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**Datasheet for the decision
of 6 May 2009**

Case Number: T 1824/07 - 3.4.01

Application Number: 02090145.0

Publication Number: 1251433

IPC: G06K 9/00

Language of the proceedings: EN

Title of invention:

A method for segmentation and identification of nonstationary time series

Applicant:

Fraunhofer-Gesellschaft zur Förderung der angewandten
Forschung e.V.

Opponent:

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Headword:

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Relevant legal provisions:

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Relevant legal provisions (EPC 1973):

EPC Art. 84

Keyword:

"Clarity (no, all requests)"

Decisions cited:

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Catchword:

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Case Number: T 1824/07 - 3.4.01

D E C I S I O N
of the Technical Board of Appeal 3.4.01
of 6 May 2009

Appellant: Fraunhofer-Gesellschaft zur Förderung der
angewandten Forschung e.V.
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted 25 May 2007
refusing European application No. 02090145.0
pursuant to Article 97(1) EPC 1973.

Composition of the Board:

Chairman: B. Schachenmann
Members: H. Wolfrum
P. Fontenay

Summary of Facts and Submissions

- I. European patent application 02 090 145.0 (publication No. 1 251 433) was refused by a decision of the examining division dispatched on 25 May 2007, on the ground of lack of inventive step (Articles 52(1) and 56 EPC 1973) of the subject-matter of a main request and a first auxiliary request then on file.
- II. The applicant lodged an appeal against the decision and paid the prescribed fee on 27 July 2007. On 2 October 2007 a statement of grounds of appeal was filed together with new sets of claims according to a main request and two auxiliary requests and an amended description.
- III. On 3 February 2009 the appellant was summoned to oral proceedings to take place on 6 May 2009.

In a communication annexed to the summons the board, in addition to summarising questions to be discussed in the context of the issue of inventive step, pointed *inter alia* to problems of clarity of the claims on file.
- IV. The appellant did not respond to the board's communication but informed the board by facsimile of 6 April 2009 that it would not attend the oral proceedings.
- V. Oral proceedings were held on 6 May 2009 in the absence of the appellant.
- VI. The appellant has requested in writing that the decision under appeal be set aside and a patent be granted on the basis of amended claims 1 and 2 according to a main

request or on the basis of claims 1 and 2 according to a first auxiliary request or of a claim 1 according to a second auxiliary request, respectively, all filed together with amended pages 1 to 15 of the description with the statement of grounds of appeal on 2 October 2007.

VII. Claims 1 and 2 of the **main request** read as follows:

"1. *Computer implemented method of analysing a sequence of measured data that are gathered by sampling measured parameter of a dynamical system that switches between multiple operating modes, the method comprising the steps of*

- generating a partial data sequence, which comprises a plurality of successive data points from the sequence of measured data and which defines a data window,*
- shifting the data window from data point to data point over the sequence of measured data, wherein one data point of the partial data sequence forming the data window at its respective position is used as a reference point characterising each individual respective position of the data window in relation to the sequence of measured data, whereby the partial data sequence forming the data window at the respective position comprises the reference point and neighbouring data,*
- determining a characteristic function for each position of the data window such that the characteristic function is characteristic for the partial data sequence forming the data window at the respective position, and assigning each characteristic function to the respective position of the data window and to the sequence of measured data by way of the respective reference point, wherein the determination of the characteristic function for each position of the data window is done through estimation of*

a probability density function forming the characteristic function for each position of the data window,

- thereby forming a sequence of characteristic functions which is related to the sequence of measured data by way of each individual reference point,

the method further comprising the steps of:

- determining the distance between each two characteristic functions from the sequence of characteristic functions, so that a matrix of distances between the characteristic functions is obtained,
- analysing the matrix of distances by applying a dynamic programming algorithm to calculate a segmentation of the sequence of characteristic functions and a prototype function for each segment, each prototype function being a characteristic function selected from the sequence of characteristic functions, the computed segmentation and prototype functions being such that they minimize the sum of distances between each prototype function and the characteristic functions within the segment represented by the prototype function plus an additional regularization term that penalizes the number of switching points in the sequence of prototype functions,
- thereby yielding a segmentation of the sequence of measured data wherein each segment corresponds to one mode of the system, said mode being characterized by the prototype function."

"2. Computer adapted to online-analyse a sequence of measured data to which new measured data may be added, the computer being adapted to perform this online-analysis while keeping the required amount of memory and CPU resources limited by a fixed upper bound when processing unlimited data streams,

the computer comprising means adapted to carry out the following steps:

- generating a partial data sequence, which comprises a plurality of successive data points from the sequence of measured data and which defines a data window,*
- shifting the data window from data point to data point over the sequence of measured data, wherein one data point of the partial data sequence forming the data window at its respective position is used as a reference point characterising each individual respective position of the data window in relation to the sequence of measured data, whereby the partial data sequence forming the data window at the respective position comprises the reference point and neighbouring data,*
- determining a characteristic function for each position of the data window such that the characteristic function is characteristic for the partial data sequence forming the data window at the respective position, and assigning each characteristic function to the respective position of the data window and to the sequence of measured data by way of the respective reference point, wherein the determination of the characteristic function for each position of the data window is done through estimation of a probability density function forming the characteristic function for each position of the data window,*
- thereby forming a sequence of characteristic functions which is related to the sequence of measured data by way of each individual reference point,*
- determining the distance between each two characteristic functions from the sequence of characteristic functions, so that a matrix of distances between the characteristic functions is obtained, and*
analysing the matrix of distances by applying a dynamic programming algorithm to calculate a segmentation of the

sequence of characteristic functions and a prototype function for each segment, each prototype function being a characteristic function selected from the sequence of characteristic functions, the computed segmentation and prototype functions being such that they minimize the sum of distances between each prototype function and the characteristic functions within the segment represented by the prototype function plus an additional regularization term that penalizes the number of switching points in the sequence of prototype functions, wherein the segmentation is updated incrementally for each subsequently measured data point by considering in the dynamic programming algorithm only those sequences of prototype functions where characteristic functions can be prototype functions of current and future segments but not of past segments, and where the prototype functions are characteristic functions in temporally ascending order,

wherein characteristic functions that will not be used anymore by the dynamic programming algorithm due to this restriction are discarded,

and wherein an upper limit for the number of candidate segmentations and characteristic functions under consideration by the dynamic programming algorithm is enforced by successively discarding the oldest candidate segmentation and characteristic function in the buffer when the upper limit is reached because no switching points are detected,

-thereby yielding an online segmentation of the sequence of measured data."

The **first auxiliary request** differs from the main request in substance in that in claim 1 the term "measured data" is replaced by the expression "EEG recordings data".

The sole claim 1 of the **second auxiliary request** is identical to claim 1 of the first auxiliary request.

Reasons for the Decision

1. In the light of the entry into force of the EPC 2000, reference is made to Article 7(1), 2nd sentence of the Revision Act of 29 November 2000 ("Act revising the Convention on the Grant of European Patents (European Patent Convention) of 5 October 1973, last revised on 17 December 1991") and the transitional provisions for the amended and new provisions of the EPC (Decision of the Administrative Council of 28 June 2001), from which it may be derived which Articles of the EPC 1973 are still applicable and which Articles of the EPC 2000 shall apply.
2. The appeal complies with the requirements of Articles 106 to 108 and Rule 64 EPC 1973 and is, therefore, admissible.
3. Notwithstanding the appellant's argumentation with respect to the technical nature of the claimed subject-matter, the board does not find fault with the examining division's assessment of lack of inventive step for the computer implemented method according to claim 1 of the main request. Nevertheless, a detailed discussion of this matter is not considered to be necessary in view of the fact that first and foremost the issue of clarity (Article 84 EPC 1973) has to be dealt with.
4. In its aforementioned communication the board had expressed its preliminary view that the claims of all the requests on file suffered in various respects from a lack

of clarity. Since the appellant neither replied to these objections nor filed any amendments to the claim definitions, the board has no reason to change its preliminary opinion.

- 4.1 The first two steps contained in all claims on file concern the definition of a "data window" and its shifting over a sequence of measured data or EEG recordings data, respectively.

However, the respective definitions are ambiguous in that a literal interpretation thereof leads to the conclusion that an ensemble of measured data / EEG recordings data as such would somehow have to be shifted over the remainder of the sequence of measured data. The purpose of such a measure and its consequences for the subsequent step of determining a "characteristic function" are incomprehensible. Besides, the nature of the "reference points" mentioned in this context and the criteria for their selection rest unclear as well.

- 4.2 Moreover the role and meaning of a "characteristic function" and a "prototype function" as well as their mutual relationship are uncertain.

In particular, as regards the crucial steps of analysing the "matrix of distances" between the characteristic functions obtained and of calculating a segmentation of the measured data or EEG recordings data, the nature of the "dynamic programming algorithm" and its manner of operating remain obscure.

In this context it is also not understandable from the claim definitions what is meant by "switching points in

the sequence of prototype functions", how their number would be determined, and how this in turn would possibly influence the calculation or selection of a respective prototype function.

- 4.3 For the above reasons none of the claims of the appellant's requests on file complies with the requirement of Article 84 EPC 1973.

Although Article 84 EPC 1973 requires the claims themselves to be clear, the board notes for the sake of completeness that an understanding of the present application as a whole is impeded by the circumstance that the description does not contain a single concrete example of a practical analysis of a set of measured data / EEG recording data with the help of which the various abstract concepts and operations of the proposed algorithms would have been illustrated.

5. In conclusion, the appellant's requests are not allowable for lack of clarity alone.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar

The Chairman

U. Bultmann

B. Schachenmann