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A SMART AND OPTIMIZED ANALYSIS USING FODPSO AND PSO-CNN TECHNIQUES FOR MITIGATING DATA THEFT AND RISK OF DOWNTIME IN CLOUD

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Abstract-For several services via the Internet, cloud computing offers a flexible and cost-effective solution. The newest computing prototypes for pooled computing resources, such asstorage, bandwidth, processing power, servers, applications, &services, are considered a significant IT change. We propose two approaches in this paper, The first research approach presents a secure data center dependent on a FODPSO algorithm. The suggested FODPSO method has multiple PSOs for particle swarm optimization, in which each particle strives for an optimal solution for its own "survival," with the inherent advantage of having memory of previous choices. The first disadvantage that the conventional PSO has pointed out is this new architecture: a premature swarm convergence. The FODPSO discards swarms that converge prematurely towards a solution that may or may not be best, as does conventional Darwinian (DPSO). In the second proposed approach, the present study thus uses a Convolutional Neural Network (CNN), which converges quicker, to look for the optimal CSN design, to recognize the human activity. The use of PSO for training aims at optimizing the findings of solution vectors on CNN, which in turn increases the precision of classification to ensure that quality performance compared with state-of-the-art designs is achieved. The second research approaches examine PSO-CNN algorithms and compare the performances of conventional machine-dependent algorithms and deep learning methods. While the findings for CNN in HAR are positive, many factors are required to identify the optimum CNN design. Any neural network focuses mostly on minimizing errors between goals and anticipated outputs. Cross-entropy in the event of CNN is performed via back-propagation and gradient descent. There are numerous factors to set even a basic CNN. So, algorithms that discover and assess the CNN architecture in less time are important to find.

Keywords—Cloud Computing, FODPSO, PSO-CNN.

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I. INTRODUCTION

In the world of today, innovation is evolving fast and provides clients with different services, such as e-charging, e-mailing, messages, e-transactions, etc., that are paper-free and online. All these affordable administrations need an online exchange of information. This information, which may be private or delicate data such as information for business secrecy, Master Card details, management of an expansion into an account, etc., may be unsafe as a revelation of this information may be necessary to any unapproved customer. Capacity and cloud access are the biggest advances in computer science, but there are many. Many creators reveal that the benefits of cloud computing (CC) are somewhat different from their disadvantages. This however found that information security is becoming a huge issue as a partnership is building, even though we need to find a way to do everything you need with certain management.

The most recent innovations in the cloud computing industry have been taken into accounts, such as hardware virtualization and distributed computations. The cloud model has six key characteristics, 3 service models &4 cloud-based models. Various models like SaaS, PaaS & IaaS can be found in the Cloud. It is available in several models, including public, private, and hybrid clouds.

Virtualization technology spans the IT architecture of cloud computing and virtualizes the entire system. This includes servers, storage, networks, applications, etc. It has unified management and control over all resources to enhance the efficiency & flexibility of the system as a whole. Virtualization is also an essential technology for solving and making resource planning flexible, a problem of unified device management. The Cloud storage model can be built into a storage layer of all storage units with the same storage structure and provides single, transparent, and well-encapsulated limits for the user of

the Storage Area. [2]. CC simply means that data & programs are stored & accessed over the Internet instead ofthe hardware of your computer. It provides environment development, resources management capability, cloud application software. It offers customers the money you need. Users can access the cloud services through an internet connection. Many companies offer cloud services [3].

The Internet's endless popularity made computer resources more omnipresent in recent years. And it enabled modern cloud perception to be developed. Two different techniques are involved for CC from traditional service providers. There are numerous providers of infrastructure and services. Infrastructure providers manage cloud platforms and resources are utilized. End-user resource rental infrastructure providers. In today's information technology business, cloud computing has proven a significant factor for huge companies, like Google, Microsoft, and Amazon. Market owners have a variety of attractive features [4]. Cloud Computing (CC) offers a framework for resource sharing about the development of increasing frameworks, middleware, application, & business applications. Cloud computer operating models grasp free infrastructure services that Provide utility to other network providers, additional device services to subscription infrastructure, and sellers free services, however, distribute shoppers' sales proceeds [5].In terms of increasing systems, middleware & application development platforms & business applications, CC offers an environment for the sharing of resources. The business models of the CC are based on free infrastructure services with platform value-added services, application subscription facilities, and seller-free services. [6].

Recently, data centers were given considerable attention as hosting broad-scale service Applications as a cost-efficient data storage infrastructure. Regular uses of large data centers, web exploration, and large scope computing are big companies like Google, Amazon, Yahoo & Facebook. Datacenter service hosting has developed as a multi-billion-dollar company in the future IT industries with the development of cloud computing. Data centers have become economic storage and the infrastructure for large network application hosting. However, traditional architectures of data centers are not suitable for future multi-tenant data center environments. To meet tenant requirements to reduce infrastructure costs, Virtualisation Technology is promising to design scalable and easily deployable data centers, enhances management flexibility, and reduces energy consumption. The industries are seeking scalable IT solutions, such as in-house or third-person hosted data centers, with the advancement of virtualization technologies and the benefits of economies of scale. The availability of data centers, often through the cloud, is omnipresent. However, the in-production performance of data centers and in particular the interaction of the demand for working load and the availability of resources are unknown. A DC (Data Center) is an interface comprising of storage devices, network devices, and servers (physical machines) (e.g. switches, routers, and cables). The key infrastructure to support the ever-growing cloud-based services is large data centers. The scalability and reliability of such services in data centers will therefore be a key contact. To respond rapidly to changing requests & service needs, the data center network (DCN) in particular should be agile and reconfigurable. Important research has been performed on the development of DCN topologies to acquire improved data center arrangements [7]. The data center consists of servers, storage, networks, power systems, refrigeration systems, etc. Data centers, including online companies, smart grids, and scientific computing, are dedicated to large-scale services. The DCN network consists of a data center & provides the network topology, routing devices, & protocols description data center connections DCN[8,9].

1.1 Data Security Challenges

Since we move into the cloud model, data security and privacy must be highly emphasized. Data leakage or data loss may have an essential effect on an organization's corporation, brand, & trust. In the picture. 2. Prevention of data leaks with 88% vital & very major tasks is considered as a most significant aspect. Likewise, the segregation & security of data has a safety impact of 92%.

a) Security

Data could be misused if many organizations share resources. To evade risk, data repositories and data involving storage, transit, or processing need to be secure. The most significant challenges in cloud computing are data protection. Moreover, authentication, authorization & access management for data saved in the cloud is important for enhancing security in cloud computing. Data security's three key areas are confidentiality, Integrity, and Availability.

b) Locality

Data is distributed across the region numbers and the data is difficult to locate in cloud computing. When data are transferred to various geographical locations, rules governing such data can also be changed. Thus, compliance with cloud computing and privacy laws is a problem. It should be known to customers where they are and informed by the service provider.

c) Integrity

The system needs to be protected to enable the data to be modified only by the authorized person. To prevent lost data, data integrity needs to be correctly maintained in a cloud-based environment. Generally, ACID properties should be used to preserve the data truthfulness of all cloud transactions. Many transaction management problems are encountered in most

Web services as they use HTTP services. HTTP doesn't support or warrant transaction delivery. API itself can be used for transaction management.

d) Access

The right to data entry refers primarily to data security policies. Organization employees are provided with access to the data section depends upon their company safety policies. Other staff working in a similar organization cannot access the same information. Different encryption methods and key management mechanisms ensure that only legitimate users share the data. Only by various key distribution mechanisms is the key given to approved parties. If data from unauthorized users are to be protected, data security protocols should be enforced strictly. Since the Internet is available to all cloud users, privileged access is needed. Data encryption & security measures can be used by users to avoid risk security.

e) Confidentiality

Cloud users store data and content like data, videos, etc. with remote servers and can be store by single or multimedia cloud providers. Data confidentiality is one of the key necessities when stored in a remote server. Users should know that data is saved in the cloud and that data understanding and classification can be kept confidential.

f) Breaches Data

An additional key protection concern that needs designate focused on the cloud is violations. Since big data is kept in the cloud by different users, malicious users are likely to enter the cloud to cause a high-value attack in the whole of the cloud environment. Various accidental difficulties or an insider attack may cause an inappropriate violation.

g) Segregation

One of the main aspects of CC is multi-tenancy. Data can be intruded on by multi-tenancy since different users can save data on cloud servers. Through injecting or using a client code, data may be intruded. Data from the other customer data must therefore be stored unconnected. Vulnerabilities in data separation can be detected or detected by testing such as inoculation, data validation, and uncertain storage.

h) Storage

Virtual machine storage data has many problems One such problem is data storage reliability. In a physical infrastructure that could cause a security risk, virtual machines must be stored.

i) Data Center

Surgery For disaster and data transmission bottlenecks, cloud-based organizations must safeguard their data without loss. Data storage and admittance are problematic if data is not properly managed. Data defeat in case of adversity is caused by cloud providers [10].

1.2 Motivation of Research

As cloud computing emerges and as a result of technical and commercial changes, organizations have reevaluated their data center strategies. There is no magic formula that makes it obvious that data centers are being modernized, redeveloped, or outsourced. The reasons for taking these choices vary from operational issues in older data centers to the promise to decrease expenses and provide more flexibility and cost elasticity for cloud computing. Data storage has decoupled from servers in recent years via centralization of storage and servers utilizing a storage area network (SAN). The SAN is a dedicated server-data-storage network. The data storage systems have huge numbers of hard drives and are fitted with specific technologies to safeguard data from data loss and accelerate recovery efficiently. When data storage systems are linked through SAN at different data center locations, disk writes may be duplicated on many locations in real-time. The centralization of storage systems has significantly enhanced the use of these systems' capacity. Asmany organizations and even governments are migrating to cloud environment can throw some light on the critical issues of the cloud system. The costliest parts of the IT infrastructure are SANs and central storage equipment. A data center plan should thus assess investments in data storage technologies and the related qualitative and quantitative benefits.

Nonetheless, consolidation & migration of DCs come with high costs & risks. Newer technologies are changing the functions of Data Centers and their operations. Proper research is necessary for maintaining the data centers since lots of money has been invested in these centers. From these points, we have been motivated to do this research to addresses the critical solutions for the challenges currently faced by the data center risk in cloud systems. Hence performing this research will improve the efficiency of the data centers and enhance security.

The paper is scheduled accordingly. In Section 2; the related work exists. Section 3 provides an overview of the approach proposed describing the scene radiation methodology. Section 4 experiment outcome of proposed SSDCNW method. Section 5 makes some conclusions and Section 6 outlines the work we will do in the future.

II. LITERATURE SURVEY

The contribution of various research papers is explored in this section that exhilarated our understanding of the problem definition and helpful in determining the challenges, gaps, and issues available in the field of scene classification in indoor and outdoor images. Cloud computing is becoming

increasingly significant in the internet age as a result of an increasing no. of mobile apps. It is an absolute answer for these phone apps. Cloud computing ushers in the latest age in computer skills Currently, various internet services are available through several clouds, including elastic compute cloud, amazon web services, and Google cloud (dope box). CC is a type of internet-based computing that represents the next step in the internet's evolution. Although it has gained a lot of attention in recent years, protection problems are one of the biggest roadblocks to cloud computing development. It simply moves customer data & application software to big data centers (cloud) that are situated remotely, where the customer has no control & data management may not be safe.

W. Li et al. (2021) DCNs have gained lots of interest from industry and academia in current years to overcome these difficulties, & many innovative mechanisms at various layers are suggested to increase the transmission efficiency of DCNs. In meantime, numerous surveys have appeared to represent contemporary DCN research. Past DCN surveys, on the other hand, have mostly focused on a single network layer, making it impossible for readers to learn about important studies on a holistic level. They use a multi-layered top-down taxonomy to categorize literature & offer various possible aspects for future research in data center networks to assist readers in rapidly understand the present research efforts in this area [11].

F. Wang et al. (2021) This study gives an overview of large data cloud computing ideas, features, and advanced technologies.Data isolation, data access, data destruction,data integrity, data transfer, & data exchange are all covered in terms of protection problem data security & privacy control. Finally, a virtualization structure & associated tactics are provided to combat risks & improve data security in a large data cloud environment [12].

V. Sharma and R. Mishra (2020) In this day & age, as storage & computing solutions migrate from workstations to a cloud, DCNs are reaching new heights for large data transactions between combined servers. Because of the exponent rise in cloud services, modern DCNs face several issues, including scalability, energy efficiency, congestion, & cost, all of which are directly influenced via an architectural creation of DCNs. As a result, the purpose of this letter is to give an orderly descriptive review of different data center network topologies, as well as a comparison of these constructions to DCN efficiency matrices. Lastly, the letter summarizes potential future improvements in DCN designs & functions [13].

M. Akter et al. (2020) In this article, look at requests from corporate users that are translated to a virtual network that demands both bandwidth & processing helps, & they interconnect them from an entrance point to at least one DCN server. Depending on a Mixed Integer Linear Programming model, they develop an efficient traffic engineering technique. In DCN, this strategy from an ingress entrance point to an egress server is used to reduce the cost of creating associations among an ingress point & a server while ensuring load balancing at both relation & server levels. Load balancing aids in the decrease of latency. The effectiveness of their system is described by performing a trade-off analysis among composite goal function's many aims. They as well explore how other network metrics, include bandwidth cost, greatest association & server resource utilization, alter when varying kinds of priority are allocated to multiple goals [14].

A. Augustus et al. (2019) This study presents aCSM (Cloud Storage Monitoring) system that monitors IaaS storage consumption & analyses file access trends using multiple parameters to determine file access frequency, size, future access prediction, & file replication in cloud storage. This assigns each file a ranking & predicts future access patterns. This provides a suggestion dashboard for the customer, who may choose among actions like reorganizing, deleting, or storing information, as well as removing duplicate files from cloud storage to free up space for future usage. This system is tested in the CloudSim framework & confirmed by many simulations using file attribute comparison tools, delta version-hashing, and data de-duplication methods. The ranking method approach used for frequency distribution reveals a 10.91% gain in storage space over the normal approach. It also aids in the prediction of future file utilization& eliminates duplicate data [15].

N. N. Das et al. (2019) This article offers a new method for implementing a semantic search engine in a cloud database that employs semantic tools to retrieve relevant material for customers. They'd also like to clarify how semantic searching works in conjunction with the association of Big Data & the processing it undergoes. a People who wish to search for information about a specific issue are astonished by the vast amount of data accessible in the present Internet era since it has become quite challenging for them to navigate a web page & get the exact data they are looking for. This means that companies are making decisions based on a lack of information & lack of comprehension. The majority of today's search engines rely solely on keyword matching to find outcomes. As an outcome, after spending most of the time viewing an outcome, a customer receives a large amount of irrelevant info. To enhance the search results, more complex queries are sometimes used. Scientists are developing a new methodology known as a semantic-based solution to solve this limitation. Also, it appears that data obtained in these clouds work on a design that not everyone understands. The massive data that is stored in these clouds is automatically processed before it is displayed to customers [16].

R. Di Pietro et al. (2018) In this article, offer a mobile secure storage solution that is primarily focused on ensuring data confidentiality & integrity on smart devices that are part of the multi-Cloud architecture. They demonstrated & explained their Android app, "ARIANNA," in this article. It allows & combines their multi-Cloud experimental framework, which has been mentioned in the literature. Furthermore, to assess their concept, they performed many tests involving a mobile app in a real-world multi-Cloud framework situation [17].

H. Yao et al. (2016) are motivated in this article to investigate VM location & law placement together to create energy-efficient SD-DCNs. Intrinsic TCAM size limits of SDN are taken into account in particular. An ILP (Integer Linear Programming) paradigm is used to first explain the issue. A 2-phase heuristic algo is created to prevent a computing complexity of ILP. Their approach greatly decreases overall energy use, according to simulation outcomes [18].

III. PROPOSED METHODOLOGY

The many experiments for VANET in both cities have been examined in this section. We have carefully carried out our tests in a realistic simulation environment.

3.1 Problem Statement

Due to the considerable physical distance between the Data Centers (DCs) & End Users (EU) of a cloud service provider, a major delay, traffic congestion, massive quantity of data processing, and communication costs are affected by Cloud computing systems. Even if few enterprises like Apple go towards 100% renewable DCs using wind, solar & geothermal energy that are more ecologically friendly, the DC carbon emissions from all-the-clock operations will dominate the global carbon footprint. There are lots of risks involved when analyzing the cloud system. These risks have to be reduced by making the data centers more effective. To minimize data theft, the cloud data storage system has to be decreased & security improved. Cloud computing issues linked to security and privacy. The security of cloud computing includes several technologies like networks, databases, virtualization, OS, transaction administration, resource scheduling, concurrency control, load balance, and memory management. Security concerns are thus relevant to cloud computing for several of these systems & skills. The network that links systems in a cloud, for instance, must be safe. In addition, the CCs virtualization model leads to numerous security issues. For instance, it is necessary to securely map virtual computers to a physical machine. Data security includes data encryption & ensuring that suitable data sharing rules are implemented. Moreover, methods for the allotment of resources & memory management should be safe. The distinction among customers of a cloud provider (who are competitive businesses or even hackers) is one of the most apparent cloud issues to prevent accidental or deliberate access to critical information. Using virtual machine (VM) & hypervisor would generally be a cloud provider to segregate clients. Technologies that may enhance the safety of VMs and the virtual network separation are presently available. Additionally, the trustworthy platform module (TPM) may offer hardware-based verification and thus guarantee robust network isolation & security of hypervisors & VM integrity. Legal and regulatory problems in cloud computing with security consequences are very significant. Every customer must have their legal and regulatory specialists examine the policies and practices of cloud providers to make sure that a cloud supplier has robust policies and practices addressing legal and regulatory problems. Though data security & exporting, compliance, audit, retention & deletion of data & legal discovery are problems to be addressed in this respect. Confident storage & trustworthy platform access modules may play an important role in reducing access to sensitive & essential data in the field of data retention & elimination. IaaS is essential for data protection. As consumer accountability extends to apps, traffic, and operating systems, more risks are created. The current development in assaults beyond data should be seen by organizations as the core of IaaS risk. Malicious players take over computer resources unfriendly to mine cryptocurrencies and reuse these resources as an attack vector against other corporate & 3rd-party components.

3.2 Experimented Dataset

The data is sent in both ways via SSL. After this, the data is fed to the FODPSO algorithm where the pretrained data ensures that the data is encrypted properly. Initially, the algorithms have to be trained with a dataset. Hence, GMOPST14/GMOPST14/SASEBO_R/DATA/aes/d000 dataset [19. that contains cryptographic data will be used to train the machine learning algorithm FODPSO. This will ensure security and reduce data theft using the new rating system (DSR) in a cloud environment. At last, the performance of the proposed method will be validated & compared with a traditional method such as PSO and DPSO. Java Programming will be used to conduct the current research.

3.3Methodology

- **Approach 1**

From the research gap, It has been seen that there are lots of possibilities of data theft in the data centers. The data centers must be protected and security has to be increased. to save the important files. The present research presents a secure data center dependent on a FODPSO algorithm. The suggested FODPSO method has multiple PSOs for particle swarm optimization, in which each particle strives for an optimal solution for its own "survival," with the inherent advantage of

having memory of previous choices. The first disadvantage that the conventional PSO has pointed out is this new architecture: a premature swarm convergence. The FODPSO discards swarms that converge prematurely towards a solution that may or may not be best, as does conventional Darwinian (DPSO). At a similar time, it encourages the formation of new particle-forming swarms that can share some of the information that other particles already gain. Furthermore, because of the fractional-order extension that optimizes the balance between exploration & operation each FODPSO particle is significantly more "smarter" than PSO and DPSO particles. FODPSO method is thus used in contrast to the DPSO algorithm with smaller populations, which decreases computing cost and yet expects the same outcome. The system offers to decrease the volume of data that enables users to assess the confidentiality, availability, & integrity requirements among values of 1 to 10 of the customer's data in the cloud. The data-sensitive rating (DSR) of customer data is determined using the values. The data in one of the 3 divisions offered in the cloud is allocated space based on a DSR value. Public, private & restricted access partitions are the divisions suggested. The value above 8 of a DSR allocates data to a division with restricted access and a public partition below value 3. The data is encrypted and then appended to a MAC using 128-bit SSL encryption.

3.3.1 Proposed Algorithm 1 and Block Chart

Step 1: Load the dataset

Step 2: Apply proposed algorithm (FODPSO)

Step 3: Determine data-sensitive rate (DSR)

Step 4: Data encryption using 128-SSL and MAC.

Step 5: An index of search capabilities is prepared & encrypted.

Step 6: Proposed Secured Outcome with SSL Encryption.

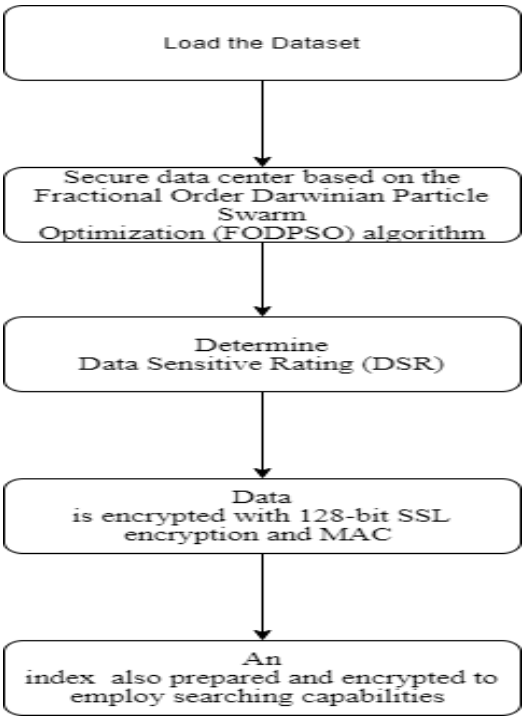

Figure 1: Block Chart of Proposed Methodology

The above diagram shows the Block chart of the Proposed Methodology. Newer technologies are changing the functions of Data Centres and their operations. Proper research is necessary for maintaining the data centers since lots of money has been invested in these centers. Hence performing this research will improve the efficiency of the data centers along with improving the security.

3.4 Proposed Methodology-2 (Hybrid CNN with FODPSO)

In addressing numerous extremely non-linear, inter-mode issues, swarm intelligence algorithms have been extensively used and have gained enormous success. However, they are not investigated in the application of deep neural networks. Deep neural networks, particularly in particular CNN (Convolutional Neural Networks), have lately made advances in addressing numerous intolerable issues; nevertheless, their effectiveness relies largely on their hyper-parameter values, which are both labor expensive and time-consuming in terms of completing. The present study thus uses a Convolutional Neural Network (CNN), which converges quicker, to look for the optimal CSN design, to recognize the human activity. The use of PSO for training aims at optimizing the findings of solution vectors on CNN, which in turn increases the precision of classification to ensure that quality performance compared with state-of-the-art designs is achieved.

The research examines PSO-CNN algorithms and compares the performances of conventional machine-dependent algorithms and deep learning methods. While the findings for CNN in HAR are positive, many factors are required to identify the optimum CNN design. Any neural network focuses mostly on minimizing errors between goals and anticipated outputs. Cross-entropy in the event of CNN is performed via back-propagation and gradient descent. There are numerous factors to set even a basic CNN. So, algorithms that discover and assess the CNN architecture in less time are important to find. Most real-world issues have been represented theoretically using differential equations, which include integer and/or fractional-order derivatives. CNNs are often utilized to provide approximate solutions to these problems. This technique is depending upon approximation of function, & the feedforward nerve artificial network can build a differentiable and closed analytic solution of the difference equation. The evolutionary optimization method was used to train the network weights and bias, resulting in a minimal average squared bug and a solution for this issue. A feed-forward ANN suggests a mathematical form of approximation solution for BVPs with double singularities:

$$\hat{B}(x) = \sum_{i=1}^{k} B_i\, u(S_i x + B_i x \qquad (1)$$

$\hat{B}(x)$ gives an approximate solution, x is an independent variable, γi, βi, and wi are unidentified weights, &eq. (3) expresses the nth derivative of this approximate solution. An in-depth discussion on neural networks. We replace the approximate solutions in Eq. 3) with a doubly singular BVP CNN-based solution. Thirdly, it is suggested to enhance the capacity of the final neural network via the automated and progressive storage procedure of the learned block. Since the tiny part of the dataset may only need a CNN with much less ability to achieve the best classification accuracy, so that the classification accuracy of the whole dataset is not compromised, the technique suggested multiple times stacks the learning block to create a more capable CNN. We conclude that the FDPSO technique has been suggested, which is efficient without sacrificing classification accuracy, for developing the hyperparameters of CNN state-of-the-art Architectures. The aim is to minimize the search space, learn a transferable block from a tiny subdivision of the training sets and multiply the stack of the learned block to enhance classification accuracy.

We demonstrate a comprehensive interaction architecture between the CNN input and hidden stages. The objective function involves the reduction of the approximate solution to mean square errors.

$$\text{Minimize} e = e_1 + e_2 \quad (2)$$

$$e_1 = \frac{1}{N}\sum_{m=1}^{n} P_m \hat{y}_m f(x_m + \widehat{B_m})^2 (3)$$

$$e_2 = \frac{1}{2}\left((\widehat{B_0})^2\right) + (aB_n + bB_n - C_1^2) \qquad (4)$$

For importing two versions of the sensor data set, a systematic examination is conducted. For future work, this may be used as a reference. It is the best classification system for data where humanly designed knowledge of the characteristics is not necessary for FDPSO based CNN. The study also seeks to enhance the performance of state-of-the-art CNN model design via the use of Optimisation. This leads to the generalization for additional activities to use the FDPSO-CNN model.

3.4.2 Proposed Algorithm and Flow Chart

Step 1-Initialization: Randomly generate initial swarm, assign values to the parameters of F0-DPSO.
Step 2-Evaluation of Fitness: Scrutinize the "fitness value" of each particle.
Step 3-Ranking: Rank each particle of minimum value of fitness function
Step 4- Stopping Criteria: Stop if

- Level of "fitness" achieved.
- Selected "flights/cycles" executed.
- I meet the "Stopping" criteria, then go to step 5.

Step 5-Renewal-Call "Position" & "velocity".
Step 6-Improvement-Repeat steps 2 to 6 up to whole flights are achieved.
Step 7-Storage-Storage "fitness values" which are best-achieved and signify as "best global particle"
Step 8-Apply Convolution Neural Network
Step 9-Predicted Results.

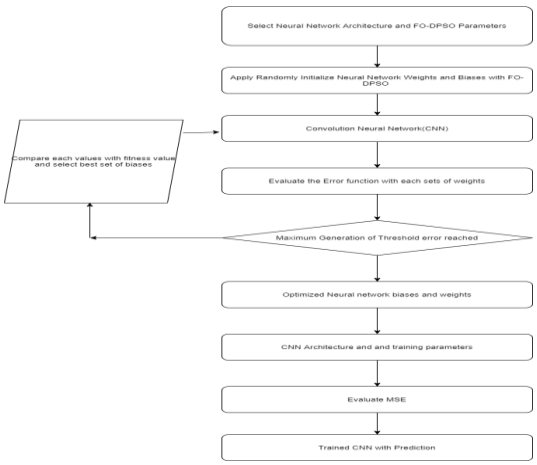

Figure 2: Flow chart of Proposed Methodology-2

The new CNN-based FO-DPSO method determines the unknown weight of the decision in error functions. In terms of the accuracy of the appropriate technique, AE's values provide superior outcomes. All solutions and AE values are provided (h = 0.2). By solving issue 2 more correctly, FO-DPSO is superior to the GA-SQP and the GA method. The results of the AE showed the production of ANN-based FO-DPSOs, ranging from 10−8 to 10−11, 10−8 to 10−11, and 10−9 to 10−11.

We have shown that FO-DPSO-based CNN is an effective method for addressing this issue. Performance indicators like Mean Absolute Error (MAE),Global Mean Absolute Error (GMAE) are utilized to assess the performance of CNNs depends upon the FO-DPSO approach.

IV. EXPERIMENTAND DISCUSSION

In the comparison with the PSO and DPSO approaches of the proposed FOPSO method, all the techniques are evaluated in two distinct image kinds, i.e. multi-spectral images and hyperspectral image types. JAVA developed the image segmentation method on a computer with Intel Core 4 Duo T5800 (4 GHz) and 4GB of storage in all situations. With CloudSim, programmers may concentrate on the precise systems integration issues they wish to investigate without worrying about cloud-based technology or service details.

#	Name	Member Type	File Size
1	AES_ENC_DQ	DATA	128KB
2	AES_ENC_NQ	DATA	128KB
3	AES_ENC_SQ	DATA	128KB
4	NO_ENC_1	DATA	128KB
5	NO_ENC_2	DATA	128KB

Figure3:GMOPST14/GMOPST14/SASEBO_R/DATA/aes/d 000DATASETS standard output

Note the context here: we are using the dictionary tables on a single library that is not metadata-bound and that contains unencrypted data sets and both GMOPST14and AES-encrypted data sets. (Readers might want to verify/check if this issue is present on their site.) The results on a metadata-bound library might be different. However, we know that GMOPST14 data sets in an encrypted metadata-bound library will be encrypted, i.e., no need to test for encryption.

Parameter	PSO	DPSO	FODPSO
I_T	100	100	100
N	150	20	20
ρ	1.2	1.2	1.2
N_{min}	-	10	10
N_{max}	-	30	30
N^s	-	4	4
I_{kill}	-	10	10
α	-	-	0.6

```
data pd_list_data;
      set pd_list (keep=name memtype);

      if memtype = "DATA" then
            output;
run;

%let lbrf=CT;

%* libref for target LIBNAME;
data check;
      set pd_list_data;
      length lib_path $250. LFN $50. msg msg2 $100.;
      retain lib_path;
      enc_type = 0;
      unk_msg = 0;

      if (_N_ = 1) then
            lib_path = left(pathname("&lbrf."));
      LFN = cats("&lbrf..",name);
      ds = open(strip(LFN));
      msg=sysmsg();
      msg2 = sysmsg();

      if (index(upcase(msg),"INVALID ENCRYPTKEY VALUE") > 0) then
            enc_type = 1;

      if (index(upcase(msg),"INVALID OR MISSING READ PASSWORD") > 0) then
            enc_type = 2;

      if (not missing(strip(msg))) and (enc_type = 0) then
            unk_msg = 1;
```

Figure 4: Proposed Code for FODPSO

Notably, the value has a significant influence on inertial elements. They overlook the previous conduct, not recognizing the role that the system dynamics play in determining their current behavior. This, therefore, leads to them stuck in a local solution but never moving forward (i.e., exploitation behavior). That said, it should be noted that particles by huge will exhibit diverse behavior, allowing for the discovery of novel solutions and enhancing long-term results (i.e., exploration behavior). Instead, if exploration depth is set too large, an algorithm can take an excessive amount of time to discover the global solution.

Table 1: Initial parameters of PSO, DPDO & FODPSO for the Proposed data set

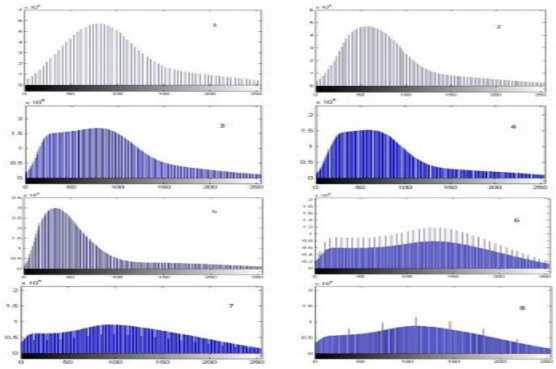

Figure 5: Histograms showing the differences in the various clouds (data channel no. inserted in each figure). on the x-axis you will find grey values, while on the y-axis you will find the value count

For each level of segmentation, average & standard deviation fitness values for entirely, data channels were computed, and the resulting values are shown in Table VI. In general, FODPSO outperformed other techniques somewhat in terms of fitness value. With exception of segmentation level 6, when the DPSO outperformed the FODPSO marginally. Notably, such behavior is anticipated under certain circumstances, since the DPSO is a subset of the FODPSO.

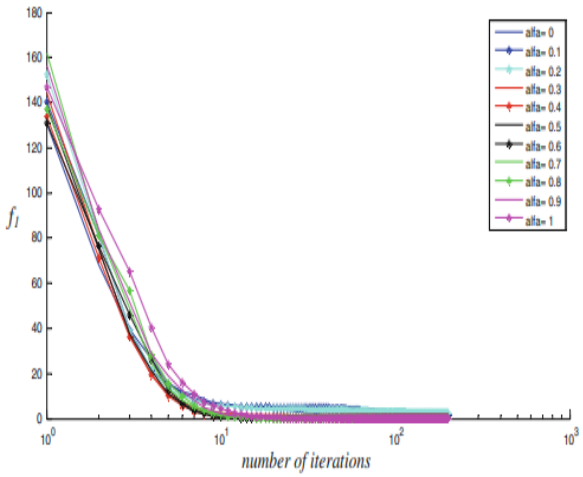

Figure 6: Evolution of the PSO for optimization in cloud storage changing α

As with the PSO, several parameters must be modified to ensure that the algorithm runs resourcefully: (i) population of the initial swarm; (ii) Swarm populations at their greatest and lowest; (iii) population of the initial swarm; (iv) Swarm populations at their greatest and lowest; & (v) stagnancy threshold.

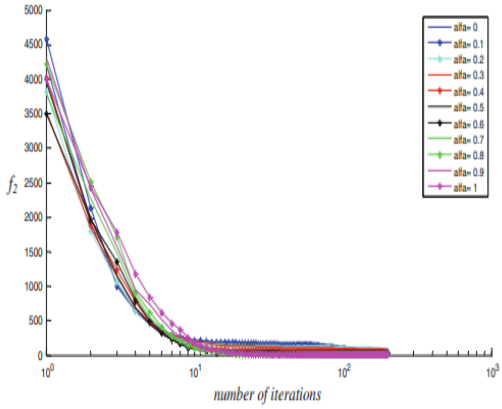

Figure 7: Evolution of the DPSO for optimization in cloud storage changing α

The first is linked to the algorithm's convergence, which enables excellent short-term efficiency. Though, if the degree of manipulation is set too high, an algorithm can get trapped on local solutions. 2nd is linked to algorithm diversity, which enables the algorithm to explore different solutions, thus increasing its long-term performance.

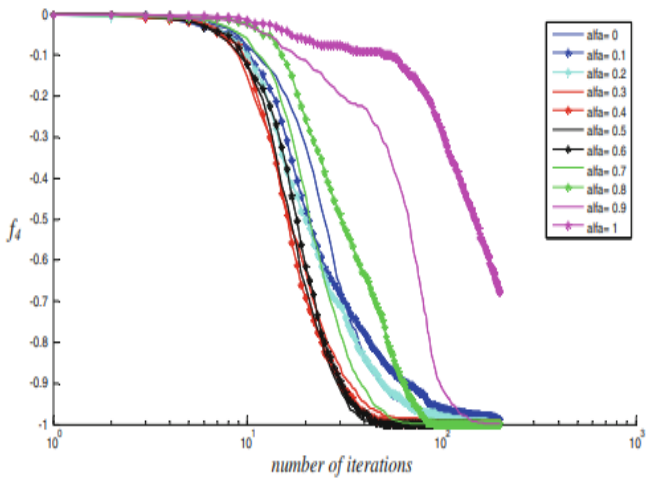

Figure 8: Evolution of the FDPSO for optimization in cloud storage changing α

Experiments demonstrate that the algorithm's convergence is dependent on fractional-order α, Unlike FO-PSO proposed in [14], the Darwinian algorithm avoids getting trapped in local solutions regardless of the value of (since it is a particularity of traditional DPSO). Furthermore, the fractional coefficient in the range [0.5,0.8] leads to faster convergence of the optimization in the vast majority of situations. To further assess the FO-DPSO, the fractional coefficient α should then routinely be adjusted between 0.5 and 0.8.

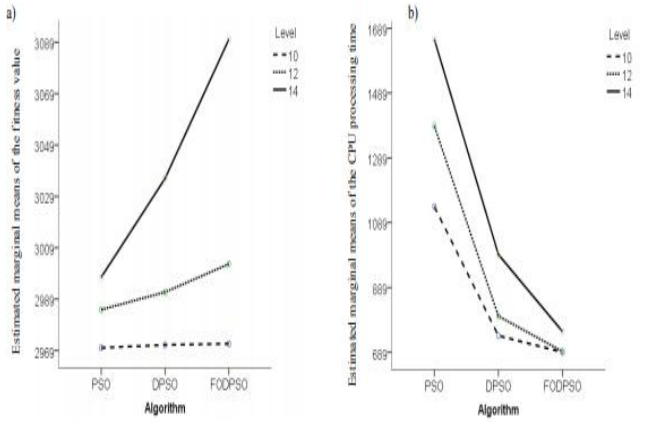

Figure 9: Marginal means calculated for: a) fitness value; b) CPU processing time.

In short, the FODPSO may be shown to be quicker than DPSO, since fractional calculations are utilized to regulate the algorithm's convergence rate. Swarm activity may be classified into two categories: exploitation & exploration. The operational behavior is connected to algorithm convergence and enables excellent performance over the short term. Though, if the degree of exploitation is too great, local solutions may remain in the algorithm. The exploration behavior, on the other hand, is connected to the diversity of the algorithm which enables novel solutions to be explored to improve long-term efficiency. Though, if the exploration level is too high, it can take too long for the algorithm to discover the global solution. The DPSO simply adjusts the inertia weight to deal with trade between exploitation and exploration Whereas a high amount of inertia enhances exploration, the operation may be enhanced with a modest amount of inertia. The α coefficient enables a greater exploration level whereas ensuring global solution of the method because FODPSO introduces a fractional computation approach to regulate convergence of particles with memory outcome.

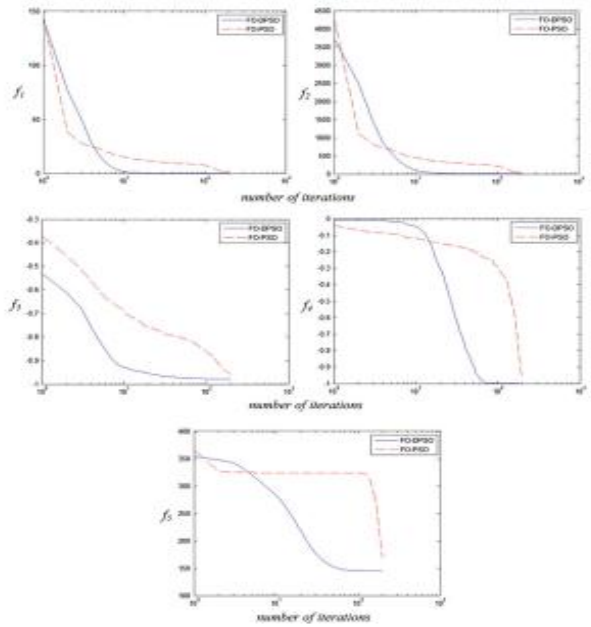

Figure 10: For FO-PSO & FO-DPSO with 128 SSL & MAC, development of the fitness function with variables

Even though the FO-DPSO algorithm's speed of convergence is influenced by the fractional-order α, experimental outcomesshow that the proposed algorithm outperforms both traditional DPSO & PSO algorithms, &the FOPSO algorithm is initially available in works.

- **Approach 2: Hybrid CNN with FODPSO**

Indicators of performance like MAE &M fit (Mean Value of Fitness) are utilized to evaluate the performance of FOPDSO based ANNs. These indicators are used to detect the stability and robustness of our method via 100 separate simulations. In terms of the sort and unsort form we provide MAE values, see Figures 10, 11, and 12. Thus, the results are sorted and the solutions errors are given in Figs 10b, 11b & 12b. We have utilized the log scale graphics for MAEs to better explain the difference between errors & those published in the literature. We obtain minimal MAE values and improved fitness for all issues during our graphical examination. Our method performing in the optimum minimal value, mean &SD (Standard Deviation) are statistically evaluated.

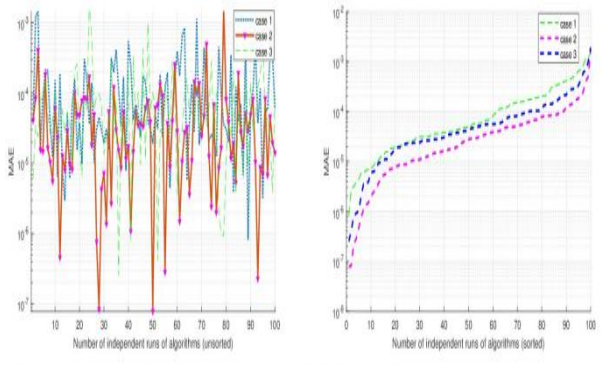

Figure 11. Graphical illustration of sorted absolute errors in solutions obtained by CNN-FODPSO during 200 runs

Our experimental results demonstrate that the FODPSO method dependsupon CNNs has consistently provided superior nonlinear ODE solutions for a real application issue.

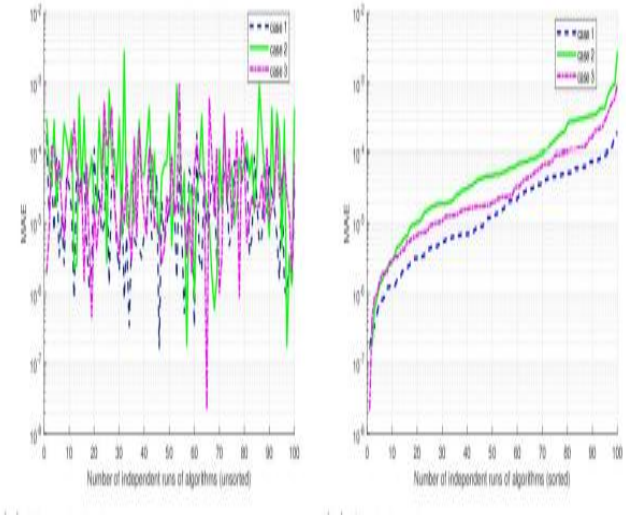

Figure 12. Graphical illustration of sorted absolute errors in solutions, obtained by CNN-FODPSO during 200 runs

We have improved values of global performance metrics for checking stability and robustness of the suggested technology; GMAE (Global Mean Absolute Error).

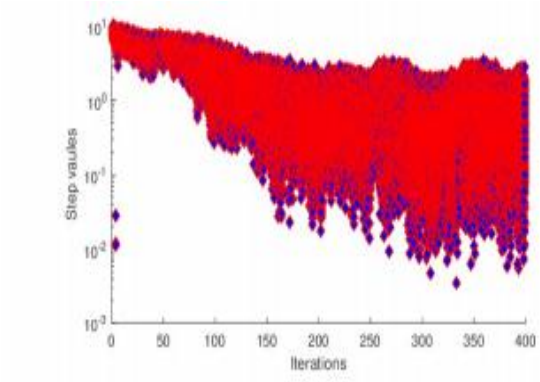

Figure 13. Graphical illustration of Step size, obtained by CNN-FODPSO during 200 runs

Taking into consideration of swarms' chaotic behavior, fractional calculus tools are suitable for tracking swarms' previous motions in the Darwinian particle swarms optimization method. We have shown that FO-DPSO-based CNN is an effective solution technology to the issue.

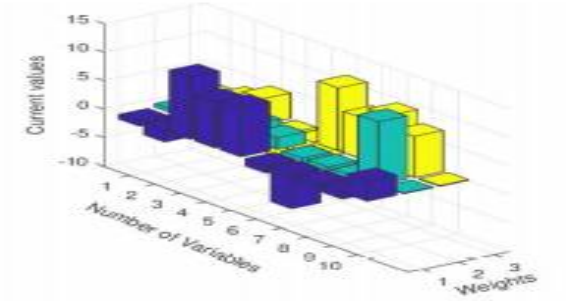

Figure 14. Graphical illustration of Trained Weight, obtained by CNN-FODPSO during 200 runs

Performance metrics such as GMAE, MAE, and Mfit are used to evaluate ANN's performance using the FO-DPSO method. We utilize these metrics to assess the stability and robustness of our method based on data obtained from 200 separate simulations.

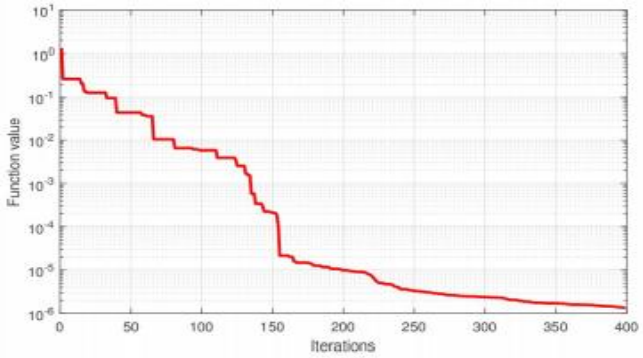

Figure 15. Graphical illustration of Convergence, obtained by CNN-FODPSO during 200 runs

Our experimental results indicate that the FO-DPSO method based on CNNs consistently produces superior solutions to non-linear & real-world application issues.

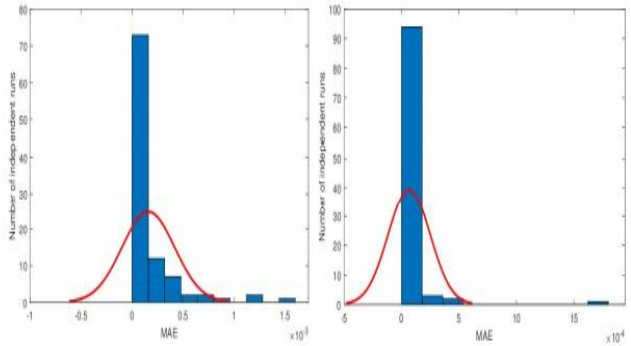

Figure 16. Normal plots of MAE obtained by CNN-FODPSO during 200 runs

With normal distribution fittings, we show frequency graphs of 200 experiments in terms of MAD. These figures demonstrate that our strategy is both dependable and consistent in terms of success rate.

The proposed method yields a more precise solution to differential equations by numerous singularities & above-table systems. The suggested technique may be used to solve problems in thermodynamics, electromagnetics, and nanotechnology by altering the activation function of CNN. We analyzed numerous real-world application issues. The values of performance measures such as GMAE and Mfit indicate that our method produces lower-error outcomes.

V. CONCLUSION

Cloud computing is a modern computer technology that offers services to customers at all times. Resources are dispersed worldwide in a cloud computing system to serve customers quicker. Customers have access to information via many devices including computers, mobile phones, PDAs & tablets. The current study is dependingupon FODPSO, a safe data center. The proposed FODPSO method, which includes several PSOs for particle swarm optimization, strives for an optimum solution for the "survival", of each particle, with the advantage of having an inherent memory of previous choices. The initial disadvantage to traditional PSO was that of the early convergence of a swarm with this new design. FODPSO discards swarms that converge prematurely to achieve or may not be the best solutions like conventional Darwinian Particulate Swarm Optimization (DPSO). It also promotes the development of new particle-based swarms that "genetically" share the information that other particles have previously gained. In addition, the fractional extension that enhances the balance among exploration & operation means that every FODPSO particle is considerately "smarter" than DPSO andPSO particles. This enables the FODPSO method to be operated with a smaller population than the DPSO algorithm, thereby lowering computational complexity also yet anticipating similar outcomes. We have used GMOPST14/GMOPST14/SASEBO_R/DATA/aes/d000 dataset with our proposed approach. Data Sensitive User Data Rating (DSR). Data are assigned space based on the DSR value in one of the 3 suggested cloud divisions. The divisions suggested are public, private & access-limited. The DSR value over 8 allocates data to the partition of restricted access and the data to the public partition below value 3. The information is encrypted & Mac has added it afterward, using 128-bit SSL encryption. A search index for encrypted data is also created & encrypted to use. This encryption will enable the users to make sure that others do not gain access to it. Based on the SR value, the data & index are transferred to the cloud where they are saved. The download is enabled based on user authentication co-operated with the data owner and the cloud. No authentication is required of the data in the public partition. On the other node, according to computer assessments, the suggested technique of using CNN-based FODPSO correctly resolves variations of nonlinear, twice singular, normal differential equations. The method presented offers a more precise solution for differential equations with numerous unique characteristics & systems. The suggested approach may deal with issues in thermodynamics, electromagnetism & nanotechnology by altering the CNN activation function. A fitness function that takes account of kernel number & neuron nodes in PSO is utilized to simplify the CNN structure. The suggested approach may achieve more accuracy than existing state-of-the-art methods in the verification tests for 2 well-known public datasets. 2 main methods are utilized to decrease time complexity. The structure of the CNN has been maintained & FODPSO merely improves its critical parameters like kernel & neuron number.

VI. FUTURE SCOPE

This paper has great importance as it addresses the important solutions for the challenges currently faced by the cloud system. As many organizations and even governments are migrating to cloud environments this research can throw some light on the critical issues of the cloud system. This will ensure security and reduce data theft using the new rating system (DSR) in a cloud environment. At last, the performance of the proposed technique will be validated & compared with a traditional method such as PSO and DPSO. Java Programming will be used to conduct the current research. This research has many scopes for further research, in evaluating the efficiency of scheduling algorithms. The rating system can be incorporated with third-party data integrity checks in the future. The possibilities are wide that this current work can be extended, with other studies and algorithms to improve the efficiency. Since data centers consume lots of energy, reducing the power consumption can be considered as future research of

this work. As part of the future study, the FODPSO will be assessed in real-time autonomous deployment & dispersed location of sensor nodes in picture segmentations because of the low computing cost of the method. The aim is to use the nodes exclusively in the fields where the pictures are taken by the camera onboard unmanned aerial vehicles are segmented using the FODPSO algorithm. For emergency usage, like disaster monitoring & battlefield surveillance, such implementation is essential. In addition, it would be important, rather than segmenting the database band by band, to develop a method to estimate no. of thresholds (parameter n) & multichannel joint division. Efficient cloud storage patterns & failure degradation need to be taken into consideration in the future to enhance forecast accuracy.

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