

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2023/084892

International filing date (day/month/year)
19.12.2023

Priority date (day/month/year)
19.12.2022

International Patent Classification (IPC) or both national classification and IPC
INV. G06Q30/0202 G06N20/00 G06Q10/04

Applicant
GENESYS CLOUD SERVICES, INC.

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA:



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Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed.
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. ☐ This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43bis.1(a))
3. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. ☐ forming part of the international application as filed.
 - b. ☐ furnished subsequent to the international filing date for the purposes of international search (Rule 13ter.1(a)),
 - ☐ accompanied by a statement to the effect that the sequence listing does not go beyond the disclosure in the international application as filed.
4. ☐ With regard to any nucleotide and/or amino acid sequence disclosed in the international application, this opinion has been established to the extent that a meaningful opinion could be formed without a WIPO Standard ST.26 compliant sequence listing.
5. Additional comments:

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	<u>1-20</u>
	No: Claims	
Inventive step (IS)	Yes: Claims	<u>1-20</u>
	No: Claims	
Industrial applicability (IA)	Yes: Claims	<u>1-20</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item VIII

Certain observations on the international application

- 1 The application does not meet the requirements of Article 6 PCT, because independent claims 1 and 17 are not clear.
 - 1.1 Claim 1 defines *"journey data samples comprising a customer journey as represented by data describing a sequence of events"*.

This expression is vague and unclear as it does not allow the reader to unambiguously understand what *sequence of events* is referred to. It therefore leaves the reader in doubt as to the meaning of the technical features to which the *sequence of events* refers, thereby rendering the definition of the subject-matter of said claim unclear, Article 6 PCT.

This objection may be obviated by incorporating the subject-matter of claim 2 into claim 1.
 - 1.2 Claim 1 defines *"an output of the machine learning model, for each training data sample, comprises the associated journey outcome"*.

The expression *event attributes* is also vague and unclear as it leaves the reader in doubt as to the meaning of the technical feature to which the *respective event attributes* refer, thereby rendering the definition of the subject-matter of said claim unclear, Article 6 PCT.

This objection may be obviated by incorporating the subject-matter of claim 5 into claim 1.
 - 1.3 Claim 1 defines *"for each of the events, values associated with respective event attributes of a list of event attributes"*.

In this last step of claim 1, reference is made to a generic associated journey outcome, without providing any details concerning the nature of such outcome. This wording is therefore considered vague and unclear as it leaves the reader in doubt as to the meaning of the technical feature to which the *journey outcome* refers, thereby rendering the definition of the subject-matter of said claim unclear, Article 6 PCT.

This objection may be obviated by incorporating the subject-matter of claim 4 into claim 1.

- 1.4 The same objections raised above against claim 1 apply mutatis mutandis to the corresponding independent claim 17.

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Prior art

Reference is made to the following documents:

- D1 US 2020/327444 A1 (NEGI SAPNA [IE] ET AL) 15 October 2020
- D2 US 2020/273052 A1 (GANTI RAGHU KIRAN [US] ET AL) 27 August 2020
- D3 PIN-JUNG CHEN ET AL: "CASPR: Customer Activity Sequence-based Prediction and Representation", ARXIV.ORG, CORNELL UNIVERSITY LIBRARY, 201 OLIN LIBRARY CORNELL UNIVERSITY ITHACA, NY 14853, 16 November 2022, XP091371010,
- D4 US 11 068 942 B2 (CEREBRI AI INC [US]) 20 July 2021

Patentability

Document D1 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses a computer-implemented method for facilitating on-demand building of predictive models, i.e. machine learning algorithms (see para [0008]). The method of D1 comprises the step of generating, via a training data process, training data samples from respective journey data samples (see paras [0008] and [0009]), each of the journey data samples comprising a customer journey as represented by data describing: a sequence of events (see para [0043]); for each of the events, values associated with respective event attributes of a list of event attributes (see para [0073]); and a journey outcome (see para [0037]); and training a machine learning model using the generated training data samples (see para [0085]).

The subject-matter of claim 1 therefore differs from this known method in that it discloses at least the following additional features:

(df1) wherein the training data process comprises generating a vector embedding for each of the events included within a given one of the journey data samples that captures the value for each of the event attributes by dividing the event attributes of the list of event attributes into a low cardinality group and a high cardinality group, wherein the dividing is done according to whether the values included within the training data samples for a given event attribute has a cardinality above or below a predefined cardinality threshold;

(df2) for each of the low cardinality groups, categorically encoding the values included within the low cardinality group according to a total number of unique values appearing therein;

(df3) for each of the high cardinality groups: clustering the values included within the high cardinality group to create a plurality of cluster groups; and categorically encoding the values included within the high cardinality group according to the plurality of cluster groups in which the value resides.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as how to provide an improved machine learning model based on web-events.

Provided that claim 1 is amended in order to overcome the objections under Article 6 PCT raised in Section VIII above, the solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons.

It is considered that the man skilled in the art, even when faced by the above mentioned objective technical problem, would not have arrived at a method including the features present in current claim 1. The distinguishing features (df1) to (df3) are not deemed part of a common general knowledge. Moreover, there is no teaching in the remaining prior art documents D2 and D3 that would have prompted the person skilled in the art, faced with the objective technical problem, to modify or adapt the D1 while taking account of that teaching and to thereby arrive at the method of claim 1 incorporating the distinguishing features.

Claim 1 is therefore considered inventive.

The same conclusion is reached for the corresponding independent claim 17, defining the same invention of claim 1 in terms of a system.

Claims 2 to 16 and 18 to 20 are dependent on claims 1 and 17 respectively and as such also meet the requirements of the PCT with respect to novelty and inventive step.