1 reads as follows:

1. "A method for assisting the investigation of a human breast for malignancies, comprising the steps of:

a) preselecting from possible criteria identifying malignancies a set of intuitive criteria, being criteria used by experienced radiologists or physicians;

b) converting said set of intuitive criteria to specific numerical criteria, said numerical criteria including first numerical criteria for identifying calcifications and second numerical criteria for identifying masses;

c) generating a computer representation of a mammogram defining said human breast;

d) detecting information in said computer representation defining calcifications in said breast by applying said first numerical criteria to said representation;

e) detecting information in said computer representation defining masses in said human breast by applying said second numerical criteria to said representation; and

f) generating a display of said mammogram in which the calcification and masses identified at steps (d) and

(e) are distinguished from other parts of the display of the mammogram; wherein:

a spatial domain sharpening filter is applied to said representation;

said filtered representation is partitioned into two or more segments of substantially uniform intensity;

a mean and standard deviation of said intensity are calculated in each of said segments;

a threshold is determined in each of said segments based upon said calculated mean and standard deviation;

said filtered representation is segmented by applying said threshold to create a first image; and

said second criteria are applied to said first image by:

determining an average and maximum width of said masses in said first image; comparing said mass average and maximum width to a preselected width criteria;

determining the height of said masses in said first image;

comparing said height of said masses to a preselected height criteria;

determining the area of said masses in said first image;

comparing said area of said masses to a preselected area criteria; and thereby to identify suspicious masses which fulfil said second criteria.".

Claims 2 to are dependent on claim 1.

Reasons for the Decision

1. The appeal is admissible.

2. *Amendments*

Claim 1 is based on the combination of features of original claims 1, 19, 20, 25, and 27. The dependent claims are based on original claims 8, 30, 36, and 47 to 49,, and the description has been amended for consistency with the new claims and the relevant prior art has been acknowledged. The application is formally in order with respect to Article 123(2) EPC.

3. *Clarity*

The examining division criticised the then pending claims for lack of clarity, since the expression "specific numerical criteria" is defined exclusively in terms of the result to be achieved and claim 1 gives no specific information as to which specific numerical criteria must be applied. The Board does not consider these objections to be well founded since a large variety of criteria is known in the prior art, see for example Table I of D3, and the person skilled in the art would not have any difficulty in selecting a set of criteria from these and reducing them to numerical values after consultation with the radiologist or medical practitioner.

The claim now makes it clear that different criteria are used in the determination of calcifications and masses, respectively. Moreover, the person skilled in the art knows which specific numerical criteria are appropriate to a given medical situation and no confusion arises in this respect, so the examining division's criticism of claim 1 are not justified.

4. *Novelty*

Novelty was not an issue for the present claims during the examination procedure and the Board has no reason to investigate this topic now.

5. *Inventive step*

The invention relates to a method of computer-aided diagnosis, known in the art by its acronym CAD. The method seeks to automate procedures for mass screening of women so as to obviate errors in diagnosis to which humans are prone. In the past humans examined mammograms visually and applied their experience (or "intuition") to identify masses and calcifications, and classify them either as harmless, or as suspicious and harbingers of potential malignancies. It is desirable to examine mammograms purely by machine so as to give the same results more reliably than provided by human inspection.

Claim 1 defines a series of steps for detecting calcifications and masses, and the latter, having an appreciable size, are then investigated further as to their dimensions. The claim includes steps for firstly identifying an event in a computer representation of a mammogram as a mass, and then analysing the mass to ascertain whether it should be classified as suspicious or not. This is done as follows.

The computer representation is filtered and partitioned into segments of substantially uniform intensity, the mean and standard deviation of intensity are calculated in each of said segments, and a threshold is determined in each segment based on the calculated mean and standard deviation. The thresholds are used to create an image and the second numerical criteria are applied to this image to analyse its dimensions and identify suspicious masses.

The invention imports teaching from the art of image analysis into the domain of CAD, which teaching is neither disclosed nor suggested in any of the documents cited above, or any other document cited in the Search Reports. In particular, the documents D1 to D3 discusses the analysis of calcifications only, and while D4 does mention that mass lesions may also be diagnostic signs of breast cancer no detail is given as to how this is done.

The method of claim 1 applies a teaching from an alien technical field to solve a problem in a medical field, for which there is no suggestion in the prior art, and the method involves an inventive step, accordingly.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the first instance to grant a patent on the basis of the request according to paragraph III "Summary of Facts and Submissions".

The Registrar: The Chairman:

V. Commare W. D. Weiß