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(57) Abstract :
[036] An innovative method for enhancing the accuracy and robustness of machine learning models by employing a combination of adaptive preprocessing, hierarchical feature selection, dynamic model architecture modification, and a continuous feedback mechanism. This approach ensures optimal model performance by dynamically adapting to data intricacies, iteratively refining model parameters, and perpetually learning from its own predictions. Accompanied Drawing [FIGS. 1-2]

No. of Pages : 19 No. of Claims : 10

<table>
<tr><td colspan="4">“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)</td><td colspan="2">(FOR OFFICE USE ONLY)</td></tr>
<tr><td colspan="4"></td><td>Application No.</td><td></td></tr>
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<tr><td colspan="4"></td><td>Signature:</td><td></td></tr>
<tr><td colspan="4">1. APPLICANT’S REFERENCE / IDENTIFICATION NO. (AS ALLOTTED BY OFFICE)</td><td colspan="2"></td></tr>
<tr><td colspan="6">2. TYPE OF APPLICATION [Please tick (✓) at the appropriate category]</td></tr>
<tr><td colspan="2">Ordinary (✓)</td><td colspan="2">Convention ( )</td><td colspan="2">PCT-NP ( )</td></tr>
<tr><td>Divisional ( )</td><td>Patent of Addition ( )</td><td>Divisional ( )</td><td>Patent of Addition ( )</td><td>Divisional ( )</td><td>Patent of Addition ( )</td></tr>
<tr><td colspan="6">3A. APPLICANT(S)</td></tr>
<tr><td colspan="2">Name in Full</td><td>Nationality</td><td>Country of Residence</td><td colspan="2">Address of the Applicant</td></tr>
<tr><td colspan="2">Andhra University</td><td>Indian</td><td>India</td><td colspan="2">Visakhapatnam, Andhra Pradesh, India. Pin Code: 530003</td></tr>
<tr><td colspan="6">3B. CATEGORY OF APPLICANT [Please tick (✓) at the appropriate category]</td></tr>
<tr><td colspan="2" rowspan="2">Natural Person ()</td><td colspan="4">Other than Natural Person</td></tr>
<tr><td colspan="2">Small Entity (✓)</td><td>Startup ()</td><td>Others ()</td></tr>
<tr><td colspan="6">4. INVENTOR(S) [Please tick (✓) at the appropriate category]</td></tr>
<tr><td colspan="2">Are all the inventor(s) same as the applicant(s) named above?</td><td colspan="2">Yes ()</td><td colspan="2">No (✓)</td></tr>
<tr><td colspan="6">If “No”, furnish the details of the inventor(s)</td></tr>
<tr><td colspan="2">Name in Full</td><td>Nationality</td><td>Country of Residence</td><td colspan="2">Address of the Inventor</td></tr>
<tr><td colspan="2">1. Prof. James Stephen Meka</td><td>Indian</td><td>India</td><td colspan="2">Dr. B. R. Ambedkar Chair Professor, Dean, A.U. TDR-HUB, Andhra University, Visakhapatnam, Andhra Pradesh, India. Pin Code: 530003</td></tr>
</table>

2. Mrs.Malla Sirisha	Indian	India	Research Scholar, Department of IT & CA, Andhra University, Visakhapatnam, Andhra Pradesh, India. Pin Code: 530003
3. Mr.I.Ravi Kumar	Indian	India	Research Scholar, Department of CS & SE, Andhra University, Visakhapatnam, Andhra Pradesh, India. Pin Code: 530003
4. Mr.K. Joseph Noel	Indian	India	Associate Professor, Department of Mechanical Engineering, Wellfare Institute of Science, Technology & Management (WISTM), Pinagadi, Pendurthy, Visakhapatnam, Andhra Pradesh, India. Pin Code: 531173
5. Prof.Augustine Tarala	Indian	India	Professor, Department of Mathematics, Wellfare Institute of Science, Technology & Management (WISTM), Pinagadi, Pendurthy, Visakhapatnam, Andhra Pradesh, India. Pin Code: 531173

5. TITLE OF THE INVENTION

"A NOVEL METHOD FOR IMPROVING THE ACCURACY OF MACHINE LEARNING MODELS"

6. AUTHORISED REGISTERED PATENT AGENT(S)	IN/PA No.	
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	Mobile No.	
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~~**8. IN CASE OF APPLICATION CLAIMING PRIORITY OF APPLICATION FILED IN CONVENTION**~~

~~**COUNTRY, PARTICULARS OF CONVENTION APPLICATION**~~

~~Country~~	~~Application~~	~~Filing date~~	~~Name of the~~	~~Title of the~~	~~IPC (as classified in the~~

	~~Number~~		~~applicant~~	~~invention~~	~~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~~

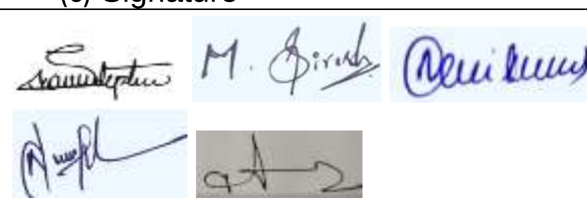
12. DECLARATIONS

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 24/08/2023

(b) Name	(c) Signature
1. Prof. James Stephen Meka 2. Mrs.Malla Sirisha 3. Mr.I.Ravi Kumar 4. Mr.K. Joseph Noel 5. Prof.Augustine Tarala	

~~(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
Complete/ ~~Provisional~~ specification) #	No. of pages: 15		
No. of Claim(s)	No. of claims: 10 No. of pages: 02		
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 24th day of August 2023

Applicant: Andhra University

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”;

FORM 2

THE PATENTS ACT, 1970

(39 of 1970)

&

The Patent Rules, 2003

COMPLETE SPECIFICATION

(See section 10 and rule 13)

TITLE OF THE INVENTION

"A NOVEL METHOD FOR IMPROVING THE ACCURACY OF MACHINE LEARNING MODELS"

Applicant

NAME	**NATIONALITY**	**ADDRESS**
Andhra University	Indian	Visakhapatnam, Andhra Pradesh, India. Pin Code: 530003

The following specification particularly describes the nature of the invention and the manner in which it is performed:

FIELD OF THE INVENTION

[001] The proposed invention presents a novel method designed to enhance the accuracy of machine learning models. The method encompasses a multi-pronged approach that focuses on data preprocessing, feature selection, model modification, and post-processing techniques.

BACKGROUND OF THE INVENTION

[002] The following description provides the information that may be useful in understanding the present invention. It is not an admission that any of the information provided herein is prior art or relevant to the presently claimed invention, or that any publication specifically or implicitly referenced is prior art.

[003] Further, the approaches described in this section are approaches that could be pursued, but not necessarily approaches that have been previously conceived or pursued. Therefore, unless otherwise indicated, it should not be assumed that any of the approaches described in this section qualify as prior art merely by virtue of their inclusion in this section.

[004] Machine learning models have become an integral part of various sectors, revolutionizing the way we approach complex problems and make decisions. From the financial world's algorithms that optimize trading strategies, to the medical field's diagnostic tools that detect diseases at early stages, the applications seem endless. Yet, for all their promise and potential, these models are far from perfect.

[005] Achieving consistently high accuracy across diverse datasets and scenarios is a challenge. Many models, while performing admirably on training data, falter when presented with unseen or novel data, rendering them less effective in real-world applications. This decline in performance can often be attributed to various factors, such as noisy data, irrelevant features, or model architectures that either oversimplify or overcomplicate the underlying patterns in the data. Traditional techniques have tried to address these issues using regularization, ensemble methods, feature engineering, and more.

[006] Still, there remains a noticeable gap between the desired outcomes and what our current methodologies can achieve. Thus, there's a burgeoning demand for innovative techniques that not only bolster the accuracy of machine learning models but also ensure they are robust and generalizable.

[007] This quest for betterment has paved the way for the proposed invention, which introduces a unique method to enhance accuracy and offers a fresh perspective on the challenges faced by conventional machine learning models. Building on the aforementioned challenges, the crux of the matter lies in the interplay between data quality, model architecture, and the interpretability of results. Often, traditional machine learning models tend to overly rely on the data they are trained on, leading them to become too specialized or too generalized. For instance, an algorithm might excel when processing a dataset from one particular region or timeframe but may fail to deliver similar results when exposed to data from a different context.

[008] Another common stumbling block is the manner in which data is preprocessed and fed into models. Many algorithms rely heavily on the input data's format and structure, which, if not carefully curated, can introduce biases or skew the results. For example, an image recognition model trained primarily on daylight images might struggle to identify objects in low-light conditions. Similarly, a financial model developed using data from bullish market years might misinterpret signals during a bearish phase.

[009] Furthermore, feature selection and model complexity often turn into a balancing act. While including numerous features might provide a holistic view of the data, it also introduces the risk of overfitting, where the model becomes too tailored to the training data and fails to generalize well. Conversely, overly simplified models might miss out on crucial nuances, leading to underfitting.

[010] The proposed invention aims to tackle these challenges head-on. Instead of relying on static methodologies, it adopts a more dynamic and adaptive approach. By continually assessing and adjusting to the data's inherent complexities, the method ensures that the model remains relevant and accurate. It eliminates the one-size-fits-all mindset, advocating for a system that evolves based on the data it encounters.

[011] Moreover, the invention places a significant emphasis on understanding and reducing the noise in datasets. Recognizing that real-world data is often messy and inconsistent, the method introduces advanced noise reduction techniques to cleanse the data before it's used for training, ensuring that models are built on solid foundations.

[012] Patent Name: Dynamic Data Resampling for Enhanced Model Training

Date of Publication: Jan 3, 2019

Summary:

The patent describes a method wherein data is dynamically resampled during the training process. The system identifies regions in the data where the model's predictions are suboptimal and then oversamples or undersamples data points from these regions to improve model accuracy.

Relevance to Proposed Invention:

This patent deals with dynamic sampling, which is also a component of the proposed invention. However, the proposed method further includes hierarchical feature selection and model modification, which aren't covered in this patent.

[013] Patent Name: Hierarchical Feature Selection for Machine Learning

Date of Publication: April 2, 2018

Summary:

The invention offers a process where features are grouped into meta-categories. The importance of each meta-category is assessed first, followed by the evaluation of individual features within each significant meta-category.

Relevance to Proposed Invention:

The hierarchical feature selection approach aligns with the proposed method's feature selection strategy. However, the proposed invention integrates this feature selection into a broader system that also includes dynamic data preprocessing and feedback loops.

[014] Patent Name: Adaptive Machine Learning Model Architectures

Date of Publication: Sep 18, 2018

Summary:

This patent presents a machine learning model that adapts its architecture based on the complexity of the incoming data. The system can add or remove layers or nodes based on predefined conditions.

Relevance to Proposed Invention:

The dynamic model architecture described in this patent is similar to the model modification part of the proposed method. However, the proposed invention integrates this adaptability within a larger framework that also emphasizes data preprocessing and post-processing.

[015] Patent title:Feedback-driven Iterative Training for Machine Learning Models

Date of Publication: March 26, 2019

Summary:

The invention details a method wherein after initial model predictions, regions of low model confidence are identified. The system then gathers more data or gives higher weights to these regions during retraining, aiming for improved model accuracy in subsequent iterations.

Relevance to Proposed Invention:

This patent's feedback-driven approach is similar to the post-processing feedback loop in the proposed method. However, the broader context of the proposed invention, with integrated dynamic preprocessing, feature selection, and model modification, provides a more comprehensive solution.

SUMMARY OF THE PRESENT INVENTION

[016] The proposed invention introduces a multifaceted approach to improve the accuracy of machine learning models by dynamically adapting to the complexities and nuances inherent in the data. It kicks off with an adaptive data preprocessing stage that not only handles dynamic resampling based on regions of low model confidence but also effectively reduces noise through advanced clustering and anomaly detection techniques. Building on this strong foundation, the method proceeds to a nuanced hierarchical feature selection process, analyzing groups of related features—termed as meta-features—before diving into individual feature evaluation. This layered approach ensures that only the most impactful features contribute to the model, thus reducing the risks associated with overfitting and underfitting.

[017] Taking adaptation, a step further, the invention employs a dynamic machine learning architecture that adds or removes layers based on data complexity, ensuring optimal model complexity at all times. To tackle the challenge of misclassifications in traditionally difficult-to-model regions of the data space, a weighted loss function is incorporated to skew the model's attention toward these regions. Finally, the entire process is made iterative through a feedback loop. After initial predictions, the system identifies areas where the model's confidence is suboptimal and dynamically adjusts the various elements—from data sampling to feature selection to model architecture—before going through another round of training.

[018] In this respect, before explaining at least one object of the invention in detail, it is to be understood that the invention is not limited in its application to the details of set of rules and to the arrangements of the various models set forth in the following description or illustrated in the drawings. The invention is capable of other objects and of being practiced and carried out in various ways, according to the need of that industry. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

[019] These together with other objects of the invention, along with the various features of novelty which characterize the invention, are pointed out with particularity in the disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be made to the accompanying drawings and descriptive matter in which there are illustrated preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[020] When considering the following thorough explanation of the present invention, it will be easier to understand it and other objects than those mentioned above will become evident. Such description refers to the illustrations in the annex, wherein:

[021] FIG. 1, illustrates a general functional working diagram, in accordance with an embodiment of the present invention.

[022] FIG. 2, illustrates a concept of the functional flow diagram, accordance with an embodiment of the present invention.in accordance with an embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[023] The following sections of this article will provide various embodiments of the current invention with references to the accompanying drawings, whereby the reference numbers utilised in the picture correspond to like elements throughout the description. However, this invention is not limited to the embodiment described here and may be embodied in several other ways. Instead, the embodiment is included to ensure that this disclosure is extensive and complete and that individuals of ordinary skill in the art are properly informed of the extent of the invention.

[024] Numerical values and ranges are given for many parts of the implementations discussed in the following thorough discussion. These numbers and ranges are merely to be used as examples and are not meant to restrict the claims' applicability. A variety of materials are also recognised as fitting for certain aspects of the implementations. These materials should only be used as examples and are not meant to restrict the application of the innovation.

[025] Referring now to the drawings, these are illustrated in FIG. **1**&**2,** The invention is set against the backdrop of the burgeoning field of machine learning, where models, while powerful, are often beset with challenges of accuracy, overfitting, and adaptability to diverse data. With the aim of improving accuracy and performance, the invention presents an innovative, holistic approach to model training and optimization, designed to be dynamic and reactive to the data's intrinsic complexities.

[026] At the heart of this invention is its ability to preprocess data in an adaptive manner. Recognizing that conventional static preprocessing can be limiting, the invention employs dynamic resampling techniques that focus on regions of the data where the model might falter. By analyzing these regions and resampling more data points from them, the model is given a better chance to understand and predict intricate patterns. Concurrently, the system incorporates sophisticated noise reduction strategies. Instead of merely eliminating outliers, it delves deeper, employing clustering methods to discern anomalies that might have previously escaped detection, ensuring that the model is trained on clean, high-quality data.

[027] Beyond preprocessing, the invention treads into the complex realm of feature selection, but with a fresh perspective. Instead of Analyzing individual features in isolation, it groups them into meta-features, allowing for an examination of the collective impact of related features. This hierarchical approach ensures a more granular understanding of feature importance, thus eliminating irrelevant features and retaining those pivotal to prediction accuracy.

[028] One of the standout components of this invention is its ability to modify the model's architecture based on data complexity. Gone are the days of rigid model architectures; this system can add or remove layers as needed, ensuring the model is just right—not too simple to miss out on nuances, nor too complex to overfit the training data. Accompanying this is the introduction of a weighted loss function. This function assigns greater weights to regions of the data where the model has historically struggled, pushing the model to allocate more attention and resources to challenging segments.

[029] Closing the loop, the invention introduces a feedback mechanism, a sort of continual learning where the model's performance is constantly monitored. Upon detecting areas of low confidence, the system retrains, refines, and adapts, ensuring that the model not only starts strong but keeps improving with each iteration.

[030] Embracing the ever-evolving landscape of data, the invention serves as a bridge between the potential of machine learning and the myriad intricacies that real-world data presents. Recognizing that static methodologies can only go so far, the invention moves beyond traditional boundaries, creating a fluid and ever-evolving learning paradigm.

[031] Its strength lies not just in its individual components but in the harmony with which they operate together. The adaptive preprocessing ensures that models aren't tripped up at the outset, addressing issues of noisy or imbalanced data that have historically plagued machine learning outcomes. By making data resampling reactive to the model's areas of weakness, the system inherently amplifies its strength, targeting those areas that need the most attention.

[032] The hierarchical feature selection, meanwhile, represents a step forward in our understanding of data. By assessing features at multiple levels, the invention avoids the pitfalls of tunnel vision, ensuring that models see both the forest and the trees. This holistic view of data, both at the macro and micro levels, ensures a depth of understanding that's crucial for nuanced decision-making.

[033] But perhaps the most groundbreaking facet of this invention is its embrace of dynamic model architectures. In a realm where data varies in complexity and scope, a one-size-fits-all approach is not just suboptimal, but often detrimental. By allowing the model to self-adjust, to expand or contract based on the data's demands, the invention ensures that models remain agile, responsive, and, most importantly, effective.

[034] And yet, even with these advanced mechanisms, the invention recognizes that no model is infallible. It acknowledges that learning is a continual journey, and this is where the feedback mechanism comes into play. By continuously monitoring, learning from its errors, and iterating, the model is set on a path of perpetual growth. It's not just about reaching a high accuracy; it's about maintaining and enhancing that accuracy over time.

[035] In conclusion, this invention isn't just a step forward; it's a leap. By intertwining advanced techniques with the core philosophy of adaptability and continuous learning, it pushes the boundaries of what machine learning models can achieve. As we look towards a future where machine learning is increasingly intertwined with myriad sectors and industries, the importance of such dynamic, self-evolving systems becomes paramount. This invention, with its blend of innovation and adaptability, stands as a beacon for the next era of machine learning excellence.

We Claim:

1. A method for adaptive data preprocessing in machine learning, wherein the preprocessing mechanism dynamically resamples regions of the data based on identified weaknesses in model predictions.
2. The method of claim 1, further including advanced noise reduction techniques that utilize clustering methods to identify and eliminate anomalies within the data set, ensuring high-quality input data for model training.
3. A feature selection process in machine learning wherein features are categorized into meta-features, enabling an evaluation of grouped related features prior to individual feature assessment.
4. The method of claim 3, wherein the hierarchical feature selection process aids in the removal of irrelevant features and prioritizes features that have significant predictive power, thereby enhancing model accuracy.
5. A machine learning system capable of dynamically modifying its model architecture based on the inherent complexity of incoming data, wherein the system can add or remove layers to ensure the appropriate balance between model simplicity and complexity.
6. The system of claim 5, wherein the dynamic model architecture operates in tandem with a weighted loss function, designed to assign higher weights to historically challenging regions of the data, thereby skewing the model's focus towards these segments.
7. A feedback-driven machine learning mechanism that continuously monitors the model's prediction confidence, identifying areas of suboptimal performance and triggering subsequent rounds of retraining and refinement.

8. The method of claim 7, wherein the feedback mechanism operates in conjunction with the adaptive preprocessing, hierarchical feature selection, and dynamic model architecture, ensuring comprehensive refinement across all components of the model.

9. A machine learning approach that integrates the components of adaptive preprocessing, hierarchical feature selection, dynamic model architecture modification, and feedback-driven iterative training, providing a unified framework for enhanced model accuracy and adaptability.

10. The method of claim 9, wherein the integrated approach ensures models not only achieve high initial accuracy but also possess the capability to maintain and enhance this accuracy over prolonged periods, adapting to novel and evolving data scenarios.

Dated this 24th day of August 2023

Applicant

Andhra University

ABSTRACT

A NOVEL METHOD FOR IMPROVING THE ACCURACY OF MACHINE LEARNING MODELS

[036] An innovative method for enhancing the accuracy and robustness of machine learning models by employing a combination of adaptive preprocessing, hierarchical feature selection, dynamic model architecture modification, and a continuous feedback mechanism. This approach ensures optimal model performance by dynamically adapting to data intricacies, iteratively refining model parameters, and perpetually learning from its own predictions.

Accompanied Drawing **[FIGS. 1-2]**

Dated this 24th day of August 2023

Applicant

Andhra University

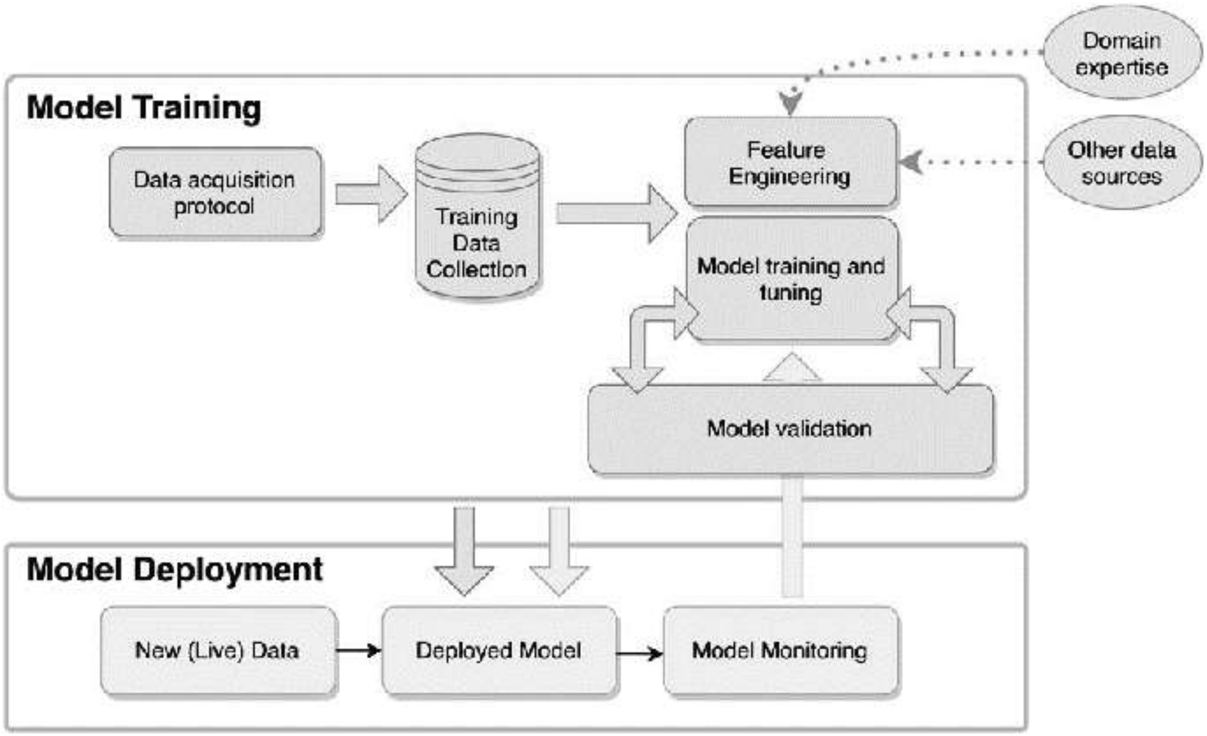


Figure 1

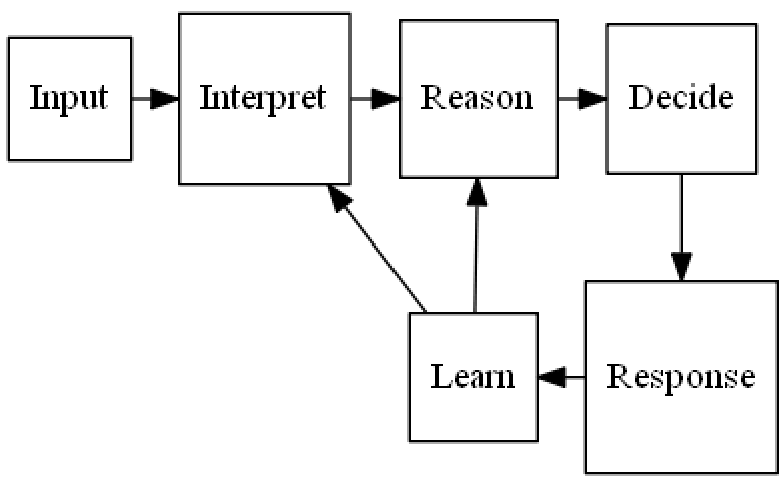


Figure 2

Dated this 24th day of August 2023