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Quantifying the Impact of Operating System Design Choices on Performance using Grey Relational Analysis Method

Gayatri Parasa

Department of Computer Science & Engineering,Koneru Lakshmaiah Education Foundation

gayathriparasa20@gmail.com

M. Arulselvi

Department of Computer Science & Engineering ,Annamalai University, Tamilnadu.

marulcse.au@gmail.com

Abstract.

to ensure the correctness of computer resources and deal with failures, it is important to synchronize accesses when running applications. System transactions adhere to the principles of atomicity, consistency, isolation, and durability (acid). By utilizing a reliable operating system, programmers can specify updates for various computing resources. Cloud computing allows for memory analysis for security, which is highly useful in detecting malicious activity without the need for installation on virtual machines. It enables quick scanning of a large number of virtual machine instances. Routing in this context requires minimal processing and buffering of devices. The principle of gray system was initially proposed to describe data in a backward, incomplete, and transient system. Gray relations assess the adequacy of knowledge datasets given general-purpose systems, which consume less energy and are environmentally friendly. Integrating the philosophy of ambal aims to make writing easier and provide services in a timely manner based on specific conditions. When it comes to supplier selection, previous research primarily focused on modeling problems and the capabilities of centralized manufacturers and suppliers. However, in the context of corporate social responsibility, there is a growing emphasis on examining the capabilities of suppliers in an institutional context and accepting responsibility for the broader society. Please note that some sentences required assumptions or clarifications for accurate revision. the operating system serves as a framework that enables user application programmers to communicate with computer hardware. It provides a structured environment where programmers and applications can perform various useful tasks. However, developing and implementing an operating system can present numerous

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challenges, including design and implementation issues. From the result it is seen that Operating system 1 is got the first rank where as is the Operating system 3 is having the lowest rank

Keywords: Memory management, Process management, Storage management, Operating system

1. INTRODUCTION

An operating system (OS) is a combination of computer hardware and software that manages and allocates resources for the efficient execution of computer programs. It provides essential services to facilitate tasks such as time-sharing, memory management, file storage, printing, and cost allocation. The OS also includes wireless sensor networks, which enable communication among small sensor devices and facilitate the transmission and analysis of sensor data. In the realm of cloud computing, memory analytics plays a crucial role in security. It is particularly useful in detecting and mitigating malicious activities in virtual machines without requiring their installation. By quickly scanning a large volume of virtual machine instances, potential threats can be identified. In terms of optimization, several improvements have been made to reduce tool overhead. This includes computing equivalent instruction classes and assigning identifiers to streamline code checking and eliminating redundant reading and writing tools through static analysis of the compiler's low-level intermediate representation. Over the past 15 years, the computing environment has undergone significant changes, with widespread physical distribution and increased computing power. However, the level of security has not always kept pace. Attacks on computer systems have exploited vulnerabilities such as physical security, temporary protection methods, password guessing, and software errors. To combat these new types of attacks, the best security systems need to adapt quickly, reconcile easily, and have sufficient knowledge and access control. While general-purpose operating systems can easily support dynamic applications, the case is different for sensor nodes in embedded systems. The resourcefulness and energy constraints in such settings introduce tensions, making it necessary to develop specialized operating systems. The Inferno platform, designed for environments like advanced phones, mobile devices, cable TV set-top boxes, satellite systems, and cheap internet computers, is an example of a platform that supports various networks and can be controlled through software. Organizational facilities, such as Lucent Technologies' Inferno-based firewall called Cygnet, are developed to secure access to

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the computer's internet connection externally. It is a clear example of how products and offerings can be related to the control and support of switches, routers, and other relevant functionality.

MATERIALS & METHODS

Alternative: Memory management, Process management, Storage management, protection and security

Evaluation parameter: Operating system 1, Operating system 2, Operating system 3, Operating system 4, Operating system 5.

Memory management: Memory management refers to the control and coordination of the primary memory in a computer system. It ensures efficient management and allocation of memory space, allowing the operating system, programs, and other processes to access the memory they need to function properly.

Process management: Process management involves the design and implementation of process structures to support organizational objectives. It includes measuring and installing process measurement systems, as well as providing training and organizing processes within a company to align with strategic goals.

Storage management: Storage management focuses on increasing the efficiency of data storage resources through software and procedures. It encompasses various aspects such as process automation, storage provisioning, network virtualization, replication, mirroring, protection, abstraction, deduction, traffic analysis, and memory management.

Protection and security: Protection and security are crucial aspects of an operating system. Protection ensures that only authorized users have access to system resources, while security deals with both internal and external threats. Protection mechanisms respond to fundamental questions related to resource access control, while security measures safeguard the system against external dangers.

Operating system: An operating system (OS) is a system comprised of computer hardware and software that controls and manages system resources. It serves as a standard for computer programs and acts as a service provider for various software applications. The OS facilitates better resource utilization, supports time-sharing of program activities, and handles tasks such as processing time, mass storage, printing, cost allocation, accounting, and memory allocation. It acts as a bridge between hardware and software, enabling the functionality of applications

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and providing essential services for various devices ranging from mobile phones and game consoles to web servers and supercomputers.

Grey Relational Analysis (GRA): Gray correlation analysis (GRA), this type of problem to solve data envelopment analysis facility analyzed. Layout and dispatch rules both cases of selection problem are gra's to illustrate the application, gra procedure were analyzed using gra's core process is first of all compare the performance of alternatives sequential translation. This step ash is called associated formation. Then, compare all gray between rows and reference row the correlation coefficient is calculated. Finally, this gray is related in terms of coefficients, reference sequence and for each comparison sequence the gray in between relative quality is calculated [13]. The surface roughness and bur of the work piece drilling process parameters for height gray related analysis to improve application introduced. An orthogonal sequence to the experimental design was used. Many performances characteristics surface gray for hardness and burr height ash obtained from corresponding analysis machining parameters optimized by relevant standards are determined. By the author of this work for better knowledge, gray is related drilling down using analysis optimization and in the process effect of cutting parameters on several performance characteristics there is no published work to evaluate [14]. Deng (1989) is a gray relational proposed the analysis. Gray relational analysis is gray relational approximate rows using grade a method of measuring quantity. Some other researchers of process parameters optimization has also been studied. Die-sinking EDM machining parameters related to gray to shape analysis. In polycarbonate composites of yield stress and elongation injection molding for mechanical properties to obtain optimum parameters of the process gray relational analysis. The simulation used the taguchi method and presented an ash-related analysis. Taguchi method and gray related analysis with several performance characteristics improve turn functions. Particle with multiple performance properties wire of reinforced material is electric to optimize the extrusion process gray relational analysis. Taguchi method and gray relational analysis final grinding dry for high purity graphite in process improve machining parameters [15]. Gray correlation analysis, a weighted average in practice depends on several criteria. Several criteria have been proposed decision making for ordering goods. Gray correlation analysis (GRA) is commonly used in asia. It's an impact assessment model, which is relational two in terms of quality similarity between rows or measures the degree of difference. A global comparison to a local comparison is done by measuring the distance between two data sets between two points. Gra has the merit of point set topology therefore, it is subjective to the parameters in the model

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avoids side effects of the system. Using the ordered pair concept available products and eol the two result domains of the strategy are linked this article is going to provide the method. To apply this domain-combination method the gra model is obviously appropriate [16] Istanbul stock exchange (ISE) some funds in the financial sector index order shares of companies do gray correlation analysis (GRA) is used. Gra has become a benchmark of global comparability contains and to instead, it does not change any hierarchical structure. To retain eligibility, all criteria are also the means of decision are equally distributed. The original decision model was multilevel if in a multilevel hierarchical structure, multiple a level from levels weighting for performance characteristics a change must be made [17] Gray correlation analysis (GRA) based on the use of optimization of wastewater treatment alternatives gray is related to selection analysis. Bad, incomplete and to deal with uncertain information it has been proven to be effective. The main directions gray relational analysis (GRA) is in current applications one of gray system. Gray relationship grades multiple performance by optimizing complexity between characteristics gra can be used to effectively resolve correlations [18]. Gray relational analysis is used with many performance characteristics to solve the turning functions. As a performance index gray relative quality using the taguchi method optimum cutting parameters by can be determined. Ash taguchi by relational analysis multiple performance characteristics by method an overview of optimization first is given. Then, cut select and turn parameters evaluation of machine performance in operations is discussed. Gray communication of taguchi method by analysis basically turn functions the upgrade is described in detail [19]. In gray correlation analysis, electrode wear, material removal rate and surface roughness test results are initially zero, in the normalized range, it is gray, also known as correlation formation. For determining optimum machining parameters gray relational analysis, it is reported step by step. Many considering performance characteristics optimum machining parameters are obtained [20]. The following conclusions on the benefits of using the Gra method are based on original data, a gray area in multi-attribute decision making (MADM) problems is correlation analysis (GRA) method. The calculations are simple and easy to understand. In a business context helps in making management decisions this is one of the best methods [21] multi-functional properties surface removal rate and maximum surface area all 203 particles with hardness for machining reinforced material optimized wire electrical discharge machining (WEDM) gray to determine the parameters correlation analysis. Gray relational analysis method material removal rate using the tool abrasion, surface roughness and specific shear stress of multi-functional properties

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including basically cutting speed, feed rate, turning parameters such as depth of cut and machining time [22].

RESULT AND DISCUSSION

TABLE 1. Operating System

	Operating System			
	Memory management	**Process management**	**Storage management**	**protection and security**
Operating system 1	43.65	140.69	33.16	35.63
Operating system 2	23.63	142.97	38.65	45.63
Operating system 3	36.63	130.56	42.51	53.36
Operating system 4	23.17	148.50	46.51	41.63
Operating system 5	45.56	186.41	36.65	50.16

Table 1 shows that the Alternative: Memory management, Process management, Storage management, protection and security. Evaluation parameter: Operating system 1, Operating system 2, Operating system 3, Operating system 4, Operating system 5

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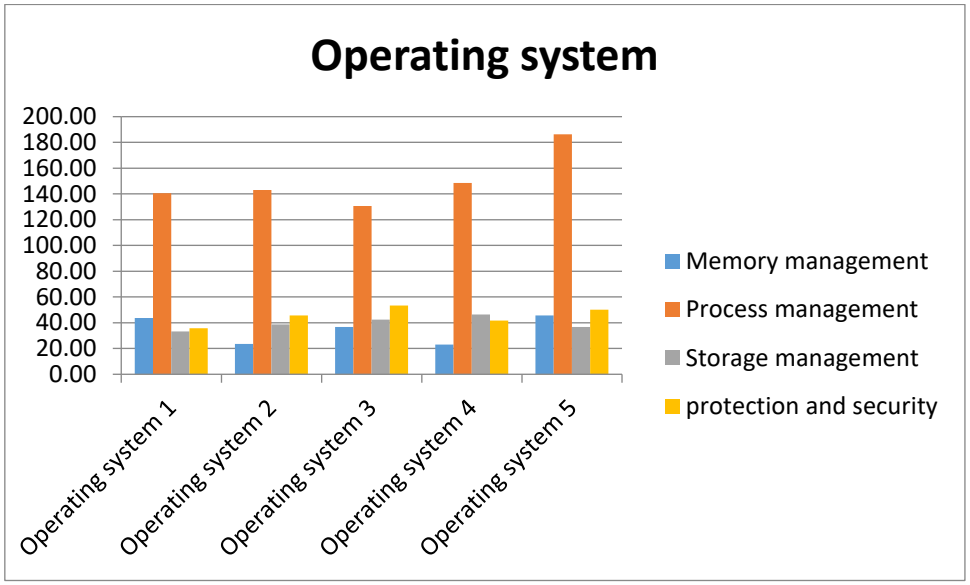

FIGURE 1. Operating System

Figure 1 Shows the Memory management it is seen that Operating system 5is showing the highest value for Operating system 4 is showing the lowest value. the Process management it is seen that Operating system 5 is showing the highest value for Operating system 3 is showing the lowest value. the Storage management it is seen that Operating system 4 is showing the highest value Operating system 1 for is showing the lowest value. the protection and security it is seen that Operating system 3 is showing the highest value for Operating system 1 is showing the lowest value.

TABLE 2. Normalized data

	Normalized Data			
	Memory management	**Process management**	**Storage management**	**protection and security**
Operating system 1	0.9147	0.1814	1.0000	1.0000
Operating system 2	0.0205	0.2222	0.5888	0.4360
Operating system 3	0.6012	0.0000	0.2996	0.0000

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Operating system 4	0.0000	0.3212	0.0000	0.6616
Operating system 5	1.0000	1.0000	0.7386	0.1805

Table 2 shown that the normalized data for Operating system 1, Operating system 2, Operating system 3, Operating system 4, Operating system 5. These values are calculated using by formulas showing in figure 2.

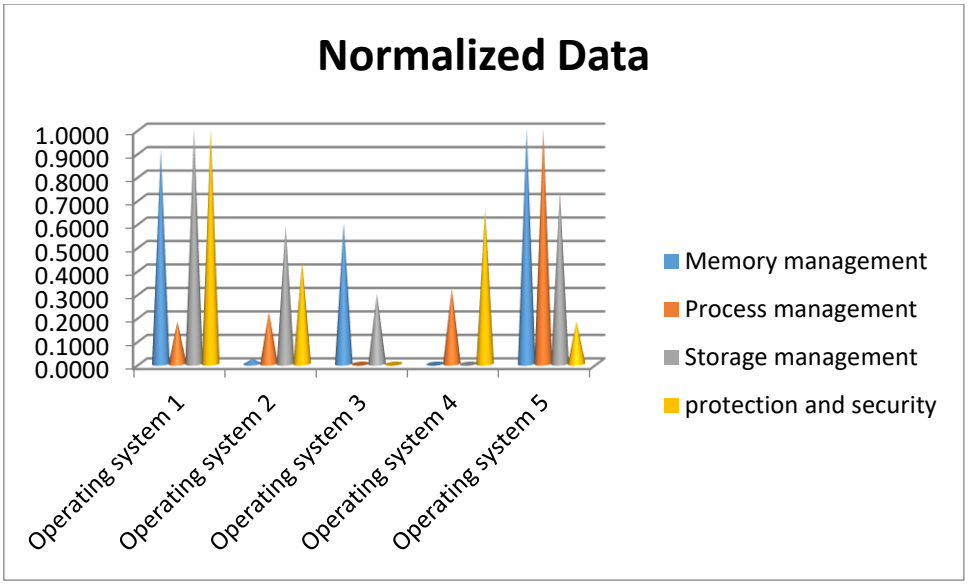

FIGURE 2. Normalized Data

TABLE 3. Deviation Sequence

	Deviation sequence			
	Memory management	**Process management**	**Storage management**	**protection and security**
Operating system 1	0.0853	0.8186	0.0000	0.0000
Operating system 2	0.9795	0.7778	0.4112	0.5640

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Operating system 3	0.3988	1.0000	0.7004	1.0000
Operating system 4	1.0000	0.6788	1.0000	0.3384
Operating system 5	0.0000	0.0000	0.2614	0.8195

Table 3. Deviation Sequence shows the Alternative: Memory management, Process management, Storage management, protection and security. Evaluation parameter: Operating system 1, Operating system 2, Operating system 3, Operating system 4, Operating system 5.

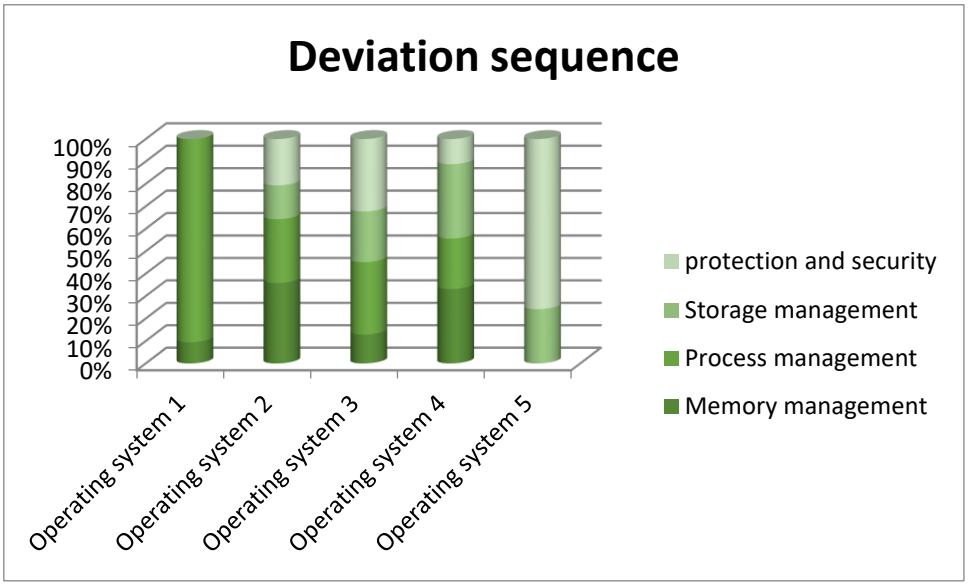

FIGURE 3. Deviation Sequence

TABLE 4. Grey relation coefficient

	Grey relation coefficient			
	Memory management	**Process management**	**Storage management**	**protection and security**
Operating system 1	0.5757	0.3792	1.0000	1.0000
Operating system 2	0.3365	0.3913	0.5487	0.4699

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Operating system 3	0.4608	0.3333	0.4165	0.3333
Operating system 4	0.3333	0.4242	0.3333	0.5964
Operating system 5	0.6176	1.0000	0.6567	0.3789

Table 4 shows the Operating system 1 has a Grey Relation Coefficient of 1.0000 for both storage management and protection and security, indicating a strong correlation or influence of this operating system in these aspects. Operating system 2 has relatively lower coefficients for all aspects, ranging from 0.3365 to 0.5487. Similarly, other operating systems have their respective Grey Relation Coefficients for each aspect.

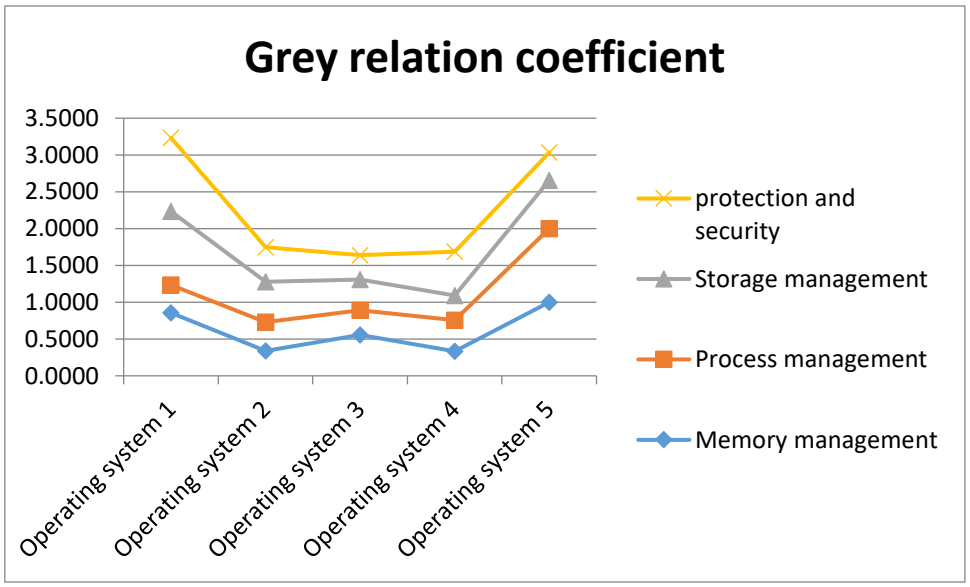

FIGURE 4. Grey relation coefficient

TABLE 5. GRA& Rank

	GRG	**Rank**
Operating system 1	0.8084	1
Operating system 2	0.4370	3

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Operating system 3	0.4099	5
Operating system 4	0.4218	4
Operating system 5	0.7589	2

Table 5 shows the in Rank the final result of this paper the Operating system 1 family is in 1st rank, the Operating system 2 is in 3rd rank, the Operating system 3 is in 5th rank, the Operating system 4 is in 4th rank, the Operating system 5 is in 2nd rank.

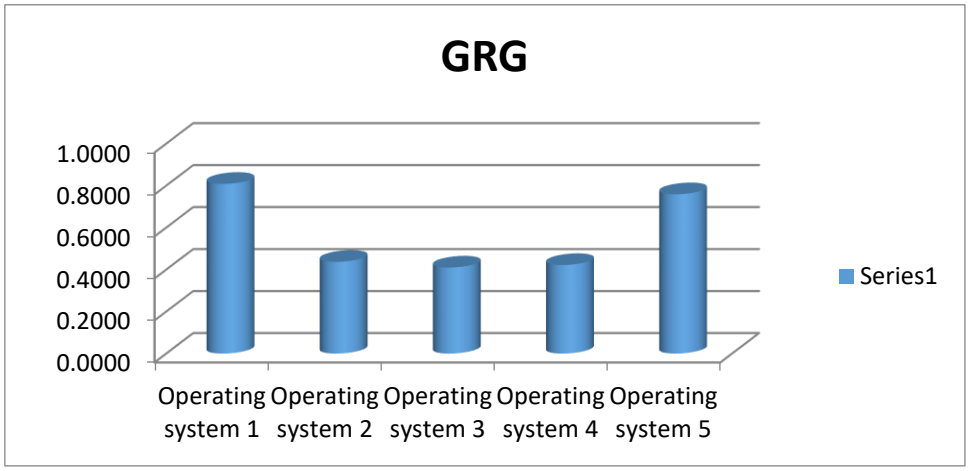
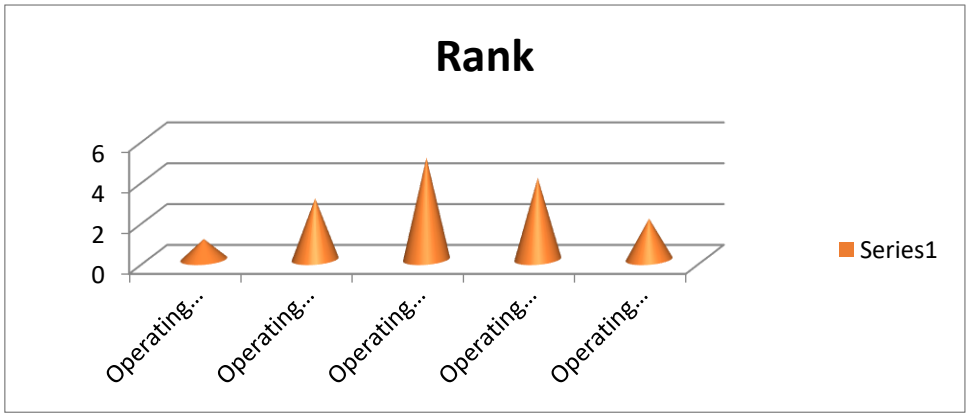


FIGURE 4. GRA

Figure 4. shows the graphical representation GRG Operating system 1 (0.8084), Operating system 2 (0.4370), Operating system 3 (0.4099), Operating system 4 (0.4218), Operating system 5 (0.7589).



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CONCLUSION

Operating system services are designed to provide various functionalities and performance metrics to enhance the efficiency and effectiveness of the operating system. However, the number of cores in a system has a significant impact on application performance. The term "GRA" stands for Gray System Essentials, which is rooted in Gray Structural Theory and deals with uncertain information. A system is called a white system if all information is known, while a gray system refers to a system with uncertain knowledge. Gray relation analysis is a technique that compares and analyzes measurements. It was introduced by Professor Deng Zhu-long from China in 1980 and utilizes specific information for analysis. In the field of digital crime investigation and malware analysis, memory analysis has gained importance. Traditional methods rely on hard disk-based forensic analysis, but with the advent of non-volatile memory, direct extraction of evidence from the running system has become valuable. Memory analysis methods, including GRA, enable the extraction of attack traces and evidence from dense SC head networks. The advantages of using GRA include simple processing, suitability for complex relationships, and the ability to provide fair comparisons and confirm dimensional properties in multiple attribute decision-making (MADM) techniques. However, it's important to note that every method or approach has its limitations, assumptions, hypotheses, premises, and advantages or disadvantages. There is no one-size-fits-all solution for every problem. In conclusion, operating system services aim to provide a range of functionalities and performance metrics. GRA, as a problem-solving technique, utilizes gray system essentials and is applied in analytical facility analysis. The outcome of this research paper indicates that the Operating system 1 family holds the top position in the ranking, while the Operating system 2 is placed in the third position. The Operating system 3 is ranked fifth, followed by the Operating system 4 in the fourth position. Finally, the Operating system 5 secures the second rank.

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