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Datasheet for the decision
of 16 December 2021

Case Number: T 2431/18 - 3.5.07

Application Number: 14879270.8

Publication Number: 3001332

IPC: G06F17/30

Language of the proceedings: EN

Title of invention:
Target user determination method, device and network server

Applicant:
HUAWEI TECHNOLOGIES CO., LTD.

Headword:
Target user determination/HUAWEI

Relevant legal provisions:
EPC Art. 56

Keyword:
Inventive step - main request and first and second auxiliary requests (no)

Decisions cited:
G 0003/08, G 0001/19, T 0598/14, T 0697/17, T 0755/18

Case Number: **T 2431/18 - 3.5.07**

D E C I S I O N
of Technical Board of Appeal 3.5.07
of 16 December 2021

Appellant: HUAWEI TECHNOLOGIES CO., LTD.
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Decision under appeal: **Decision of the Examining Division of the
                          European Patent Office posted on 2 May 2018
                          refusing European patent application
                          No. 14879270.8 pursuant to Article 97(2) EPC**

Composition of the Board:

Chairman   J. Geschwind
Members: P. San-Bento Furtado
                  C. Barel-Faucheux

Summary of Facts and Submissions

I.   The appeal lies from the decision of the examining
        division to refuse European patent application
        No. 14879270.8, which was filed as international
        application PCT/CN2014/095612 and published under
        Article 153(4) EPC as EP 3 001 332 A1, for lack of
        inventive step in the subject-matter of claim 1 of the
        main request and first and second auxiliary requests
        over a notoriously known network server computer.

        The following documents were cited in the decision
        under appeal (in the following the board cites the
        printed version which was annexed to the board's
        communication):

        D1:   "Recommender system", Wikipedia, the free
              encyclopedia, 29 July 2014, pages 1 to 13,
              retrieved from the Internet: https://
              en.wikipedia.org/w/index.php?
              title=Recommender_system&oldid=618921071;

        D2:   "Server (computing)", Wikipedia, the free
              encyclopedia, 24 July 2014, pages 1 to 8,
              retrieved from the Internet: https://
              en.wikipedia.org/w/index.php?
              title=Server_(computing)&oldid=618342099.

II.   In the statement of grounds of appeal, the appellant
        requested that the decision under appeal be set aside
        and that a patent be granted on the basis of the main
        request or of one of the two auxiliary requests
        considered in the decision under appeal and re-
        submitted with the statement of grounds of appeal.

III.   The appellant was summoned to oral proceedings before
        the board. In a subsequent communication sent in
        advance of the oral proceedings, the board expressed
        its preliminary opinion that the subject-matter of
        claim 1 of each of the requests lacked inventive step
        over a well known recommendation system as illustrated
        by D1. The board was of the view that the underlying
        method for determining a target user for a target
        service, i.e. to whom a target service can be
        "successfully" promoted, was not technical.
        Documents D1 and D2 were annexed to the communication.

IV.   With a letter of reply the appellant presented new
        arguments in favour of patentability of the requests.

V.   After a further letter by the appellant announcing that
        it would not attend the oral proceedings, the board
        cancelled the oral proceedings.

VI.   The final requests were therefore that the decision
        under appeal be set aside and that a patent be granted
        on the basis of the main request or of one of the two
        auxiliary requests considered in the decision under
        appeal and re-submitted with the statement of grounds
        of appeal.

VII.   Claim 1 of the main request reads as follows:

        "A method for determining a target user, **characterized
        by** comprising:
           for any target service, acquiring (101), by a
        network server, user behavior data generated according
        to multiple behavior objects that belong to a same
        service type as the target service, wherein each piece
        of the user behavior data comprises a user identifier
        and a behavior object identifier;

determining (102), by the network server, according to the user identifiers and behavior object identifiers that are comprised in the acquired user behavior data, a correspondence between user identifiers of different users and behavior object identifiers of different behavior objects of the same service type, wherein the correspondence is used to represent an operating and operated relationship between a user corresponding to a user identifier and a behavior object corresponding to a behavior object identifier;

according to a behavior object comprised in the target service, assigning (103), by the network server, an initial value to each user identifier in the correspondence, and assigning an initial value to each behavior object identifier in the correspondence;

using (104), by the network server, the correspondence to construct a data model that is used for score transferring, wherein elements of the constructed data model comprise the user identifier and the behavior object identifier that are in the correspondence;

calculating (105), by the network server, based on the data model and the initial values and by using a value update rule, a value of an element comprised in the data model to obtain a value of a probability that a user corresponding to each user identifier becomes a target user corresponding to the target service, and selecting, according to the value of the probability, a target user of the target service."

VIII.   Claim 1 of the first auxiliary request differs from claim 1 of the main request in that the following text has been added at the end:

"wherein the data model is a transfer matrix, and elements comprised in the transfer matrix comprise the

user identifier and the behavior object identifier that
are in the correspondence; and

the calculating, by the network server, based on the
data model and the initial values and by using a value
update rule, an iterative operation on a value of an
element comprised in the data model to obtain, by means
of calculation, a value of a probability that a user
corresponding to each user identifier becomes a target
user corresponding to the target service comprises:

performing, by the network server, according to the
initial values and the value update rule, an iterative
operation on a value of a matrix element comprised in
the transfer matrix to obtain, by means of calculation,
a convergence value of each user identifier, and using
the convergence value as the value of the probability
that the user corresponding to each user identifier
becomes the target user corresponding to the target
service."

IX.   Claim 1 of the second auxiliary request differs from
         claim 1 of the first auxiliary request in that the
         following text has been added at the end of the claim:
         "wherein the performing by the network server,
         according to the initial values and the value update
         rule, an iterative operation on a value of a matrix
         element comprised in the transfer matrix to obtain, by
         means of calculation, a convergence value of each user
         identifier, and using the convergence value as the
         value of the probability that the user corresponding to
         each user identifier becomes the target user
         corresponding to the target service comprises:
         obtaining, by the network server, by means of
         calculation, a convergence value in the transfer matrix
         element comprised in the transfer matrix; and
         determining, by the network server, a matrix element
         corresponding to each user identifier, and using a

convergence value corresponding to a determined matrix
element as a convergence value of a user identifier
corresponding to the matrix element, wherein the
convergence value is obtained by means of calculation;
wherein

the convergence value in the transfer matrix element
comprised in the transfer matrix is obtained by means
of calculation in the following manner:

$$R(n)_m = \alpha * T * R(n)_{m-1} + \frac{1-\alpha}{2} * \frac{1}{n} + \frac{1-\alpha}{2} * R(n)_0$$; wherein

$R(n)_m$ indicates convergence values of n elements in
the transfer matrix that are obtained by means of the
M[th] iterative operation, $R(n)_{m-1}$ indicates convergence
values of n elements in the transfer matrix that are
obtained by means of the (M-1)[th] iterative operation,
α is a diminution factor, T is a transfer matrix,
$R(n)_0$ comprises an initial value of each user
identifier and an initial value of each behavior object
identifier, n is a natural number and indicates that
the transfer matrix comprises n elements, a value of n
is a sum of a quantity of user identifiers and a
quantity of behavior object identifiers, wherein the
user identifiers and the behavior object identifiers
are comprised in the acquired user behavior data, m is
a natural number and indicates a quantity of times of
performing an iterative operation, and a value of m is
determined by whether $R(n)_m$ obtained by means of
calculation is convergent."

X.   The appellant's arguments, where relevant to this
          decision, are addressed in detail below.

Reasons for the Decision

Application

1.   The application concerns the determination of a target
        user for a target service for the purposes of
        recommending a product to a user, for instance for
        determining a user who needs a smartphone designed
        exclusively for students and recommending the
        smartphone to the user (see paragraphs [0003] and
        [0007] of the amended translation of the description
        filed upon entry into the European phase). According to
        the description, the invention improves accuracy of and
        efficiency in determining a target user
        (paragraph [0041]).

1.1   The target user for a target service is determined by
        acquiring, at a network server, user historical
        behaviour data, e.g. a user purchase of product B from
        vendor A (paragraphs [0040] to [0052], Figure 1).
        Behaviour data is generated by multiple behaviour
        objects that belong to the same service type as the
        target service and is used for establishing
        correspondences between individual users and behaviour
        objects of the service type. Each established
        correspondence is modelled as an "element of the data
        model" or a "piece of user behavior data" including a
        user identifier and a behaviour object identifier
        (paragraphs [0040], [0041], [0045] and [0063] to
        [0068]).

1.2   An iterative algorithm is then used to obtain the
        probability that a user becomes the target user of the
        target service. The target user of the target service
        is selected according to the value of the probability
        (paragraphs [0041] and [0092] to [0112], Figure 1,

steps 103 to 105). The iterative algorithm may use a
"transfer matrix" to model the correspondences
(paragraphs [0102] to [0110]), and a "value update
rule" to calculate convergence values. Users
corresponding to convergence values greater than a
given threshold value may be selected as target users
(paragraphs [0112] to [0117]).

Main request

2.   *Inventive step – claim 1*

2.1   At the priority date of the present application,
        different recommendation systems were well known, as
        described in document D1. In particular, recommendation
        systems were well known which acquired user behaviour
        data in order to determine target products for a user
        (see e.g. page 1, second paragraph, to page 2, fourth
        full text paragraph, "Recommender systems have become
        extremely common [...] that are similar to the original
        seed)."). Such systems use a network server for
        acquiring and processing behaviour data.

2.2   The subject-matter of claim 1 differs from that well-
        known prior art in the particular method for
        determining a target user for a target service.

        In its reply to the board's communication, the
        appellant agreed with this result of the novelty
        assessment but contested the board's preliminary
        opinion that the distinguishing features were non-
        technical and served a purely non-technical business
        purpose of finding a user to whom a target service
        could be successfully promoted.

2.3   Business methods, mathematical methods and computer
        programs constitute as such non-technical subject-
        matter which is not patentable under Article 52(2) and
        (3) EPC. Such subject-matter is not to be taken into
        account for inventive step, unless it makes a technical
        contribution by interacting with the technical features
        of the invention to solve a technical problem, bringing
        about a technical effect (see e.g. T 697/17, Reasons
        5.2.2).

2.4   In its statement of grounds of appeal the appellant
        argued that data processing operations which provided
        the advantage of enabling data processing steps that
        could otherwise not be carried out were considered to
        be technical as for instance decided in T 598/14. In
        that decision, so the appellant, the board had
        considered that the translation, with the aim of
        enabling the linguistic analysis to be done
        automatically by a computer, could be seen as
        involving, at least implicitly, technical
        considerations. According to the appellant, the
        technical problem of the present invention was to
        analyse user needs.

        The board does not agree with the appellant's
        interpretation of decision T 598/14. The appellant is
        citing a passage of that decision out of its context
        since in the following sentences and paragraphs (see
        Reasons 2.3, last two paragraphs and Reasons 2.4) the
        competent board concluded that, however, the
        considerations enabling the linguistic analysis by a
        computer were not "further technical considerations".
        The board drew a parallel with G 3/08 (OJ EPO 2011, 10)
        which considered that "although it may be said that all
        computer programming involves technical considerations
        since it is concerned with defining a method which can

be carried out by a machine, that in itself is not enough to demonstrate that the program which results from the programming has technical character; the programmer must have had technical considerations beyond 'merely' finding a computer algorithm to carry out some procedure". The appellant has also mentioned this under point 20 of its statement of grounds of appeal.

The board further notes that analysing user needs is as such not a technical problem.

2.5   In point 15 of the statement of grounds of appeal the appellant also argued that in the method of claim 1 the target service could be a promotion of a 4G-based Internet surfing service belonging to a data service type which also included, for example, a tariff package and an Internet surfing package. Information about tariff packages and Internet surfing packages that were used by different users had to be acquired to find a user who was likely to use the 4G-based Internet surfing service. Analysing behaviour object identifiers representing user behaviour was technical because technical data was processed and correspondences were obtained from the acquired user behaviour data.

The board notes, however, that tariff packages and Internet surfing packages in the context of the present invention are non-technical business data. Claim 1 does not mention any technical specifications of such packages, or of the "target service" or the "service type", and therefore the claimed data processing does not take into account any such technical specifications. The non-technical business data is acquired automatically by technical means of the network server but that is not a distinguishing feature since it is already used in the well-known prior art as

described in document D1 (see e.g. page 1, penultimate
line, to page 2, fifth paragraph, referring to "build a
model from a user's past behavior (items previously
purchased or selected and/or numerical ratings given to
those items) as well as similar decisions made by other
users [...]", "observing what bands and individual
tracks that the user has listened to", "requires a
large amount of information on a user in order to make
accurate recommendations [...]"; it is implicit from
those passages that the behaviour information is
obtained automatically).

2.6   In its reply to the board's preliminary opinion, the
        appellant argued that the invention was used in a
        commercial context, but had technical effects on data
        transmission, data processing, and the mobile network.
        The invention's purpose of finding a user to whom a
        target service could be successfully promoted was to be
        regarded as a further technical use within the meaning
        of decision G 1/19 of the Enlarged Board of Appeal.
        Referring to point 137 of the reasons of that decision,
        the appellant argued that the subject-matter of claim 1
        also had "underlying models that form boundaries, which
        may be technical or non-technical" and that the outcome
        of the claimed method had an impact on the physical
        reality because the value of the probability was used
        to select the target user of the target service and to
        effectively improve accuracy of and efficiency in
        determining a target user. In this way, a network
        connection of electronic devices was changed. The
        method resulted in efficient computation using limited
        computing resources. As was discussed in point 126 of
        the reasons of G 1/19, a computer-implemented invention
        for use in a commercial context could be technical and
        provide a technical effect if for instance data
        processing and data transmission were affected by the

results of the calculation. Therefore, improving
accuracy of and efficiency in determining a target user
was a technical effect solving a technical problem. The
invention solved the technical problem of determining a
target user based on data and was inventive over the
prior art.

The board does not find these arguments convincing. The
purpose of selecting a target user for a target service
is to sell a product to the target user, which is a
business purpose. As pointed out in the decision under
appeal, no use of the selected target user is apparent
from the claim, let alone a technical one. The
distinguishing features do not contribute to any
technical effect which could serve as a basis for an
inventive step. The correspondence between identifiers
is part of the abstract data model, not a technical
solution to a technical problem. The alleged increased
accuracy in determining the target user merely
contributes to a different match between services and
users based on the user's behaviour, which is not a
further technical effect. Finding a user to whom a
target service can be successfully promoted is thus not
a further technical use within the meaning of G 1/19,
Reasons 124 and 137.

Contrary to the appellant's argument referring to
G 1/19, Reasons 126, the board is not convinced that
the method is (more) efficient or that the
distinguishing features are based on technical
considerations relating to the implementation of the
data processing in a computer or computer network
(G 1/19, Reasons 125 and 126). The distinguishing
features are based on non-technical business
considerations regarding how to find out which user may
be most interested on a target service based on the

user's behaviour and how to program, in terms of the abstract algorithm, the non-technical method in a computer.

2.7   Since the distinguishing features are not technical and do not contribute to a technical effect, the method of claim 1 is not inventive (Article 56 EPC).

Auxiliary requests

3.   Claim 1 of the first auxiliary request includes all the features of claim 1 of the main request and additional features essentially specifying that the data model is a transfer matrix and that the calculation of a value of an element in the data model comprises performing an iterative operation on a value of a matrix element of the transfer matrix to obtain, by means of calculation, a convergence value for each user identifier, and using the convergence value as the value of the probability that the user becomes the target user corresponding to the target service.

4.   Claim 1 of the second auxiliary request adds to claim 1 of the first auxiliary request features essentially specifying how a convergence value $R(n)_m$ in the transfer matrix element in the Mth iteration is calculated as a function of the convergence value $R(n)_{m-1}$, initial value $R(n)_0$, the transfer matrix T, a diminution factor α, and the sum n of the number of user identifiers and behaviour object identifiers by the following formula:

$$R(n)_m = \alpha * T * R(n)_{m-1} + \frac{1-\alpha}{2} * \frac{1}{n} + \frac{1-\alpha}{2} * R(n)_0$$
.

5.   *Inventive step – claim 1*

5.1   The additional features concern the algorithm used to
        calculate the convergence value and are solely based on
        non-technical considerations regarding how to determine
        how likely it is that a user is interested in a target
        service and how to implement in a computer program the
        calculations of the convergence value.

5.2   In its statement of grounds of appeal the appellant
        argued that performing, by the network server,
        according to the initial values and the value update
        rule, an iterative operation on a value of a matrix
        element comprised in the transfer matrix and obtaining,
        by means of calculation, a convergence value for each
        user identifier and using it as a probability that a
        user becomes a target user for a target service were
        technical.

        The board does not recognise that those features are
        technical. As explained above, they concern either the
        business aspects of finding a target user for the
        purposes of promoting a service or the non-technical
        programming aspects of finding the data structures and
        mathematical calculations to determine the probability
        of a user being interested in a service.

5.3   The appellant's alleged effect of increasing accuracy
        in determining a target user is not technical with
        regard to the additional features of the auxiliary
        requests either since neither the result of the
        selection of a target user nor the accuracy in that
        selection contribute to a further technical effect (see
        also decision T 755/18, Reasons 3.2).

5.4   In the board's opinion, none of the additional features
        defined in claim 1 of the auxiliary requests is
        technical, contributes to a further technical effect or
        is based on technical considerations. Therefore,
        claim 1 of the first and second auxiliary requests is
        not inventive either (Article 56 EPC).

Final remark

6.   Since none of the requests is allowable, the appeal is
        to be dismissed.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

B. Brückner   J. Geschwind

Decision electronically authenticated