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Application Details

APPLICATION NUMBER	202141055544
APPLICATION TYPE	ORDINARY APPLICATION
DATE OF FILING	30/11/2021
APPLICANT NAME	Institute of Aeronautical Engineering
TITLE OF INVENTION	A METHOD FOR HIERARCHICAL MACHINE LEARNING FOR AN INDUSTRIAL PLANT MACHINE LEARNING SYSTEM
FIELD OF INVENTION	COMPUTER SCIENCE
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ADDITIONAL-EMAIL (As Per Record)	
E-MAIL (UPDATED Online)	
PRIORITY DATE	
REQUEST FOR EXAMINATION DATE	--
PUBLICATION DATE (U/S 11A)	10/12/2021

Application Status

APPLICATION STATUS	Awaiting Request for Examination
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➡ Filed ➡ Published ➡ RQ Filed ➡ Under Examination ➡ Disposed

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Patent Search

Invention Title	A METHOD FOR HIERARCHICAL MACHINE LEARNING FOR AN INDUSTRIAL PLANT MACHINE LEARNING SYSTEM
Publication Number	50/2021
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Application Number	202141055544
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Priority Date	
Field Of Invention	COMPUTER SCIENCE
Classification (IPC)	G06N0020000000, G06N0007000000, G06N0003040000, G06N0003080000, G06N0005040000

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Abstract:

[035] The present invention discloses a method for hierarchical machine learning for an industrial plant machine learning system. The method and system include, but not limited to, a memory device for storing a latent variable machine learning model and a joint probability model that are previously learned from the industrial plant; an acquisition module configured to acquire an input data of an abnormality detection target in machine learning system; a data encryption unit for inferring a latent variable machine learning model from the input data based on the latent variable machine learning model stored in the memory device; a decryption unit for generating restored data from the latent variable machine learning model based on the joint probability model stored in the memory device; and a hierarchical machine learning determination unit designed to determine whether the input data is normal or abnormal for the provided set of the latent variable machine learning model, which is based on a deviation between the input data and the restored data. Accompanied Drawing [FIG. 1]

Complete Specification

Claims:1. A system for hierarchical machine learning for an industrial plant machine learning system, comprising:
a memory device for storing a latent variable machine learning model and a joint probability model that are previously learned from the industrial plant;
an acquisition module configured to acquire an input data of an abnormality detection target in machine learning system;
a data encryption unit for inferring a latent variable machine learning model from the input data based on the latent variable machine learning model stored in the memory device;
a decryption unit for generating restored data from the latent variable machine learning model based on the joint probability model stored in the memory device; and
a hierarchical machine learning determination unit designed to determine whether the input data is normal or abnormal for the provided set of the latent variable machine learning model, which is based on a deviation between the input data and the restored data.

2. The system as claimed in claim 1, wherein the determination unit is implemented through a processing unit to determine an amount of the deviation between the input data and the restored data based on probability calculated for the provided set of the latent variable machine learning model according to parameters obtained in processes at the data encryption unit and decryption unit.

3. The system as claimed in claim 1, wherein the processing unit is configured to perform the inferring and generating by the data encryption unit and decryption unit, which includes, but not limited to, a Variational Auto Encoder, Adversarial Auto Encoder, Ladder Variational Auto Encoder, and Auxiliary Deep Generative Model.

4. The system as claimed in claim 1, wherein the processing unit is further configured to a discriminator that inputs the feature quantity generated by the data encryption unit of the self-encoder and generates an estimated label. The label corresponding to the input data and the estimated label are matched through a classifier for the

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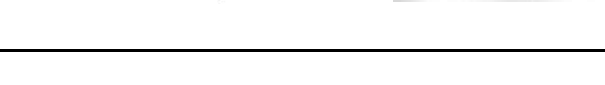




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Page last updated on: 26/06/2019

“FORM 1 THE PATENTS ACT 1970 (39 of 1970) and THE PATENTS RULES, 2003 APPLICATION FOR GRANT OF PATENT (See section 7, 54 and 135 and sub-rule (1) of rule 20)				(FOR OFFICE USE ONLY)	
				Application No.	
				Filing date:	
				Amount of Fee paid:	
				CBR No:	
				Signature:	
1. APPLICANT'S REFERENCE / IDENTIFICATION NO. (AS ALLOTTED BY OFFICE)					
2. TYPE OF APPLICATION [Please tick (✓) at the appropriate category]					
Ordinary (✓)		Convention ()		PCT-NP ()	
Divisional ()	Patent of Addition ()	Divisional ()	Patent of Addition ()	Divisional ()	Patent of Addition ()
3A. APPLICANT(S)					
Name in Full		Nationality	Country of Residence	Address of the Applicant	
Institute of Aeronautical Engineering		INDIAN	India	Dundigal, Hyderabad, Telangana, India. Pin Code:500043	
3B. CATEGORY OF APPLICANT [Please tick (✓) at the appropriate category]					
Natural Person ()		Other than Natural Person			
		Small Entity ()	Startup ()	Others (✓)	
4. INVENTOR(S) [Please tick (✓) at the appropriate category]					
Are all the inventor(s) same as the applicant(s) named above?		Yes ()		No (✓)	
If “No”, furnish the details of the inventor(s)					
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9. Mr.K.Chaitanya	INDIAN	India	Assistant Professor, Department of ECE, Institute of Aeronautical Engineering, Hyderabad, Telangana, India. Pin Code:500043
5. TITLE OF THE INVENTION			
"A METHOD FOR HIERARCHICAL MACHINE LEARNING FOR AN INDUSTRIAL PLANT MACHINE LEARNING SYSTEM"			
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8. IN CASE OF APPLICATION CLAIMING PRIORITY OF APPLICATION FILED IN CONVENTION COUNTRY, PARTICULARS OF CONVENTION APPLICATION					
Country	Application Number	Filing date	Name of the applicant	Title of the invention	IPC (as classified in the convention country)
9. IN CASE OF PCT NATIONAL PHASE APPLICATION, PARTICULARS OF INTERNATIONAL APPLICATION FILED UNDER PATENT CO-OPERATION TREATY (PCT)					
International application number			International filing date		
10. IN CASE OF DIVISIONAL APPLICATION FILED UNDER SECTION 16, PARTICULARS OF ORIGINAL (FIRST) APPLICATION					
Original (first) application No.			Date of filing of original (first) application		
11. IN CASE OF PATENT OF ADDITION FILED UNDER SECTION 54, PARTICULARS OF MAIN APPLICATION OR PATENT					
Main application/patent No.			Date of filing of main application		
12. DECLARATIONS					
(i) Declaration by the inventor(s)					
(In case the applicant is an assignee: the inventor(s) may sign herein below or the applicant may upload the assignment or enclose the assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period).					
I/We, the above named inventor(s) is/are the true & first inventor(s) for this Invention and declare that the applicant(s) herein is/are my/our assignee or legal representative.					
(a) Date 30/11/2021					
(b) Name			(c) Signature		
1.	Dr.P.Ashok Babu				
2.	Dr.B.Ravi Kumar				
3.	Mr.J.Siva Ramakrishna				
4.	Ms.G.Mary Swarna Latha				
5.	Mr.Mohammad Khadir				
6.	Mr.U.Somanaidu				
7.	Mr.G.Kiran Kumar				
8.	Mr.A.Karthik				
9.	Mr.K.Chaitanya				

(ii) Declaration by the applicant(s) in the convention country

~~(In case the applicant in India is different than the applicant in the convention country: the applicant in the convention country may sign herein below or applicant in India may upload the assignment from the applicant in the convention country or enclose the said assignment with this application for patent or send the assignment by post/electronic transmission duly authenticated within the prescribed period)~~

~~I/We, the applicant(s) in the convention country declare that the applicant(s) herein is/are my/our assignee or legal representative.~~

~~(a) Date~~

~~(b) Signature(s)~~

~~(c) Name(s) of the signatory~~

(iii) Declaration by the applicant(s)

I/We the applicant(s) hereby declare(s) that: -

- ~~I am/ We are in possession of the above-mentioned invention.~~
- ~~The provisional/complete specification relating to the invention is filed with this application.~~
- ~~The invention as disclosed in the specification uses the biological material from India and the necessary permission from the competent authority shall be submitted by me/us before the grant of patent to me/us.~~
- ~~There is no lawful ground of objection(s) to the grant of the Patent to me/us.~~
- ~~I am/we are the true & first inventor(s).~~
- ~~I am/we are the assignee or legal representative of true & first inventor(s).~~
- ~~The application or each of the applications, particulars of which are given in Paragraph-8, was the first application in convention country/countries in respect of my/our invention(s).~~
- ~~I/We claim the priority from the above mentioned application(s) filed in convention country/countries and state that no application for protection in respect of the invention had been made in a convention country before that date by me/us or by any person from which I/We derive the title.~~
- ~~My/our application in India is based on international application under Patent Cooperation Treaty (PCT) as mentioned in Paragraph-9.~~
- ~~The application is divided out of my /our application particulars of which is given in Paragraph-10 and pray that this application may be treated as deemed to have been filed on DD/MM/YYYY under section 16 of the Act.~~
- ~~The said invention is an improvement in or modification of the invention particulars of which are given in Paragraph-11.~~

13. FOLLOWING ARE THE ATTACHMENTS WITH THE APPLICATION

(a) Form 2

Item	Details	Fee	Remarks
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Complete/ Provisional specification)#	No. of pages : 17		
No. of Claim(s)	No. of claims : 09 No. of pages: 03		
Abstract	No. of pages: 01		
No. of Drawing(s)	No. of drawings: 02 No. of pages: 01		

In case of a complete specification, if the applicant desires to adopt the drawings filed with his provisional specification as the drawings or part of the drawings for the complete specification under rule 13(4), the number of such pages filed with the provisional specification are required to be mentioned here.

(b) Complete specification (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).

(c) Sequence listing in electronic form

(d) Drawings (in conformation with the international application)/as amended before the International Preliminary Examination Authority (IPEA), as applicable (2 copies).

(e) Priority document(s) or a request to retrieve the priority document(s) from DAS (Digital Access Service) if the applicant had already requested the office of first filing to make the priority document(s) available to DAS.

(f) Translation of priority document/Specification/International Search Report/International Preliminary Report on Patentability.

(g) Statement and Undertaking on Form 3

(h) Declaration of Inventorship on Form 5

(i) Power of Authority

(j) **Total fee ₹.....in Cash/ Banker's Cheque /Bank Draft bearing No.....**

Date on Bank.

I/We hereby declare that to the best of my/our knowledge, information and belief the fact and matters slated herein are correct and I/We request that a patent may be granted to me/us for the said invention.

Dated this 30th day of November, 2021

Signature: 

Name: Institute of Aeronautical Engineering

To,
The Controller of Patents
The Patent Office, at Chennai

Note: -

- * Repeat boxes in case of more than one entry.
- * To be signed by the applicant(s) or by authorized registered patent agent otherwise where mentioned.
- * Tick (/) /cross (x) whichever is applicable/not applicable in declaration in paragraph-12.
- * Name of the inventor and applicant should be given in full, family name in the beginning.
- * Strike out the portion which is/are not applicable.
- * For fee: See First Schedule”;

