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Evaluation of Computer Application using DEMATEL Method

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Abstract

Computer Application. Software, also known as a set of instructions or code created in a program to carry out a task or function on a computer, is referred to as an "application." Applications are end-user programs that assist users in performing several tasks on a computer, hence they play a significant part in a computer. The knowledge required to use application software on a computer is provided by a computer applications program. Word processing, spreadsheets, databases, desktop publishing, the Internet, and Windows operating systems are examples of applications. A computer is a handy instrument that can be used for decision-making, processing student data, creating manuals and references, and teaching and learning. Online learning also makes use of computers. occupations. Computers are used for budgeting, process control, and industrial research. Any computer's operating system is the most crucial piece of software. An operating system governs the operation of every computer system. Applications for computers facilitate communication, workflow, and efficiency. It makes sense that companies would wish to exploit them. However, all programs require intelligent users, as we well know. Companies seek qualified personnel who can reach their full potential. A utility system is a business-oriented system, such as a public ledger. DEMATEL (Decision-Making Trial and Evaluation Laboratory). They are divided into analyses using the Computer Application of the Reliability, Security, Data Storage, Data location, Mobility Evaluation Parameters Reliability, Security, Data Storage, Data location, Mobility in the value. Reliability, Security, Data Storage, Data location, Mobility. Reliability, Security, Data Storage, Data location, Mobility. Data Storage has the highest rank whereas Data location has the lowest rank.

Keywords: Cloud computing, Classes of Service for Fog Applications, DEMATEL Method

1. Introduction

Cloud computing, which combines several computing disciplines, has grown incredibly popular in recent years. Over the Internet, cloud computing offers computers, storage, services, and applications. Additionally, cloud computing offers flexibility in resource provisioning to lower capital costs and deliver services that are independent of the underlying technology. The complexity of smartphone applications drives up the demand for computing power. Due to limitations like low processing power, small memory, erratic network connectivity, and short battery life, many apps are still not appropriate for smartphones. Electricity networks and communication infrastructure are both parts of a "smart grid." A smart grid can deliver electricity with higher efficiency and dependability than a conventional power system since it allows for two-way communication and power transfer. An electrical network made up of intelligent nodes that can function, communicate, and interact autonomously to efficiently supply electricity to clients is referred to as a "smart grid." This variety in smart grid architecture promotes the use of cutting-edge technologies to address distinct technical issues at various levels. To manage millions of smart meters in a secure, dependable, and scalable manner, applications must expand this communication network management system to a distributed data center. In this regard, cloud computing is expected to be a major driving force behind the development of future smart grids. A new technology called cloud computing can quickly offer simple, on-demand network access to pooled computer resources and can be implemented with little management work or service provider involvement. Through a network-connected device, a customer can access their applications from any location at any time using cloud infrastructure. An essential paradigm for gaining access to resources for distributed computing is cloud computing. Commercial vendors provide environments for creating and delivering cloud-based apps, including Amazon, Rack space, and Microsoft. Although there are many different definitions of cloud computing, most of them have key traits, such as the availability of virtualized environments and computer resources as needed. The recently funded DOE Magellan Project's objective is to assess the viability of using cloud computing to satisfy DOE's computing requirements. The program assesses the technology and business cloud products currently available. This paper's goal is to study the effectiveness of current cloud computing infrastructures and create a system for their quantitative assessment. The performance of Amazon EC2, which we think to be typical of the current major commercial cloud computing services, was the subject of our initial research. The transmission delays between cloud and end devices are deemed too long and unsuitable for delay-sensitive applications, presenting significant limits, despite the growing interoperability of the Internet of Things (IoT), mobile, and multimedia apps. Applications that require low latency on the cloud for mobile devices.

2. Cloud Computing

It is suggested that cloud computing technology can offer flexible, on-demand processing and storage services for a range of applications. It is made up of a pooled collection of virtualized resources (such as computation, communication, storage, applications, and services) that are housed in centralized, sizable data centers. With little administrative work, these resources can be swiftly provided and deployed to fit various workloads. Moving computing tasks to the cloud has become an effective method since it has greater computational capacity than network edge devices. However, the rapid development of IOT, CPS, and mobile internet is producing a variety and volume of data that is unheard of. It is nearly difficult to transport all the data to the cloud for processing and storage since network capacity has become the cloud computing industry bottleneck. Increased network delay is a result of increased data volume. Because real-time applications like health monitoring and emergency response require quick data transfers, the procedure for doing so is susceptible to latency and unacceptably slow. Additionally, more advanced infrastructures are necessary to support cloud computing. primarily huge data centers with tens of thousands of servers as well as supporting hardware including cooling systems. These infrastructures can use a significant amount of energy. The concepts and architecture of cloud computing and fog computing are distinct. But computational, connectivity and storage resources are what they are all focused on. They strike a balance between the allocation of these resources to various priorities. The conventional location of cloud computing is a centralized data center, remote from edge devices. As a result, while fog computing relies on wired or wireless communication (such as WLAN, WiFi, 3G, 4G, ZigBee, etc.), cloud computing's communication model primarily depends on IP networks (part of IP networks). Cloud computing can be more reliable than native computing, depending on how well the core network is designed. Cloud computing has a high bandwidth cost and robust computation and storage capacities, in accordance with the characteristics of the two computer architectures.

3. Classes Of Service for Fog Applications

New applications are made possible by fog computing, especially those that require mobility and strict latency restrictions. The varied QOS requirements for these new applications will require ice management techniques to successfully manage that variability. As a result, resource management in fog computing is more difficult and requires integrated algorithms that can change the distribution of resources on the fly.

Reliability:

The capacity of fog component parts to carry out the intended function in the face of various types of failures is referred to as reliability. In order to complete activities within predetermined latency constraints, some systems demand the quick recovery of failing fog components.

Security:

Designing and executing authentication and authorization strategies to safeguard private and sensitive data created by end users is referred to as security.

Data location:

The data location specifies the storage place for application data. Data can be kept locally on the end device, nearby, in a cloud, in a faraway barn, or in a foggy corner. The amount of data that must be located for a given application depends on a number of variables, including the required reaction time, the computing power of each fog layer, and the accessibility of network connections.

Mobility:

Many edge devices have mobility as a core feature. It is necessary to guarantee service continuity for more mobile end customers. The essential processing requires a constant connection.

4. Dematel Method

The DEMATEL technique can Specific hassle, pinup Bound troubles, and structural modelling strategies that may make contributions to figuring out solutions that could paint thru a hierarchical shape, identifying the interdependence among the additives of an organization for a purpose, and influencing the fundamental Concept of situational relations Due to the influence of the elements The chart uses loads of directional graphs. Built on the basic precept of DEMATEL, it executes Issues via visualization techniques Analyses and solutions. Modelling this structure Approach adopts the form of a driven diagram, which is a causal effect for presenting values of influence between interrelated relationships and factors. By analyzing the visual relationship of conditions between systemic Factors, all components of A causal group and the effect are divided into groups. It also provides researchers with Structure between system components Better understanding of the relationship and complexity for troubleshooting computer problems Can find ways. The DEMATEL system is integrated with Emergency management together with Manage. In the manner proposed, it is not necessary to defuzzify obscure numbers before using the DEMATEL method. Therefore, this method is uncertain of whether evaluation Will truly reflect the character. Finally, to get the final results from different aspects Twice in each integrated PPA We use DEMATEL, which is ours. Decision Testing and Assessment Laboratory (DEMATEL). The DEMATEL method is a powerful method of gathering team knowledge to build a structured model and visualize the causal relationship of subsystems. But crisp values The ambiguity of the real world Is adequate reflection. DEMATEL explores the interdependence between equity The number of investment factors and factors and ANP to assess their dependencies Integrated. This section is, first of all, DEMATEL Establishes network relationships through, secondly, for each factor ANP to increase weight compared to Uses. Third, a systematic data collection process is provided. The DEMATEL method effectively calculates the consequences between criteria, which efficiently separates the set of complicated elements right into a sender organization and a recipient institution and transforms it right technique to choosing a management gadget Between alternate configurations Explicit Priority Weights come from in addition, the ZOGP model allows companies to make full use of limited resources for planning to implement optimal management systems. DEMATEL methods. This influence and causal Group barriers pro or Source for affected group barriers Can be considered due. Therefore, to effectively implement electronic waste management, barriers belonging to a causal or an influential group Should be considered on a priority basis. Therefore, decision-makers need to determine obstacles. The legal framework is strong. Make sure it is controllable to minimize impact or influence barriers. Therefore, derived from ISM and DEMATEL methods the results are somewhat consistent. Integrated ISM DEMATEL Results for e-waste management constraints determines not only the structure but also the structure and the interactions between these barriers.

TABLE 1. Computer Application

	Reliability	**Security**	**Data Storage**	**Data location**	**Mobility**	**Sum**
Reliability	0	7	5	8	4	24
Security	9	0	5	3	6	23
Data Storage	5	8	0	4	9	26
Data location	7	5	8	0	9	**29**
Mobility	6	4	9	3	0	22

Table 1 shows that DEMATEL Decision making trail and evaluation laboratory in Computer Application Reliability, Security, Data Storage, Data location, Mobility sum of the pair in the value zero.

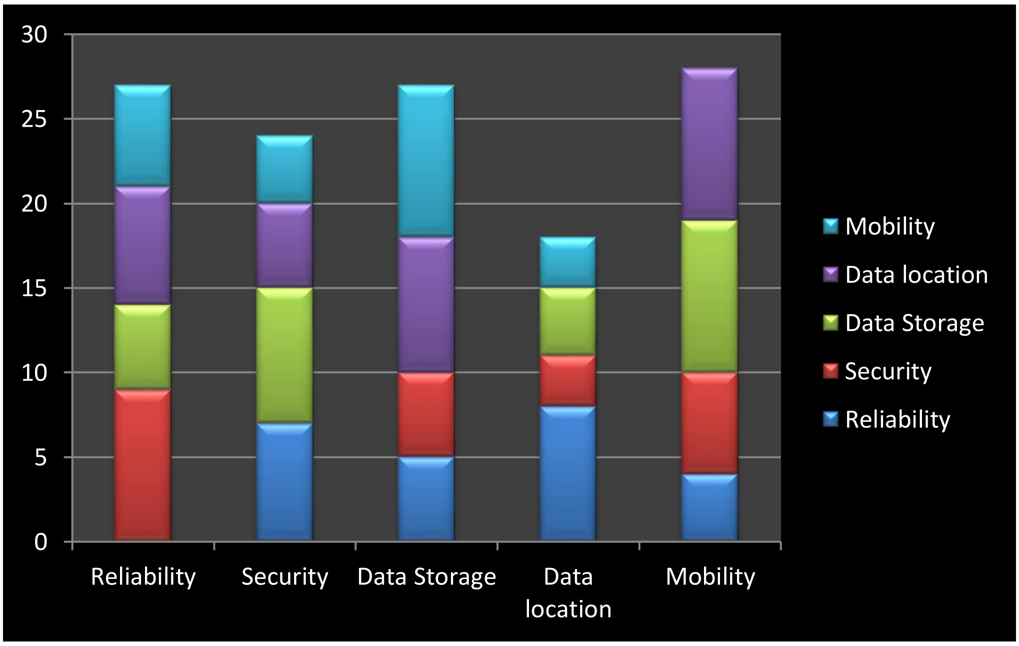

FIGURE 1. Computer Application

Figure 1 shows that DEMATEL Decision making trail and evaluation laboratory in Computer Application Reliability, Security, Data Storage, Data location, Mobility sum of the pair in the value zero.

TABLE 2. Normalizing Of Direct Relation Matrix

Normalizing of direct relation matrix					
	Reliability	**Security**	**Data Storage**	**Data location**	**Mobility**
Reliability	0	0.24137931	0.172413793	0.275862069	0.137931
Security	0.310344828	0	0.172413793	0.103448276	0.206897
Data Storage	0.172413793	0.27586207	0	0.137931034	0.310345
Data location	0.24137931	0.17241379	0.275862069	0	0.310345
Mobility	0.206896552	0.13793103	0.310344828	0.103448276	0

Table 2 shows that the Normalising of direct relation matrix in Computer Application Reliability, Security, Data Storage, Data location, Mobility. The diagonal value of all the data set is zero.

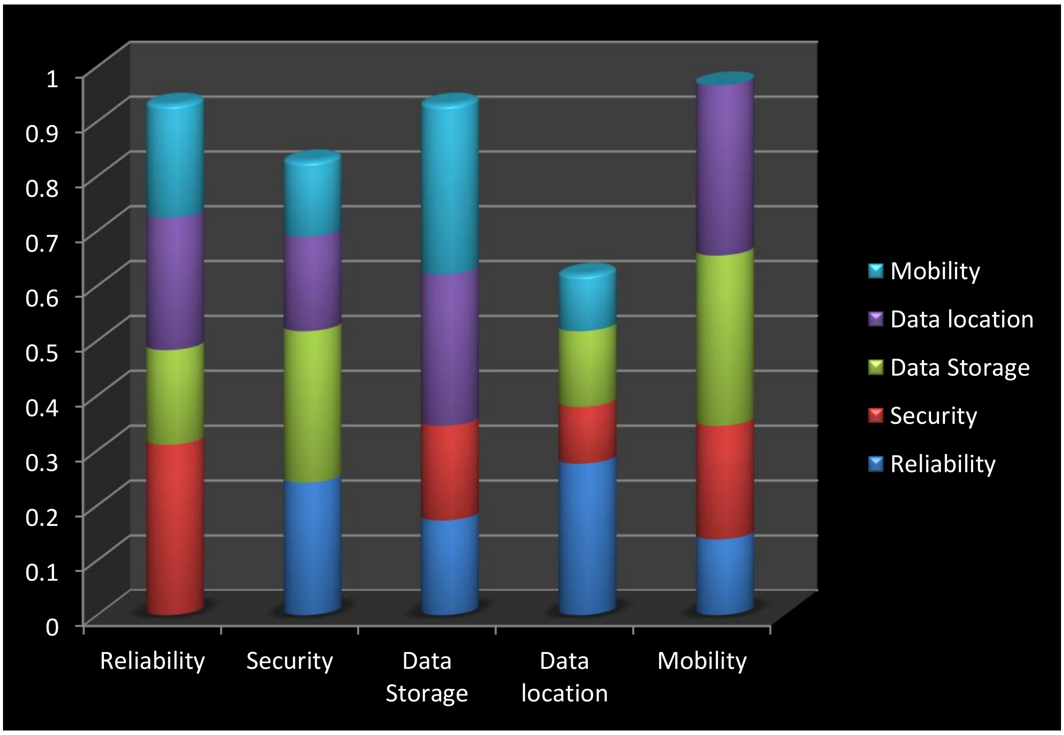

FIGURE 2. Normalising Of Direct Relation Matrix

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TABLE 3. Calculate the total relation matrix

Calculate the total relation matrix					
	Reliability	**Security**	**Data Storage**	**Data location**	**Mobility**
Reliability	0	0.24137931	0.17241379	0.275862069	0.137931034
Security	0.310344828	0	0.17241379	0.103448276	0.206896552
Data Storage	0.172413793	0.275862069	0	0.137931034	0.310344828
Data location	0.24137931	0.172413793	0.27586207	0	0.310344828
Mobility	0.206896552	0.137931034	0.31034483	0.103448276	0

Table 3 Shows the Calculate the total relation matrix in Computer Application Reliability, Security, Data Storage, Data location, Mobility Calculate the Value.

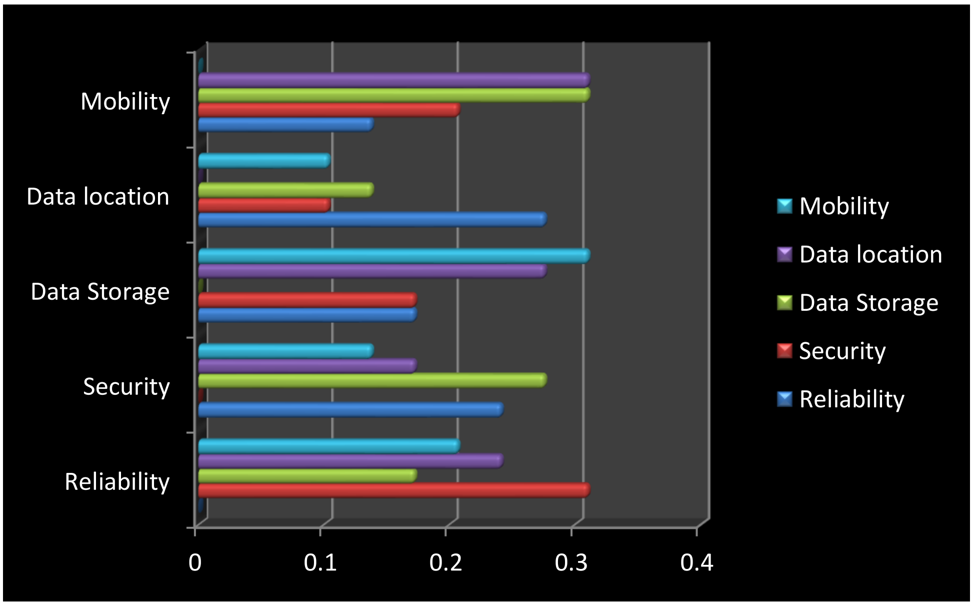

FIGURE 3. Calculate the total relation matrix

Figure 3 Shows the Calculate the total relation matrix in Computer Application Reliability, Security, Data Storage, Data location, Mobility Calculate the Value.

TABLE 4. T= Y (I-Y)-1, I= Identity matrix

I				
1	0	0	0	0
0	1	0	0	0
0	0	1	0	0
0	0	0	1	0
0	0	0	0	1

Table 4 Shows the T= Y (I-Y)-1, I= Identity matrix in Reliability, Security, Data Storage, Data location, Mobility is the common Value.

TABLE 5. Y

Y				
0	0.24137931	0.17241379	0.275862	0.137931
0.310344828	0	0.17241379	0.103448	0.206897
0.172413793	0.27586207	0	0.137931	0.310345
0.24137931	0.17241379	0.27586207	0	0.310345
0.206896552	0.13793103	0.31034483	0.103448	0

Table 5 Shows the Y Value in Reliability, Security, Data Storage, Data location, Mobility is the Calculate the total relation matrix Value and Y Value is the same value.

TABLE 6. I-Y Value

I-Y				
1	-0.24138	-0.17241	-0.27586	-0.13793
-0.31034	1	-0.17241	-0.10345	-0.2069
-0.17241	-0.27586	1	-0.13793	-0.31034
-0.24138	-0.17241	-0.27586	1	-0.31034
-0.2069	-0.13793	-0.31034	-0.10345	1

Table 6 Shows the I-Y Value Reliability, Security, Data Storage, Data location, Mobility table 4 T= Y (I-Y)-1, I= Identity matrix and table 5 Y Value Subtraction Value.

TABLE 7. (I-Y)-1 Value

(I-Y)-1				
2.041828	1.151327	1.186843	0.969059	1.18891
1.218989	1.902913	1.121277	0.80784	1.160534
1.225451	1.207896	2.0807	0.888672	1.340467
1.38692	1.251093	1.424114	1.860469	1.4695
1.114371	1.004964	1.193269	0.780178	1.974079

Table 7 shows the (I-Y)-1Value Reliability, Security, Data Storage, Data location, Mobility Table 6 shown the Min verse Value.

TABLE 8. Total Relation Matrix (T)

Total Relation matrix (T)				
1.041828	1.151327	1.186842637	0.969059	1.18891
1.218989	0.902913	1.121277433	0.80784	1.160534
1.225451	1.207896	1.0807005	0.888672	1.340467
1.38692	1.251093	1.424114287	0.860469	1.4695
1.114371	1.004964	1.193269411	0.780178	0.974079

Table 8 shows the Total Relation Matrix the Reliability, Security, Data Storage, Data location, Mobility direct relation matrix is multiplied with the inverse of the value that the direct relation matrix is subtracted from the identity matrix.

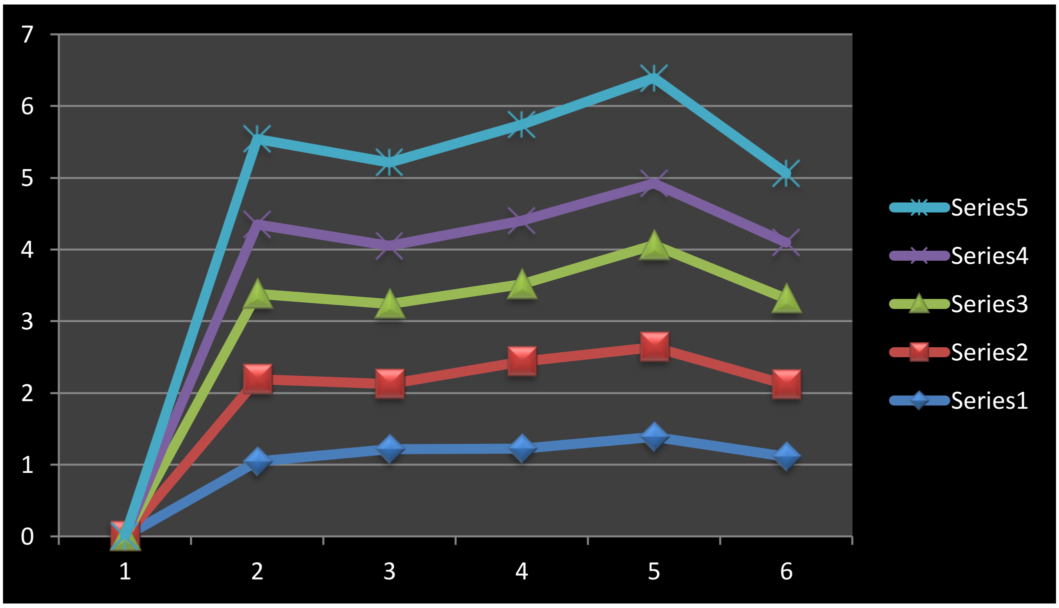

FIGURE 4. Total Relation Matrix (T)

Figure 4 shows the Total Relation Matrix the Reliability, Security, Data Storage, Data location, Mobility direct relation matrix is multiplied with the inverse of the value that the direct relation matrix is subtracted from the identity matrix.

TABLE 9. Ri, Ci Value

	Ri	Ci
Reliability	5.537967	5.98756
Security	5.211555	5.518193
Data Storage	5.743187	6.006204
Data location	6.392096	4.306219
Mobility	5.066862	6.13349

Table 9 shows the healthcare information system Reliability, Security, Data Storage, Data location, Mobility Ri, Ci Value. Data location is showing the Highest Value for Ri and Mobility is showing the lowest value. Mobility is showing the Highest Value for Ci and Data location showing the lowest value.

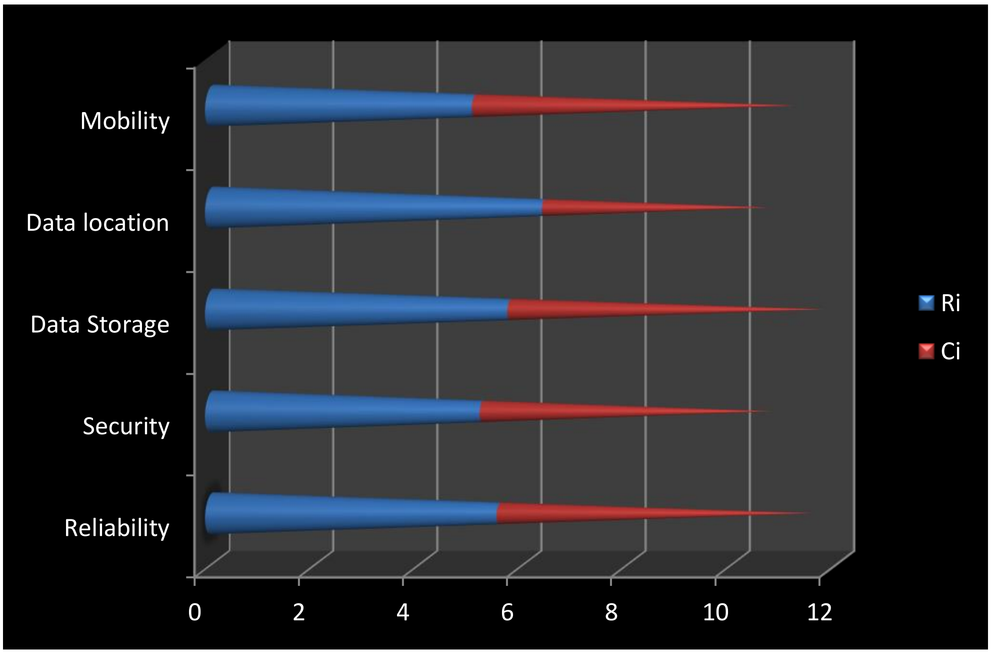

FIGURE 5. Ri, Ci Value

Figure 5 shows the healthcare information system Reliability, Security, Data Storage, Data location, Mobility Ri, Ci Value. Data location is showing the Highest Value for Ri and Mobility is showing the lowest value. Mobility is showing the Highest Value for Ci and Data location showing the lowest value.

TABLE 10. Calculation of Ri+Ci And Ri-Ci To Get The Cause And Effect

	Ri+Ci	Ri-Ci	Rank	Identity
Reliability	11.52553	-0.44959	2	cause
Security	10.72975	-0.30664	4	cause
Data Storage	11.74939	-0.26302	1	effect
Data location	10.69831	2.085877	5	effect
Mobility	11.20035	-1.06663	3	effect

Table 10 shows the Calculation of Ri+Ci and Ri-Ci to Get the Cause and Effect. Computer Application Reliability, Security, Data Storage, Data location, Mobility. Data Storage got the first rank whereas Data location, has the lowest rank.

TABLE 11. T Matrix Value

T matrix				
1.041828	1.151327	1.186843	0.969059	1.18891
1.218989	0.902913	1.121277	0.80784	1.160534
1.225451	1.207896	1.0807	0.888672	1.340467
1.38692	1.251093	1.424114	0.860469	1.4695
1.114371	1.004964	1.193269	0.780178	0.974079

Table 11 shows the T Matrix Value Calculate the Average of the Matrix and Its Threshold Value (Alpha) Alpha **1.118067** if the T matrix value is greater than threshold value then bolds it.

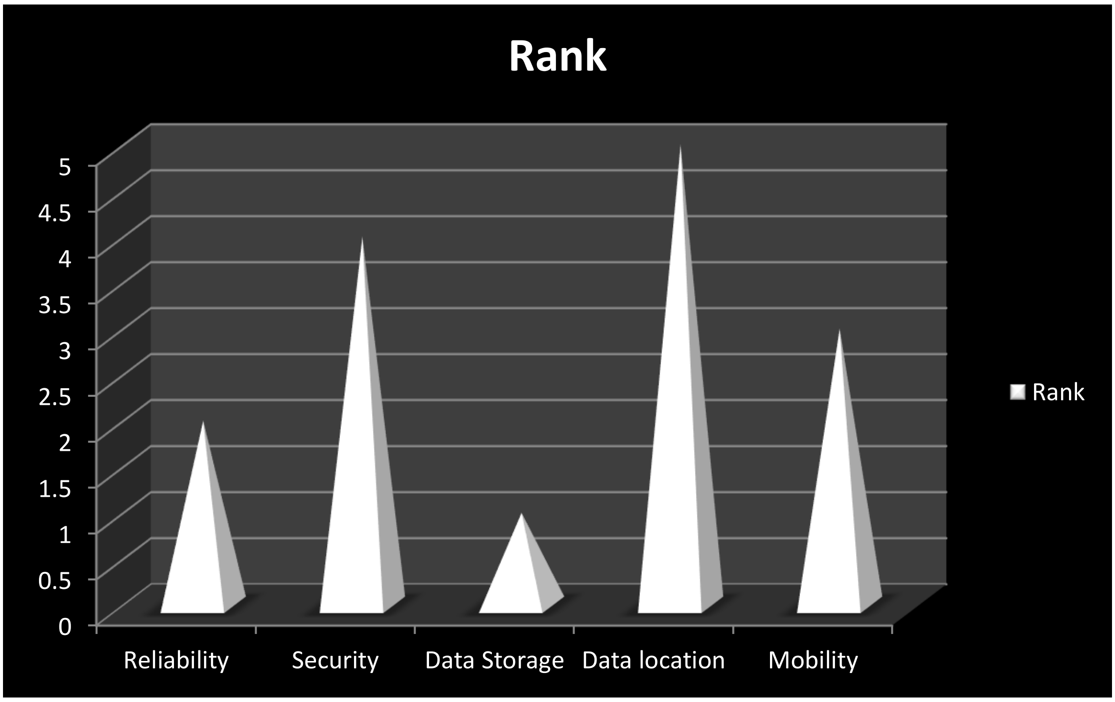

FIGURE 6. Shown the Rank

Figure 6 shows the Rank using the DEMATEL for Data Storage got the first rank whereas Data location, has the lowest rank.

5. Conclusion

Programmers are required to do extensive coding by several application models. The loading of elements (applications, components, and clones) to various platforms is restricted by the fact that developed applications typically support a single execution platform. Additionally, new energy consumption models are required to enable precise decision-making when taking into account the major players in the loading process. In order to achieve dependable, efficient, and secure energy distribution, it is necessary to integrate cloud computing into the architectures of the smart grids that are now in use. Security, information management, and a number of other smart grid-related topics are covered. We detected some significant technological problems and suggested a number of new areas for cloud-based smart grid research. First, based on their QOS requirements, possible fog computing applications are divided into seven COSs. The dataset is pre-processed in this step to change previously meaningless data into new data that ML algorithms may utilize. Then, using samples from a synthetic database for training and testing, a group of well-known ML algorithms is chosen, and the performance and accuracy of their predictions of an application's COS are evaluated. various intensities of the distinctive noise. Glacier does training and testing to gauge the level of strength for each sound. The rapid expansion of IOT, CBS, and mobile Internet has increased the importance of fog computing, a high-potential computing model. The common paradigm pushes more applications and services from the cloud to the network edge by fully using geographically dispersed network edge devices. It efficiently satisfies the requirements of real-time or delay-sensitive applications, cuts down on network transmission volume and time, and alleviates network bandwidth constraints. The technology of fog computing is the main topic of this essay. Both a brief and detailed analysis of the architecture, major technologies, applications, difficulties, and outstanding problems are provided. The hierarchical architecture of fog computing and its characteristics are reviewed and presented. And in terms of parallels and differences, fog computing is contrasted with cloud computing and edge computing. To fully support its implementation and use, key technologies like computing, communication, and storage technologies, naming, resource management, security, and privacy protection are summarised.

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