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Enhancing the Secured Automation of Storage process on Cloud: Embedding the features of Artificial Intelligence and AI-powered Network Security Tools.

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Abstract - Cloud computing and artificial intelligence both are entirely different areas but if both are merged can-dowonders especially in handling personal and student data in education settings. Artificial intelligence supports automation services whereas cloud computing provides a secured storage medium. Cloud is one such stage that permits clients to store information and applications in a single area and access them whenever paying little mind to where they are found. An individual or an organization can use the cloud for a variety of functions, including storing, retrieving, and sharing documents, photographs, and e-mails. Reading, learning, memorizing, and thinking are examples of human-like abilities that artificial intelligence can imitate. When a tiny repeated task is automated, it can enhance businesses and people's lives. Even if the cloud manages and securesa large capacity of data, the main question arises in how to move the data to the cloud. According to a survey conducted by Peter Lyman and HAL R Varian, the globe generates around two Exabyte of data per year, implying that each person's contribution is approximately 250 megabytes. So, moving this much data to cloud manually is impossible. Hence there must be an automated framework to perform this task. Therefore, the idea of AI is implanted in the cloud with the goal that the information can be naturally moved and put away in the cloud. The paper proposes a mechanized cycle to store the information in the cloud.

Keywords: AI, cloud, automation, security, storage.

I. INTRODUCTION

This part of the article deeply introduces the idea of artificial intelligence, cloud computing, automation, the function of artificial intelligence in the cloud, and the benefits of artificial intelligence in the cloud. A cloud provides a virtual image of a single system by aggregating network resources such as software, applications, databases, many servers, and so on, and is utilized in both commercial and public organizations. The word cloud computing is commonly used in combination with the term "cloud." Individuals or businesses can use cloud computing to access these resources over the internet. Cloud only delivers service to those who have requested it, and it operates on a pay-as-you-go basis [10] [11]. A large number of people will profit from the intermingling of computerized reasoning and distributed computing. Advanced colleagues like Siri, Google Home, and Amazon's Alexa join AI and distributed computing in our day-to-day routines. Computational intelligence capacities are being taught more widely in the distributed enterprise computing environment to help organizations become more effective, important, and knowledge-driven. By facilitating information and applications in the cloud, organizations can gain increased adaptability, deftness, and more costly investment funds. Distributed computing is progressively integrated with computer-based reasoning capabilities, assisting organizations in monitoring information, finding examples and knowledge gaps in information, facilitating customer encounters, and advancing tasks. Google Cloud AI can help any organization that needs to physically remove information from problematic archives on a gargantuan scale. Going enterprise-agnostic is accelerated by turning paper into organized information, unlocking measurable business value, and helping to drive more evolved customer encounters. On the whole, doing this on a large scale was wasteful. Therefore, Google Cloud has sought to help associations robotize these tasks with AI and AI[1].

1.1. Primary Benefits of Cloud Computing

- Lowering the cost: Cloud services do not require a large upfront investment. Payment is based on the procedure accomplished, not on the amount of hardware purchased.
- Improved Speed: Clouds, which are made up of a cluster of computers, can conduct required functions much faster.
- Productivity Improvements: Clouds have a higher work rate because of their vast computation capacity, which boosts the company's revenue.
- Increased storage space: This allows businesses to store and access enormous amounts of data.
- Automatic Updations: Servers are programmed to be able to automatically upgrade software versions without the need for cloud service providers to do so.
- Exceptional Results: Clouds provide accurate, higher-quality service in a shorter amount of time since resources are divided over multiple servers and services are delivered in an automated manner.
- Security: Gives data persistent storage, so it may be recovered even if an individual loses it [12].
- Transparent progression of Data: If the idea of information is extremely delicate, the need for decision going with the decision of innovation ought to be founded on the lucidity of the information stream [34]. Utilizing the cloud benefits, an incorporated stockpiling framework can be kept up with on which the entire instruction area's scholastic information organization can depend.
- Extensive capacity ability/Scalability: Based on the need foran extra room, the capacity can be expanded or diminished. As the idea of scholastic information stockpiling is to just build the need to save the current information and take the responsibility to answer a specific solicitation that can be satisfied with distributed computing innovation [35] [36].
- Data misfortune reinforcements: Cloud figuring is a computerized innovation and one of its downsides is the deficiency of information because of capacity debasement, vindictive assaults, and deliberate crashes. For these cases, the greater part of the cloud suppliers sends extra innovations to advance harm control [37].

1.2. Primary Performance Features of Cloud

- Offers automated services: Users of the cloud anticipate immediate access to resources and services. To facilitate this, clouds process and serve client requests in an automated manner.
- Pay on a per-use basis: Cloud computing allows customers to access and use only the resources they need, with a cost depending on consumption.
- Power to Stretch Cloud delivers the impression to its consumers that it has a massive amount of computing capacity by rapidly delivering requested resources and managing server load.
- Customization: Cloud computing allows customers to create a personalized environment by using remote servers to create a virtual environment [12].

1.3. Uses of AI in the IT Industry

- Artificial insight for Data stockpiling:

As the framework develops quickly, the information gathered by the assets included is enormous [30]. Man-made brainpower has arisen as one of the most encouraging innovations that can help in steering assets and allocating stockpiling to increment security and upgrade the expense. The creator presents a structure that stores tremendous secret records proficiently when contrasted with different advancements [33].

- Artificial insight for Data handling:

Information handling in the cloud and online substance extraction is polished generally, and various systems, and strategies are set up, yet there is a need of proposing effective techniques. Artificial intelligence has demonstrated useful when worked together with distributed computing [31]. As far as information handling AI can guarantee asset improvement and man be prepared to learn in light of past information which can distinguish that a human can't identify because of the force of the information.

1.4. AI for Data Security

In a modernized period, AI helps security essentials, for instance, malware ID, peril assessment, machine breakdown acknowledgment, and chance upsetting. Dependent upon the security risk examined in the future, new and better techniques with AI can be developed, but AI can moreover face security issues, for instance, attacks on the AI model, dataset harmful access attempts, AI objective change, etc. in this way challenges should be considered while conveying AI for security [32].

1.5. Benefits of AI

The advantages/benefits of utilizing man-made brainpower to keep up with and secure scholarly records are as per the following: [38]

1. Learning capacity to redress human mistakes or blunders brought about by the framework plan.
2. Big information the board by on utilizing different AI strategies to make information sensible.
3. Improved threat detection and vulnerability organization.
4. Removing pointless storing data, with the limit of reasoning.
5. Overall security design and maintenance with successfully pre-arranged models on the existential data.

1.6. The role of AI in Cloud Computing

The most basic rationale for merging AI and cloud computing is that business owners must deal with a wide range of challenges in many aspects of their operations. On the other hand, their focus on servers, software programmers, and data can draw attention away from fundamental business processes and responsibilities. As a result, combining AI and cloud computing may be a good solution in this scenario. According to Statista, by 2025, the worldwide AI market will be worth more than $89 billion per year. Cloud computing, in turn, serves as a catalyst to broaden the breadth and influence of AI in the larger market, thus a significant percentage of that value will be created as artificial intelligence powers cloud computing. The worldwide AI market will be valued at more than $89 billion per year by 2025, according to Statista. Cloud computing, in turn, will serve as a catalyst to widen the scope and influence of AI in the larger market, generating a significant chunk of that value. While AI can possibly help organizations, as indicated by Deloitte, the need for specialized abilities and the immense foundation has put it far off for some organizations. This is the place where the cloud becomes an integral factor [2]. As per Deloitte, "the end is that these trendsetters are making it simpler for additional associations to benefit from AI innovation, regardless of whether they have top specialized staff, admittance to enormous informational indexes, or their own monstrous PC power." They can utilize the cloud to acquire administrations that fill in these holes without making gigantic forthright speculations. Basically, the cloud democratizes AI by permitting endeavors to utilize it immediately [3].

Man-made brainpower is the capacity of imitating human-like capacities, from perusing, getting the hang of, retaining, and thinking [26]. The littlest repeatable assignment when computerized can help the organizations and the human way of life. In this overview, the utilization of man-made consciousness in information the board and security is introduced.

For any PC/program/system to become keen should have the accompanying essential capacities [27] as follows:

- Natural Language processing: Regular language handling is a subfield of phonetics, software engineering, and man-made brainpower worried about the communications among PCs and human language, specifically how to program PCs to process and examine a lot of normal language information used to empower the program to get human-made dialects.
- Knowledge representation (KR): To store what it knows or hears. Space information must be contemplated and its portrayal ought to be characterized to accomplish productive working of the arrangement. For

instance: A distributed computing stage is familiar with getting enormous information and designation of capacity can be planned in view of the KR technique for successful working.

- Automated thinking: To utilize the put-away data to respond to questions and to reach new inferences. This is generally concentrated on regions prior to conveying any Artificial knowledge with different advancements. For this study, mechanized thinking comparative with scholastic information will be the focusing on scholarly records, strategies for perceiving the reports, and introducing it toa reasonable secure organization. The methods rely upon the thought about issue explanation.
- Machine learning and Deep learning: To adjust to new occasions, to identify and extrapolate designs, ML and DL make it conceivable to execute human-like capacities. They can be made from the scratch and can be reused. Various libraries are accessible on the lookout for use. For issue explanations whose execution is clear utilizing existing strategies can be effective and efficient.

1.7. AI's Advantages in Cloud Computing

- Secure environment and Guarantee information exactness and consistency: Automate and approve each of your records to diminish mystery, smooth out consistency tasks, and keep up with information precision and consistency.
- Work on functional effectiveness by extricating organized information from unstructured reports and circulating it to users' business frameworks and clients, permitting users to pursue better business choices.
- To meet client assumptions, use information: Improve customer satisfaction (CSAT), promotion, lifetime worth, and use by utilizing examination to fulfill client assumptions.
- Reduced cost: Cloud computing has the advantage of eliminating costs associated with on-site data centers, such as hardware and upkeep. With AI projects, those upfront expenses can be prohibitive. So,in the cloud, businesses user can quickly access these technologies for a monthly subscription, making R&D costs more reasonable. Furthermore, AI systems can extract insights from data and evaluate it without the need for human participation.
- Automated intelligence: AI-driven cloud computing enables businesses to be more efficient, strategic, and insight-driven. To increase efficiency, AI can automate hard and repetitive operations, as well as execute data analysis without the need for human participation. AI can also be used by IT teams to oversee and monitor essential workflows. While AI handles the boring duties, IT personnel can concentrate on strategic operations. IBM Cloud Pak for Automation, for example, has pre-built workflows for AI-powered automation.
- More information: In large data sets, AI can spot patterns and trends. It analyses previous data to the most recent data to deliver well-informed, data-backed intelligence to IT personnel. Furthermore, AI systems can quickly analyze data, allowing businesses to respond to client requests and issues in a timely and efficient manner. AI capabilities provide valuable observations and guidance, resulting in faster and more accurate results. An app developer, for example, can utilize Amazon Personalize to provide real-time personalized recommendations to clients.
- Data management has been improved: In the processing, management, and structuring of data, artificial intelligence (AI) plays a vital role. With more trustworthy real-time data, AI can greatly improve marketing, customer service, and supply chain data management. AI tools make it easier to acquire, modify, and manage data. IT departments can, for example, integrate AI technologies into Google Cloud Stream analytics to receive real-time personalization, detect anomalies, and anticipate maintenance scenarios.
- Enhanced security: Intelligent data protection is becoming increasingly important as businesses deploy more cloud-based apps. To watch and analyze network traffic, IT teams might employ AI-powered network security tools. When AI-powered systems detect an anomaly, they can raise a red flag. This proactive technique aids in the prevention of data loss. Amazon Guard Duty, for example, is an intelligent threat detection platform that employs AI and machine learning to identify potential threats [1].

II. REVIEW OF EXISTING LITERATURE

The second section of the article covers the related works carried out on cloud storage services, artificial intelligence, IoT, and the combination of all three technologies.

The term "cloud" is a widely used phrase in both biological and technical disciplines. Mists have an urgent influence o human existence during stormy seasons since they store every one of the particles required for showering water and permit mankind to save the water for some time later. Essentially, in innovative areas, it gives a rundown of information-related administrations for clients, for example, information capacity, information security, information sharing, and information conservation for the future, as well as refreshing and support. Cloud is one such stage that permits clients to store information and applications in a single area and access them whenever paying little mind to where they are found.

2.1. Survey on existing cloud storage technologies

- Data storage in the cloud with built-in security: By partitioning the data based on finite field polynomial root, this feature has offered a cloud architecture to store data online with built-in security. This division system works in two ways. First, data is selected at random from the network and stored on cloud servers. Second, the partitioned data is retrieved and used to create the master copy of the data. Cloud employs a distinct algorithm for data division, reconstruction, and handling the complexity in both this method. The data will be accessible to anyone who knows the password and partitioned data location [3].
- Identification-based authentication: Because data is dispersed across multiple servers in cloud computing, data security is a major concern. As a result, in addition to providing a service, a cloud must also provide secure communication. Companies used the Safeguard Socket Layer (SSL) Hand Shaking Protocol to secure insecure network connections between client and server, such as the internet, until 1995. However, as the strain on SSL grows, it fails to secure communication, such as when networks become distributed computing environments. In both computational and communication networks, SSL wastes client and server resources. To circumvent the disadvantages of SSL, an authentication procedure based on identity was developed. For authentication, it employs a hierarchical paradigm based on encryption and signatures. It has been demonstrated through simulation that the Identity-based authentication approach is more efficient and lightweight than the SSL scheme, particularly on the client side. The authentication method consists of identity-based encryption and signature-based authentication. When a client sends a message to the server with the session ID, the server turns the message to cypher text and answers to the client with the session ID and a random number. When a client is authenticated, the server provides an acknowledgment with its signature. Companies have been employing Transport Layer Security Protocol (TLSP) for this purpose since 2015 [14].
- Dynamic data support with public auditing: Because cloud clients never own their data physically, maintaining data integrity is a major concern. Techniques like proofs for data custody and retrieval were developed to deal with this, but they couldn't handle the dynamic nature of the data. The public auditing technique, which uses an index switcher in data storage to remove the index range, provides efficient support for the dynamic nature of data [15] [16].
- Possibility of third-party auditing help: Cloud computing provides consumers with massive processing capacity while also ensuring integrity, security, and performance. Standard security approaches cannot be used because users do not have physical access to the data in the cloud. Third-party auditing (TPA) ensures that cloud service providers and consumers are on the same page. It is also cost-effective and efficient in terms of performance, as it can run in malicious clients [16] [17].
- Storage caching strategy support: With the goal of delivering an efficient service to cloud users, this strategy aims to increase the cache hit ratio in terms of latency and cost. The cache is divided into two portions for this purpose: one for high priority latency and the other for low priority pricing aware regions. A Greedy Algorithm based on Dual Size for Latency (GDS-LC) normalization performs this virtual division. The GDS-LC algorithm is very expandable, and it is changed to a higher grade to enhance cache hit ratio frequency (GDS-LCF). GDS-LC and GDS-LCF simulations were performed using Amazon Simple Storage Services (S3), and both the latency and cost goals were met [18].
- Storage System for Encrypted Duplication: This technique is implemented using a keying and rekeying system, which replaces the existing encryption key with a new one. During data leakage and security, the keying method proved ineffective. To protect against data leakage, the Rekeying aware encrypted reduplication system (REED) was created, which increased cloud system performance, security, and dynamic access control [19] [20].
- File system backup storage support: Cloud servers allow users to retain a backup of their file systems on the Internet. Cumulus, which works on the idea of thin cloud systems, is one of the most efficient implementations of file system backup storage on the cloud. Rather than just storing backups on faraway servers, cumulus also collects files from small interfaces, resulting in a storage solution that is both portable and cost-effective. Amazon S3 was used to implement and test the prototype [21].
- Data storage that is secure: A cloud service provider should protect the privacy, integrity, and availability of data deposited in cloud systems from the user's perspective. The DEPSKY (Dependable and Secure Storage in a Cloud-of-Clouds) system has successfully met all of these requirements by encrypting, coding, and duplicating data in a distributed cloud architecture that allows clouds to dump on each other. It accomplishes this by giving cloud users the illusion of a huge storage media [22] [23].
- Cloud storage based on memory: To achieve memory-based storage, network-based chip-based cloud storage has been disseminated to fulfill the large-scale storage requirement. SPM Cloud (A ScratchPad

Memory-based Storage Cloud Embedded on a Chip Single Chip) was built to achieve this goal, and it showed to be energy-efficient, multi-core scalable, faster execution, improved archive capacity, and increased cache hit ratio [24].

- Object storage on the cloud: Cloud systems use the most up-to-date storage strategies. Object storage is stateless and permanent storage that does not keep track of prior data access. As a result, object storage has been a secure storage method in cloud systems till now. For this, clouds employ REST APIs, which are in charge of handling the stateless storage method [25].

2.2. Survey on work carried on AI integrated with cloud

Computerized reasoning (AI) innovation is the impersonation of human knowledge in machines that are customized to think and carry on like people. Computerized reasoning is likewise connected to the human brain, including critical thinking capacities [4]. In the present current universe of information concentrated undertakings, with developing haze and cloud arrangements, increasingly more knowledge is expected at different levels to give ideal assignment booking choices, VM relocations, etc to advance referenced beforehand under different limitations. These imperatives can go from calculation abilities to transmission capacity cutoff points to SLA or errand cutoff time prerequisites [5]. DRL-Cloud is a sharp Deep Reinforcement Learning (DRL)- based RP and TS system planned to lessen energy costs for gigantic extension CSPs with a colossal number of servers that handle immense proportions of client requests every day. A two-stage RP-TS processor taking into account significant Q-progressing normally creates the best long stretch decisions by acquiring from the developing environment, for instance, client request plans and reasonable electric expenses. Using planning techniques, for instance, target association, experience replay, and examination and misleading, DRL-Cloud achieves an astoundingly high energy cost efficiency, a low weirdo rate, and a short runtime with speedy association [6]. Profound learning-based applications are sent in haze cloud conditions [7] to all the more likely to influence edge and cloud assets for such applications. Robotization empowers associations to arrange and get helpful data in an organized way [8]. Mechanization of unstructured information put away in advanced configuration would permit associations to rapidly acquire knowledge into their organizations, increment their upper hand, further develop efficiency, and enhance. Associations adjust to mechanization arrangements by perceiving the meaning of Artificial Intelligence-based (AI-based) advancements like Computer Vision (CV) and Natural Language Processing (NLP) [9]. Computer-based intelligence advances can comprehend and characterize unstructured information like text, pictures, and examined archives better compared to customary data extraction techniques.

2.3. Sample Illustration of AI integrated IoT in Cloud Computing

Figure 1: Illustrates the wise registering engineering with helpful advantage and distributed computing for IIoT. The AI-empowered IIoT administration incorporates self-observing, request gauging, issue discovery, and labor force the executives [10]. The choice is taken care of back to the IIoT gadgets and executed naturally. In any case, the planning time of some AI estimations, for instance, CNN, puts basic strain on the computational capacity of edge servers as well as the correspondence resources in the spine association, where getting ready data ought to be downloaded from a remote cloud. In this way, insightful computational designing ought to be reshaped. In such a way, we present a shrewd handling designing for IIoT, which includes a two-layer wise server ranch, specifically an edge layer and a cloud layer. Edge and appropriated figuring collaborate to outfit IIoT devices with close consistent handling organizations.

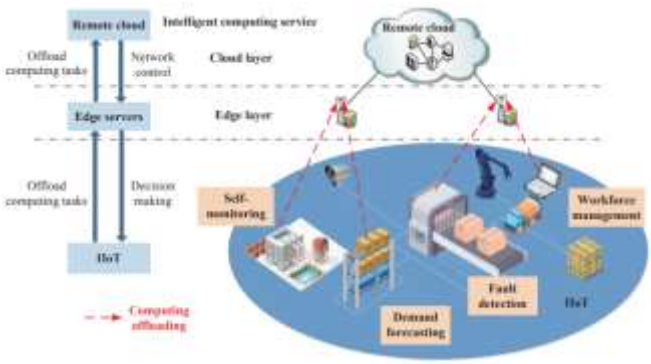


Figure 1: AI with IOT based cloud computing architecture.

2.4. Illustration of AI-enabled 6G networks

Figure 2 delineates the AI with 6G organizations 6G organizations will be huge in scope, diverse, profoundly complicated, dynamic, and heterogeneous in their turn of events. Moreover, 6G organizations should uphold consistent networks, meet the assorted QoS necessities of an enormous number of gadgets, and cycle a lot of information created in actual conditions. Artificial intelligence strategies with strong investigation, picking up, streamlining, and savvy acknowledgment abilities can be carried out in 6G organizations to cleverly complete execution improvement, information revelation, refined learning, structure association, and complex direction. We present an AI-empowered savvy design for 6G organizations utilizing AI [11], which is partitioned into four layers: keen detecting layer, information mining and investigation layer, insightful control layer, and brilliant application layer, as displayed in Figure 2.

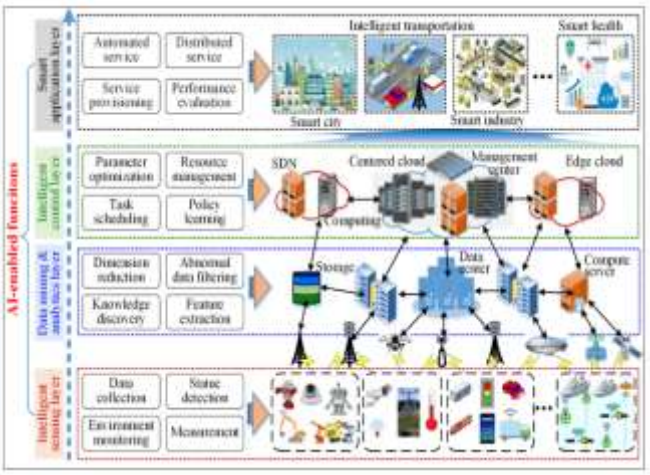
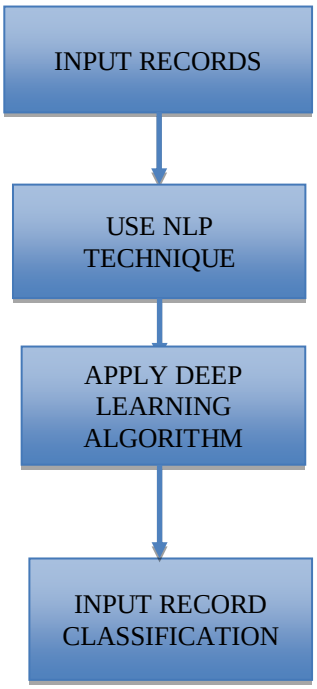


Figure 2: Different layers of AI-enabled 6G networks

III. PROPOSED IDEA

The proposed idea adds artificial intelligence capabilities to the cloud storage system.
The idea of the proposed work is shown in the flow diagram below in figure 3:



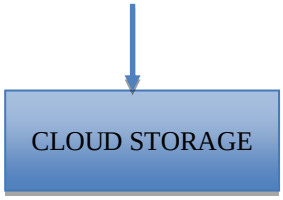


Figure 3: Proposed methodology flow diagram

The article is presenting the proposed methodology in the general form. The steps involved in the proposed method are given below:

- Identify the input data records to be stored in the cloud storage system.
- Apply natural language processing to read the input records.
- Apply deep learning to identify and classify the type of input.
- The classified input records will be stored in the cloud.

The intention of using AI concept NLP is to read the input without manual help. The best suitable NLP technique that can be used is lemmatization which can read a similar category of input at a time. The idea of using a deep learning algorithm is to classify the input data based on the client's needs. For example, the documents can be normal or confidential documents. So, identification of the class of input type is very important. One more objective of using the deep learning algorithm is that the size of data sets to be moved into the cloud will be very huge. So deep learning algorithms work efficiently on large size of data sets.

Finally, after the classification of input, the records will be moved into the cloud storage system to their designated location automatically. Hence reducing the manpower involvement and time taken in moving the records into the cloud manually.

IV. CONCLUSION

Cloud storage is the most significant step that businesses have taken toward data digitization. Although cloud storage is not a new approach, storage efficiency is improving day by day as a result of the massive amount of data generated by individuals and businesses. Individuals can secure their data on a pay-per-use basis with popular public providers such as Amazon and Google. Even the Indian government has launched its ambitious "GI Cloud" project, dubbed "MeghRaj." This NIC (National Informatics Center) public cloud service allows each citizen of the country to store his official papers on the cloud for free up to 1GB. This leads to the conclusion that cloud computing aids in the delivery of e-services.

Automation is one of the most important steps toward the digitization world. If the size of data is small storage mechanism can be employed manually. But when the size of data is very huge, the storage service must be automated plus cloud storage service must be used. This article has proposed the idea of embedding the concept of artificial intelligence in to cloud with the intention of automating the storage mechanism in the cloud.

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