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Performance and Accuracy Enhancement of Cloud Environment During Precision Agriculture

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ABSTRACT

In precision agriculture, the data acquired by sensors are classified into groups according to a variety of parameters, including the existence of animals, the degree to which soil nutrition is present, and the quantity of soil moisture. In the event that any unfavorable conditions take place, a signal of warning will be sent. On the other side, if the conditions are right, the surgical procedure won't be done at all. Several recently concluded research projects related to intelligent solutions for healthcare and agricultural problems have made use of a variety of techniques from the disciplines of cloud computing, IoT, and wearable robots. These methodologies were used in the study. Enhancing the performance and accuracy of cloud environments for use in precision agriculture is the primary emphasis of the research being done at the moment. The problem-solving aspects of the area have often been the focal point of the study that has been carried out in relation to this issue. Despite this, there are still many obstacles to overcome with regard to the implications of cloud computing and agricultural precision. One of these challenges is the necessity of including an accuracy mechanism in order to ensure the integrity of Agriculture precision while it is operating in an environment that includes Cloud Computing. This is a necessity because one of these challenges is the necessity of including an accuracy mechanism. In addition to this, the traditional approaches to research need to be enhanced in order to deliver a greater degree of accuracy.

Keywords : Cloud Computing, Agriculture precision, Accuracy, Performance

I. INTRODUCTION

1.1 Cloud computing

One method that facilitates the transfer of data and other types of information is "cloud computing" [1]. What we have here is the provision of computer services. Among the numerous available services are server maintenance, data storage, database administration, application development, network administration, and network-based research. Many companies provide these types of IT services. The term "cloud specialist co-ops" describes this kind of company. They consistently add fees for businesses that use off-the-shelf processing solutions. It works the same way as the bills we get at home for electricity and water.

Advantages

Advantages of cloud computing [3] are outlined below.

1. Remote utilities might be made available to web-based operators.
2. You may use the cloud to get access to many online development resources.
3. The programmer may make changes and additions to it at any moment while it is live.
4. Cloud computing makes previously unavailable web-based resources instantly accessible to operators.
5. With cloud computing, users may get on-demand services without having to connect to a cloud-based specialist co-op.
6. When used properly, cloud computing may be very effective. It's highly economical given that it won't be used to its maximum capacity.
7. By distributing processing demands among several servers, cloud computing is more stable.
8. The use of load balancing in cloud infrastructures attests to their reliability.

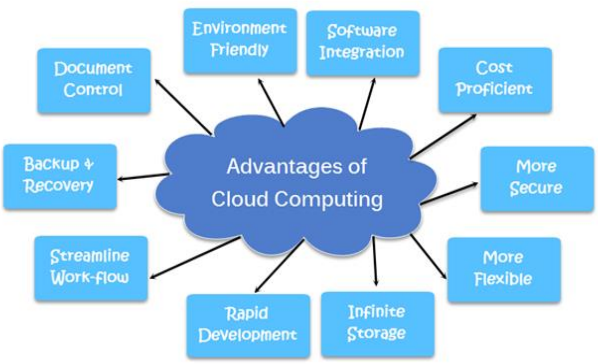

Fig: 2 Advantages of Cloud Computing

Need of Cloud Computing

1. It's available seven days a week and always willing to help.
2. Pay-as-you-go subscriptions in the cloud.
3. Owning a vehicle reduces overall transportation expenses.
4. Benefits such as reliability, flexibility, and low maintenance are available with cloud computing.
5. The Cost of Keeping Our Storage Areas Safe is Included.
6. It is reasonable to free up internal resources.
7. These systems are considered to be Fully Automated.
8. A need for these Systems is that they be useful.
9. It allows for quick and effortless deployments.
10. Ten. These structures don't care about your physical location or the gadget you're using.

a. Agriculture Precision

PA management considers both inter- and intra-field differences in crop yield. At the tail end of the 1980s, progress was made in both the theory and practise of PA. PA experts have set out to develop a DSS for farm management that would maximise returns on inputs while minimizing waste. The phytogeomorphological method is one such strategy; it correlates landscape features with the qualities and consistency of crop development over the course of many growing seasons.

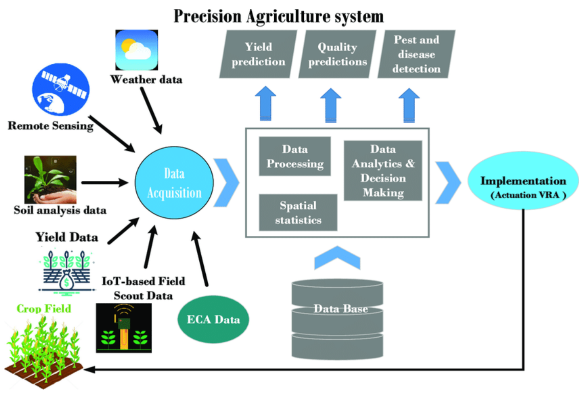

Fig: 4 Precision Agriculture System

Because geomorphology often controls the hydrology of farmland, the phytogeomorphological method is useful. Improvements in satellite navigation systems like GPS and GNSS have facilitated precision farming. Researchers and farmers may use maps to measure the geographical variability of a variety of parameters, including pH,crop yield,soil moisture, topographical characteristics, nitrogen levels, magnesium levels, and more. Similar information is gathered by the sensor arrays in the harvesters equipped with global positioning systems. Incorporating real-time sensors and multispectral imaging, the arrays allow for continuous monitoring of plant and crop water and chlorophyll levels. Utilizing satellite photos and data collected from seeders, sprayers, etc., VRT efficiently disposes of the resources. However, thanks to advances in technology, real-time sensors that can communicate without human intervention may now be installed wirelessly in the soil.

Unmanned aerial vehicles, or UAVs, have revolutionized agriculture by providing a cost-effective and user-friendly method for achieving pinpoint crop yields. Orthophotos may be made by using a variety of photogrammetric techniques to combine multiple large shots acquired with multispectral or RGB sensors placed on agricultural drones. Vegetative indices such as NDVI maps can only be analyzed and evaluated with the use of multispectral photographs, can have a lot more than just the basic RGB values per pixel. Drones are used by certain programmers to carry out complex algebraic map computations, taking pictures and gathering a wealth of data about the terrain, including its topography, altitude, and other features. As a consequence, precise maps of the area may be made. Once the connection between the environment and a plant's health has been mapped, several applications may be used to ensure inputs like water, chemical fertilizers, herbicides, and so on are provided.

1.1.4 Challenges

Connection problems are a major hindrance to the adoption of new technology by farmers. Despite the fact that there are over 90 million people who use the Internet (as reported by internal studies), we lack detailed information on how farmers make use of the web or smartphones in the agriculture sector. Large agribusinesses often use these methods, although small farmers are frequently unaware of their existence. 680 (or 68%) of 1600 American farmers surveyed regarded themselves to be Internet of Things beginners. The adoption and use of these technologies will be more challenging for smaller farms that are responsible for growing a greater diversity of crops. However, the investment required to create and maintain such technology would be significant. The cost of agricultural software and hardware goes substantially when it is damaged by factors such as high temperatures and humidity, heavy rains, strong winds and sand, and direct physical impact. As a result, deciding on the most effective approach for the firm would be a challenging task. A sound Internet of Things business plan is necessary in order for any agricultural goal to be realised. The second issue is ensuring that all of our electronic records are kept secure. It is vital to monitor and safeguard all linked devices since there is a risk of theft and abuse, as well as changes in product price and expenditures. The last hurdle is represented by the insufficient number of competent personnel. It would be difficult to evaluate and make sense of the information acquired and produced by such gadgets. Increased production has been possible for producers of agricultural equipment thanks to the use of tools and tactics for data analysis that make use of cloud computing. In spite of advances in technology, the agricultural industry continues to place a significant amount of reliance on outmoded systems, which only rarely provide sufficient levels of data backup or security. For the purpose of more accurate data collecting, some field observation drones, for example, may be attached to agricultural machines.

These devices, which are often connected to open networks as well as the internet, frequently lack even the most basic types of security, such as the capacity to monitor user behaviour or need of a second authentication factor for remote access.

II. LITERATURE REVIEW

Traditional security systems are plagued by the possibility of decryption without authentication. And, for a single path is used to transmit data, the probability of packet dropping and security breaches is more in traditional communication infrastructure. This warranted to develop a new security system. A Fog computing-based security has been proposed to thwart external-to-network attacks in a cloud environment. **[1]**

As an extension of cloud computing, fog computing is proving itself more and more potentially useful nowadays. Fog computing is introduced to overcome the shortcomings of cloud computing paradigm in handling the massive amount of traffic caused by the enormous number of Internet of Things devices being increasingly connected to the Internet on daily basis. Despite its advantages, fog architecture introduces new security and privacy threats that need to be studied and solved as soon as possible. In this work, we explore two privacy issues posed by the fog computing architecture and we define privacy challenges according to them. The first challenge is related to the fog's design purposes of reducing the latency and improving the bandwidth, where the existing privacy-preserving methods violate this design purposed.
He security and efficiency of our solution. **[2]**

Fog computing uses one or more collaborative end users or near-user edge devices to perform storage, communication, control, configuration, measurement and management functions. It can well solve latency and bandwidth limitation problems encountered by using cloud computing. First, this work discusses and analyzes the architectures of Fog computing, and indicates the related potential security and trust issues. Then, how such issues have been tackled in the existing literature is comprehensively reported. Finally, the open challenges, research trends and future topics of security and trust in Fog computing are discussed. **[3]**
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Cloud computing is the newest computing paradigm that makes computing resources available over the Internet on a utility costing basis. Cloud computing offers many advantages to users in terms of reduced cost, elimination of system administrative functions, increased flexibility, better reliability and location independence. Though these are definite advantages, cloud computing also suffers from certain limitations. These limitations arise from the very same reason that is considered an advantage too. Hosting of cloud data centres in the Internet creates large and unpredictable network latencies and undefined security issues as sensitive data is now entrusted to a third party. Also location independence of processing in cloud computing may also not desirable for certain types of networks such as sensor networks and Internet of Things. These services are known as location aware services and require location dependent fast processing. In order to overcome these limitations, researchers have proposed a new cloud computing model called fog computing where the cloud system is located either at the edge of the private network or very close to it. In this paper, the authors take an in depth look at both these technologies to investigate fog computing can reliably overcome the limitations of cloud computing and effectively replace it and become the de facto cloud computing model of the future. **[5]**

Without any doubt, cloud computing has become one of the most significant trends in any enterprise, not only for IT businesses. Besides the fact that the cloud can offer access to low cost, considerably flexible computing resources, cloud computing also provides the capacity to create a new relationship between business entities and corporate IT departments. The value added to the business environment is given by the balanced use of resources, offered by cloud computing. The cloud mentality includes the possibility to have access without storing or maintaining technologies. This leads not only to changing the way business is conducted, on an individual level, but it is also widely transforming purchase decision-making. [6]

III.Problem Statement

Several researches focus on the management of cloud computing for precision agriculture. To be effective, though, cloud computing must be included. Users should have access to the practical implementation of agricultural precision via a cloud-based, web-based interface. There can be no compromises in data security during transmission. Sensing data is filtered by parameters like livestock presence, soil nutrition, and soil moisture to achieve greater accuracy in agriculture. If there are any unfavorable circumstances, an alert will be generated. Conversely, the operation will be postponed if the preconditions are met.

IV.Proposed Research Methodology

The presence of animals, soil nutrition, and soil moisture are the three main factors used to classify sensor data in precision agriculture. In the case of any unfavourable situation, an alert will be sounded. On the other hand, when optimal circumstances exist, no action is taken. Recent studies on Smart Agriculture Solutions have made extensive use of Cloud Computing techniques. In previous studies, researchers frequently aimed to find answers to existing issues. Despite this, there are a few challenges brought up by the Implication of Cloud Computing for Smart Agriculture Solution. One of them is the necessity to implement an accuracy mechanism to guarantee the honesty of the Smart Agriculture Solution even when it's being run in a Cloud Computing setting. Research methods that have been used traditionally also need to be more precise.

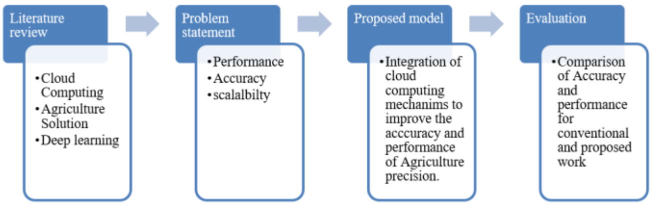

Fig : 5 Process flow of Proposed work

V. Conclusion

Data collected by sensors in precision agriculture is organised in three ways: by the presence or absence of animals, by the availability of soil nutrients, and by the amount of soil moisture. A notification will be sent if there is a problem. However, when conditions are favourable, no action is performed. Recently published research on "Smart Agriculture Solutions" has taken use of Cloud computing. Long studies have concentrated on the field's problem-solving aspects. However, the Implication of Cloud Computing for Smart Agriculture Solutions presents a number of obstacles, including the need to provide an accuracy mechanism to guarantee the integrity of Smart Agriculture Solutions when deployed to the cloud. Additionally, standard research techniques need increased accuracy.

VI.Scope of Research

Precision agriculture might lead to more effective use of inputs including herbicides, fertilisers, tillage, and irrigation water. More effective use of inputs has the potential to increase agricultural output and/or quality while decreasing the industry's total environmental impact. If precision agriculture is to be given more weight in policymaking, more research along these lines is required. In addition, deep learning's threat classification helps guarantee confidential data transfers, and picking the right people to lead each cluster is key to peak efficiency. The.NET-based, user-friendly web interface has potential to collect images from a wide range of cloud nodes deployed in a farming environment.

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