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Datasheet for the decision
of 7 October 2024

Case Number: T 1733/22 - 3.5.04

Application Number: 14189106.9

Publication Number: 2840552

IPC: G06T7/00

Language of the proceedings: EN

Title of invention:
Method and system for processing multiple series of biological
images obtained from a patient

Applicant:
Olea Medical

Headword:

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

Keyword:
Main request - inventive step (no)
Auxiliary request - admittance (no)

Decisions cited:

Catchword:

Beschwerdekammern

Boards of Appeal

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Case Number: T 1733/22 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 7 October 2024

Appellant: Olea Medical
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Decision under appeal: **Decision of the Examining Division of the**
                           European Patent Office posted on 22 April 2022
                           refusing European patent application
                           No. 14189106.9 pursuant to Article 97(2) EPC.

Composition of the Board:

Chair   B. Willems
Members: B. Le Guen
                   G. Decker

Summary of Facts and Submissions

I.   The appeal is against the examining division's decision
        to refuse European patent application No. 14 189 106.9.

II.   The prior-art documents cited in the decision included
        the following:

        D1:   WO 2007/058632 A1

III.   The decision was based on the grounds that claim 1 of
        the main request then on file was not clear (Article 84
        EPC) and that the subject-matter of claim 1 of the main
        request and of the auxiliary request then on file did
        not involve an inventive step (Article 56 EPC) in view
        of the disclosure of document D1 and the common general
        knowledge of the person skilled in the art.

IV.   The applicant (appellant) filed notice of appeal. With
        the statement of grounds of appeal, the appellant
        re-filed, as a "principal request", the claims of the
        auxiliary request on which the decision under appeal
        was based. The appellant also argued why, in its view,
        the subject-matter of claim 1 of that request involved
        an inventive step.

V.   The appellant was summoned to oral proceedings. In a
        communication under Article 15(1) RPBA (OJ EPO 2024,
        A15), the board gave its preliminary opinion that the
        subject-matter of claim 1 of the "principal request"
        lacked an inventive step (Article 56 EPC).

VI.   With its reply dated 6 September 2024, the appellant
        filed amended claims of a "principal
        request" (hereinafter "main request") and a "subsidiary
        request" (hereinafter "auxiliary request") and
        submitted arguments to support its opinion that the
        subject-matter of claim 1 of both requests involved an
        inventive step.

VII.   In a communication dated 12 September 2024, the board
        indicated why the arguments provided by the appellant
        for the main request were not persuasive and why it was
        minded to exercise its discretion under Article 13(2)
        RPBA by not admitting the auxiliary request into the
        appeal proceedings.

VIII.   In a letter dated 4 October 2024, the appellant
        informed the board that it would not be represented at
        the oral proceedings, and submitted arguments why the
        subject-matter of claim 1 of the main request involved
        an inventive step and why the auxiliary request should
        be admitted into the appeal proceedings.

IX.   The oral proceedings before the board were held as
        scheduled on 7 October 2024, in the appellant's
        absence.

        The appellant's final requests were that the decision
        under appeal be set aside and that a patent be granted
        on the basis of the claims in accordance with the main
        request or, alternatively, on the basis of the claims
        in accordance with the auxiliary request, both requests
        filed with the letter dated 6 September 2024.

        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 method for identifying a region representing an area affecting by ischemic stroke, performed by a processing entity (102) of a computing apparatus (100), said apparatus comprising output means (110) communicatively coupled to said processing entity (102), said method comprising obtaining biological images in a first class obtained by diffusion-weighted magnetic resonance imaging, forming series evidencing a B1000 or Apparent Diffusion Coefficient and in a second class obtained by perfusion-weighted magnetic resonance imaging, forming series evidencing a hemodynamic parameter, obtained from a patient affected by an ischemic stroke, wherein certain biological images in any series are corresponding to certain biological images in other series, wherein corresponding images consist in an array of pixels or voxels having respective values, all corresponding images in any series having same pixel or voxel spacing, origin and orientation, characterized in that it further comprises (208):*

- *creating a segmentation mask (604, 622, 624) for a selected image (602, 612, 614) in a first series of one of the two classes, based on an input from a user (114) of said computing apparatus (100) received by input means (108) of said computing apparatus, said segmentation mask geometrically fitting over all images corresponding to the image from which the segmentation mask was created to define a set of pixels to be eliminated from said image;*
- *applying said segmentation mask (604, 622, 624) to a corresponding biological image in a second series of the other of the two classes, wherein applying a segmentation mask (604, 622, 624) to said corresponding biological image brings the*

value of pixels or voxels captured by said
segmentation mask (604, 622, 624) to a baseline
value and leaving the value of the other pixels or
voxels intact, creating a filtered image ;
- *outputting by said output means (110) said*
  filtered image."

XI. Claim 1 of the **auxiliary request** reads as follows
(features added to claim 1 of the main request are
<u>underlined</u>):

"*A method for identifying a region representing an area*
affected by ischemic stroke, [...], characterized in
that it further comprises (208):
- *creating a segmentation mask [...];*
- *applying said segmentation mask (604, 622, 624) to*
  a corresponding biological image <u>(704)</u> in a second
  series of the other of the two classes, wherein
  applying a segmentation mask (604, 622, 624) to
  said corresponding biological image <u>(704)</u> brings
  the value of pixels or voxels captured by said
  segmentation mask (604, 622, 624) to a baseline
  value and leaving the value of the other pixels or
  voxels intact, creating a filtered image <u>(706)</u>;
- *<u>calculating an optimized color scheme to adjust</u>*
  <u>the contrast and the brightness of the pixels of</u>
  <u>said filtered image (706) by constraining the</u>
  <u>value of said pixels to within m-s and m+s, m</u>
  <u>being the average pixel value and s the standard</u>
  <u>deviation of them, and applying said optimized</u>
  <u>color scheme to said filtered image, yielding a</u>
  <u>new set of pixel values to create a higher</u>
  <u>resolution filtered image (708) ;</u>
- *outputting by said output means (110) said <u>high</u>*
  <u>resolution</u> filtered image <u>(708)</u>."

XII.   The appellant's arguments may be summarised as follows.

Main request - inventive step

(a) Document D1 did not disclose the characterising
    portion of claim 1.

(b) The segmentation process disclosed in D1 consisted
    in classifying pixels or voxels of an image on the
    basis of their intensity values, and resulted in
    distinct classifications for distinct images. This
    did not result in a segmentation mask defining a
    set of pixels to be eliminated from an image, i.e.
    a binary image whose pixels determine the pixels to
    be retained or deleted from an image to which the
    mask is applied, independently of the value of the
    pixels.

(c) In the method disclosed in D1, segmentation was
    used to define one or more contour lines intended
    to be overlaid on the brain images to delineate a
    region of interest. Thus hiding or excluding pixels
    was achieved in D1 by overlaying contour lines, not
    by using any kind of mask.

(d) The invention made it possible to retain and
    display only the features of interest on an image
    by applying at least one exogenous segmentation
    mask generated from one or more third-party images.
    The technical effect of the invention was the
    possibility of extracting and improving the
    visibility of information useful for diagnosis from
    a large amount of information contained in a
    plurality of images.

(e) The objective technical problem could be formulated
    as facilitating diagnosis by healthcare
    professionals, regardless of their level of
    experience.

(f) Document D1 (paragraphs [0034], [0071] and [0098])
disclosed a method for superimposing images to
accumulate and increase information obtained by
each image. This ran counter to the effect sought
by the invention.

Auxiliary request - admittance

(g) The appeal proceedings were *ex parte*.

(h) The auxiliary request was submitted one month
before the oral proceedings to further emphasise
the inventive character of the invention.

(i) Compared with claim 1 of the main request, claim 1
of the auxiliary request merely specified an
additional, secondary, feature. This did not create
a fresh case.

Reasons for the Decision

1.   The appeal is admissible.

2.   *Background of the application*

2.1   Ischemic stroke occurs when a blood vessel in the brain
is blocked, causing cerebral nervous tissue to be
deprived of oxygen. Portions of the cerebral tissue
irreversibly damaged due to oxygen deprivation are
known as the "core ischemic zone". Portions of the
affected cerebral tissue that have not yet been
irreversibly damaged because they have been receiving
blood flow from collateral arteries are known as the
"ischemic penumbra".

2.2   Ischemic stroke is typically treated by administration
of a thrombolytic, a drug that aims to restore the
blood flow in the ischemic penumbra but can cause

hemorrhage if the ischemic penumbra is not large
enough.

2.3   The application aims at helping a clinician in
        identifying the ischemic penumbra in medical images of
        a patient affected by an ischemic stroke. Images
        obtained by different types of magnetic resonance
        imaging are used to create and apply segmentation masks
        to isolate the core ischemic zone and the ischemic
        penumbra.

3.   *Main request – inventive step*

3.1   An invention is to be considered to involve 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   Document D1 discloses a method for identifying a region
        representing an area affected by ischemic stroke (see
        paragraph [0057]), performed by a processing entity of
        a computing apparatus, said apparatus comprising output
        means communicatively coupled to said processing entity
        (see Figure 1 and paragraphs [0040] and [0041]), said
        method comprising obtaining biological images in a
        first class obtained by diffusion-weighted magnetic
        resonance imaging ("DWI"), forming series evidencing a
        B1000 or Apparent Diffusion Coefficient, and in a
        second class obtained by perfusion-weighted magnetic
        resonance imaging ("PWI"), forming series evidencing a
        hemodynamic parameter, obtained from a patient affected
        by an ischemic stroke, wherein certain biological
        images in any series are corresponding to certain
        biological images in other series (see
        paragraph [0033]: "*The superimposed image may include
        diffusion and perfusion images of the brain [...] The*

*brain maps may include one or more of diffusion maps
and perfusion maps. A diffusion map may be generated
from a diffusion image of the brain. For instance, an
apparent diffusion coefficient (ADC) map may be
generated from two diffusion images. [...] A perfusion
map may be generated from a perfusion image of the
brain. Exemplary perfusion maps include mean transit
time (MTT), cerebral blood flow (CBF), cerebral blood
volume (CBV), time to peak (TTP), and peak height
(PKHT) maps.*"; paragraph [0035]: "*the captured brain
images may include two or more of [...] diffusion
weighted imaging (DWI), perfusion weighted imaging
(PWI), [...] ADC, CBF, CBV, MTT, TTP, and PKHT maps. In
a particular embodiment, the superposition may include
a DWI image and a PWI image. [...] a DWI image or an
ADC MAP may show infarct regions in the brain, a PWI
image or maps derived from the PWI image may show
penumbra regions in the brain*"; paragraph [0052]),
wherein corresponding images consist in an array of
pixels or voxels having respective values, all
corresponding images in any series having same pixel or
voxel spacing, origin and orientation (see
paragraph [0053]: "*the images points such as pixels and
voxels of the images may be co-registered to a same
co-ordinate system*"; paragraph [0079]: "*the brain
images, with the contours for delineating the actual
infarct and penumbra regions, are co-registered to a
co-ordinate system* [such as] *a 2D or 3D Cartesian or
Talairach co-ordinate system*").

3.3   The appellant argued that document D1 did not disclose
        the characterising portion of claim 1 (see
        point XII.(a) above), i.e.:

        (a) creating a segmentation mask for a selected image
            in a first series of one of the two classes, based

on an input from a user of said computing apparatus
received by input means of said computing
apparatus, said segmentation mask geometrically
fitting over all images corresponding to the image
from which the segmentation mask was created to
define a set of pixels to be eliminated from said
image ("Feature (a)");

(b) applying said segmentation mask to a corresponding
biological image in a second series of the other of
the two classes, thus creating a filtered image,
wherein applying a segmentation mask to said
corresponding biological image brings the value of
pixels or voxels captured by said segmentation mask
to a baseline value and leaving the value of the
other pixels or voxels intact, creating a filtered
image ("Feature (b)");

(c) outputting by said output means said filtered image
("Feature (c)").

3.4   *Feature (a)*

3.4.1   Paragraphs [0058] to [0061] of document D1 disclose
segmenting an infarcted region from a DWI image and
generating one or more infarct contours on the basis of
the segmentation. Image segmentation is normally
understood as the process of assigning a label to every
pixel in an image such that pixels with the same label
share certain characteristics. Thus D1 discloses
creating a segmentation mask in which the same label is
assigned to all pixels determined to be part of the
infarct region, this label being different from the
label assigned to the remaining pixels. D1 does not
disclose that only two labels are assigned during image
segmentation (i.e. does not disclose a binary mask, as

argued by the appellant, see point XII.(b) above).
However, a binary mask is not specified in
claim 1 either.

3.4.2   Paragraph [0062] specifies that the segmentation "*may
        be improved through semi-automatic local thresholding.
        For instance, an* [sic] *region of interest may be
        selected, such as interactively, and the selected
        region, such as a local volume or a slice, may be
        segmented using thresholds determined either
        automatically or interactively for the region of
        interest.*" In view of this and point 3.4.1 above, the
        board finds that document D1 discloses a step of
        creating a segmentation mask for a selected image in a
        first series of one of the two classes (i.e. in the DWI
        image), based on an input from a user of said computing
        apparatus received by input means of said computing
        apparatus.

3.4.3   By definition, any segmentation mask (even a non-binary
        one) identifies different segments and can be used to
        identify one segment (i.e. a set of pixel positions) to
        be eliminated. Therefore the segmentation mask
        disclosed in document D1 also defines "*a set of pixels
        to be eliminated from said image*", as required by
        Feature (a).

3.4.4   The paragraph bridging pages 15 and 16 of the present
        application as filed states that "[s]*ince corresponding
        images have the same pixel spacing, origin and
        orientation, the segmentation mask geometrically 'fits'
        over all images corresponding to the image from which
        the segmentation mask was created.*" In view of this,
        the phrase "*said segmentation mask geometrically
        fitting over all images corresponding to the image from
        which the segmentation mask was created*" in Feature (a)

is not to be understood as defining an additional
technical feature but as the mere consequence of a
feature already specified in the preamble of claim 1
and disclosed in document D1, namely that the
corresponding images have the same pixel spacing,
origin and orientation (see point 3.2 above). The
segmentation mask created for the infarct regions in
the method of document D1 on the basis of the DWI image
will necessarily geometrically fit over all
co-registered images.

3.4.5   It is correct that the segmentation process disclosed
        in document D1 consists in classifying pixels of an
        image on the basis of their intensity values, and
        results in distinct classifications for distinct images
        (see appellant's argument in point XII.(b) above).
        However, claim 1 does not specify any feature that
        guarantees that the segmentation mask is the same for
        distinct DWI images. Claim 1 specifies the result of
        the segmentation process (segmentation mask) and an
        input to that process (from the user), not the
        segmentation process itself. Therefore no difference
        can be identified between the segmentation process to
        be used to create the segmentation mask specified in
        claim 1 and the segmentation process disclosed in D1.
        In any case, the threshold-based routine described in
        paragraphs [0054], [0060] and [0061] of document D1
        falls within technique a) specified on page 15 of the
        application at hand.

3.4.6   In view of the above, the board finds that document D1
        discloses Feature (a).

3.5   *Features (b) and (c)*

3.5.1   Claim 1 of document D1 specifies "*determining an
        infarct region of said brain from said first image*" and
        "*determining a penumbra region of said brain from said
        second image*". Claim 13 specifies that the infarct
        region is determined from an ADC map image obtained
        from at least two diffusion images. It is also clear
        from other passages of document D1 that the
        determination of the infarct region is exclusively part
        of a "*diffusion processing*" (see Figure 4;
        paragraph [0033]: "*Contours for delineating infarct
        regions may be determined and generated from the
        diffusion image, or optionally from a diffusion map
        such as the ADC map.*"; paragraph [0035]: "*As can be
        understood, a DWI image or an ADC MAP may show infarct
        regions in the brain [...]*"; paragraph [0049]: "*Process
        diffusion (to segment and quantify the infarct);*
        paragraph [0060]: "*CAD application 208 may have a
        routine for automatically segmenting an infracted* [sic]
        *region from the DWI image, such as by using an adaptive
        intensity threshold.*"). Claim 14, which refers back to
        "*any one of claims 1 to 13*", specifies that the second
        image comprises a perfusion image. Claim 16, which
        refers back to claim 14, specifies that an apparent
        penumbra region is determined "*from said superimposed
        perfusion image and said at least one perfusion map
        image*". Claim 17, cited by the examining division in
        point 22 of the decision under appeal, refers back to
        claim 16 and specifies that determining the penumbra
        region comprises "*excluding from said apparent penumbra
        region any overlap with said infract* [sic] *region to
        form said penumbra region*". This would have been
        understood by the skilled person as requiring that the
        whole surface of the infarct region be removed from the
        apparent penumbra region. Therefore document D1 not
        only discloses superimposing images and overlaying
        contour lines on images but also removing information

to extract a feature of interest, i.e. the penumbra region (see appellant's arguments in points XII.(c) and (f) above; see also paragraph [0078] of document D1: "*the volume of the actual penumbra may be calculated by subtracting the volume of any overlap between the actual infarct and the apparent penumbra from the volume of the apparent penumbra*").

3.5.2   Before excluding the overlap from said apparent penumbra region, the set of pixels (or voxels) of the perfusion image relating to the infarct region must necessarily be determined. Given the consistent teaching of document D1 that the infarct region is determined in diffusion images, the person skilled in the art would have understood that the pixels (or voxels) corresponding to the infarct region which are to be excluded from the perfusion images were determined in the diffusion images.

3.5.3   In view of the above, the board finds that document D1 discloses the first part of Feature (b) ("*applying said segmentation mask to a corresponding biological image in a second series of the other of the two classes*").

3.5.4   Furthermore, Figure 7 of document D1 discloses a Graphical User Interface (GUI) for "*Perfusion Processing*" showing an MTT map along with the infarct and penumbra contours (see also paragraph [0075]). The GUI allows a user to decide to show the infarct region or not (see bottom-right section of Figure 7: "*Show infract* [sic]"). The resulting output image is a filtered image.

3.5.5   As a means to hide the infarct region in the MTT map shown in Figure 7, the person skilled in the art would have thought of bringing the intensity value of the

pixels of the infarct region to the background value or their transparency to a maximum level. Since the pixels of the infarct region are identifiable in the segmentation mask calculated for generating the contour lines (see points 3.4.1 and 3.5.2 above), the skilled person would have thought of using this mask to identify the pixels of the infarct region in the MTT map. Therefore the board finds that the remaining part of Feature (b) ("*applying a segmentation mask to said corresponding biological image* [by] *bringing the value of pixels or voxels captured by said segmentation mask to a baseline value and leaving the value of the other pixels or voxels intact,* [thus] *creating a filtered image*") does not involve an inventive step.

3.6   In view of the above, the board arrives at the conclusion that the subject-matter of claim 1 of the main request does not involve an inventive step within the meaning of Article 56 EPC.

3.7   The board additionally notes that the appellant had argued in its statement of grounds of appeal that the objective technical problem could be formulated as facilitating diagnosis by healthcare professionals, regardless of their level of experience (see point XII.(e) above). However, diagnosis for curative purposes is an intellectual exercise, i.e. a task devoid of any technical character (see G 1/04, points 5.2 and 5.3 of the Reasons). Thus the problem formulated by the appellant, being non-technical, cannot be considered the objective technical problem in the so-called "problem-solution approach" developed by the boards (see Case Law of the Boards of Appeal of the European Patent Office, 10th edition, 2022, I.D.2). In the board's view, a formulation of the objective technical problem in line with the technical effects

identified by the appellant (see point XII.(d) above)
is that of showing the actual penumbra region - or,
equivalently, hiding the infarct region - in the image
of the second series evidencing a hemodynamic parameter
(the MTT map in D1). The obviousness of the last part
of Feature (b) ("*wherein applying ...*") was assessed on
that basis in point 3.5.5 above.

4.   *Auxiliary request - admittance*

4.1   The auxiliary request was filed after notification of
        the board's preliminary opinion.

4.2   According to Article 13(2) RPBA, which applies to *inter
        partes* and *ex parte* cases alike (see appellant's
        argument in point XII.(g) above), "[a]*ny amendment to a
        party's appeal case made ... after notification of a
        communication under Article 15, paragraph 1, shall, in
        principle, not be taken into account unless there are
        exceptional circumstances, which have been justified
        with cogent reasons by the party concerned.*".

        Article 13(2) RPBA imposes the most stringent
        limitations on appeal submissions which are made at an
        advanced stage of the proceedings (see document
        CA/3/19, section VI, Explanatory remarks on
        Article 13(2) RPBA, first paragraph, second sentence).

4.3   None of the arguments submitted by the appellant (see
        point XII.(g) to XII.(i) above) include reasons for not
        submitting the auxiliary request until after
        notification of the board's communication pursuant to
        Article 15(1) RPBA. The board's preliminary opinion in
        its communication pursuant to Article 15(1) RPBA cannot
        have taken the appellant by surprise, as it merely
        confirmed the examining division's view that the

claimed subject-matter lacked an inventive step
starting from D1. Thus there was no reason to submit a
request further emphasising the inventive character of
the invention only after notification of the board's
communication (see appellant's argument in
point XII.(h) above).

4.4   In view of the above, the board exercised its
       discretion under Article 13(2) RPBA by not admitting
       the auxiliary request into the appeal proceedings.

5.   *Conclusion*

       Since the main request is not allowable and the
       auxiliary request was not admitted into the appeal
       proceedings, the appeal must be dismissed.

Order

For these reasons it is decided that:

       The appeal is dismissed.

The Registrar: The Chair:

C. Spira   B. Willems

Decision electronically authenticated