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ANALYSIS OF THE CURRENT STATE OF THE SUBJECT AREA OF DECISION SUPPORT: AUTOMATED SUPPORT ALGORITHMS

The decision support system is defined as the type of program that is computerized to support the judgments, determinations, and cause of actions that are in an organization or a company. This system is a huge one, oscillating through data analysis, compiling a large amount of comprehensive information, and analyzing this information to form a tool that is effective in the decision-making process. This system usually is backed up with the existing automation algorithm, a list of instructions that are used to supplement the information analysis of the decision support system to make organizational decisions. Just like the decision support system, the support algorithm is a computer program that follows the instructions that in this case are termed as algorithms to play a trade. However, having understood the meaning of these two systems, we develop an understanding they are one system, working together to help the organization make reasonable decisions to reach profits at a speed. In this paper, we are to explore the current state and trends that are surrounding the decision support; automated support algorithms area. Through the use of secondary research, we explored different government publications, business documents, technical trade journals, and other documents to formulate results that will make a solution to the research question of this paper. Through research, artificial intelligence informs machinery learning forms the most important trend in automated algorithms support.

Keywords: *automated algorithms support, trends, artificial intelligence, decision making, decision support system.*

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АНАЛІЗ СУЧАСНОГО СТАНУ ПРЕДМЕТНОЇ ОБЛАСТІ ПІДТРИМКИ ПРИЙНЯТТЯ РІШЕНЬ: АЛГОРИТМИ АВТОМАТИЗОВАНОГО ПІДТРИМКИ

Система підтримки прийняття рішень визначається як тип програми, яка комп'ютеризована для підтримки суджень, ухвал і причин дій, що знаходяться в організації або компанії. Ця система є величезною системою, що проходить через аналіз даних, збирання великої кількості вичерпної інформації та аналіз цієї інформації для формування інструменту, ефективного в процесі прийняття рішень. Ця система зазвичай підкріплюється існуючим алгоритмом автоматизації – списком інструкцій, які використовуються на додаток до аналізу інформації системи підтримки прийняття рішень для прийняття організаційних рішень. Як і система підтримки прийняття рішень, алгоритм підтримки є комп'ютерною програмою, яка слідує інструкціям, які в даному випадку визначаються алгоритми для торгівлі. Однак, зрозумівши значення цих двох систем, ми приходимо до розуміння того, що вони є однією системою, яка працює разом, щоб допомогти організації приймати розумні рішення для швидкого досягнення прибутку. У цій статті ми повинні вивчити поточний стан та тенденції, які оточують область підтримки прийняття рішень та автоматизованих алгоритмів підтримки. Використовуючи вторинні дослідження, ми вивчили різні урядові публікації, ділові документи, технічні журнали та інші документи, щоб сформулювати результати, які дозволяють вирішити дослідження цього питання. В результаті дослідження стає зрозумілим, що машинне навчання є найважливішою тенденцією у підтримці автоматизованих алгоритмів.

Ключові слова: *автоматизована підтримка алгоритмів, тенденції, штучний інтелект, прийняття рішень, система підтримки прийняття рішень.*

Introduction. Decision support; automated algorithms system is a computer-generated program that is mainly focused on generating important strategies that make up the decision-making process in organizations. These computer-generated programs usually originate from the collection and analysis of data figures that help, based on the current trends in the market today. As we are moving towards a technologically oriented regime, different changes have been created in organizations, and one of them is the changes in the decision support systems. An analysis of these changes in the decision support system makes up the research topic of this paper. Therefore, through a complete analysis of the trends in this decision support system, the research gives organizations tips and opportunities that they can implement to realize an effective and dependable decision-making process. For instance, Hellen Nisserbaum in her research about accountability in our computerized society suggested that four trends make up the current lines of accountability in decision support and automated algorithms (Nisserbaum, 1996). She suggests that the accountable nature of computers and technology nowadays is affected by the number of people that use them. Other factors and trends that she incorporates in her research include the inevitability of bugs in software, the human blame for computer failure instead of taking responsibility, and the software developer’s nature of denying accountability as a result of their failed systems.

Even as Hellen diversifies through these trends, it is important to note that her research has been focused on the hardware part of this whole system, building a focus on the operators and manufacturers of this computer software. This creates a gap in the research literature, such that if we focus our attention on the trends surrounding the software part of this system, then we can build on this gap and find solutions to most problems affecting the decision support system that is as a result system failure. For instance, the growing importance of decision-making depends greatly on the factors of automated algorithms systems. Algorithms have therefore been part of the decision-making for long enough such that they need developments to increase the effectiveness of the decision-making process. Through research on the important trending issues that can better these algorithms, we can be able to diversify and make the decision support system useful and effective at the same it, helping organizations to avoid flaws that come as a result of it and ensuring that profit-making in organizations is becoming a priority, and attached advantage of decision making.

In an attempt of finding possible useful trends that can help in improving the decision support; automated support algorithms, my research paper explores the analysis of the current state of the subject area of decision support systems and the automated support algorithm. Through the use of secondary research, we explored different government publications, business documents, technical trade journals, and other documents to formulate results that will make the solution to the research question of this paper. Through research, artificial intelligence informs machinery learning forms the most important trend in automated algorithms support.

Literature review. Based on recent research and publication, major developments show that the decision support system (DSS) has different ways through which it works. These developments form the major trends in these sections, allowing us to effectively understand how this decision support system and automated support algorithms work. Previous research shows that the DSS system works based on the computer interactive features that serve as the decision-making instruments for different organizations [3]. The decision support system acts as a source of information that enables these organizations to draw effective strategies that make up unstructured decisions as well as the semi-structured decisions, and therefore, a major discussion of the development features that make up this decision support system will give us an understanding on the underlying analytical models that helps organizations to perform different levels data analysis and creation of important information that help organizations structure these various decisions.

Previous research confirms that organizations usually apply acquired knowledge through training and innovation to the system to develop an understanding of the underlying problem that is facing the organization. This ability to integrate the system and understand how it works is a major area of concern, especially when dealing with the developments that are surrounding this system. It is clear that when organizations use the decision support system and the automated support algorithms, the ability of organizations to make collect balanced decisions become easy and highly effective. For instance, research shows that the DSS system has something termed an interactive interface. An interactive interface is an effective tool in this system in that it makes it easy for users to develop real-time responses to major questions that arise when problems are experienced in organizations. The use of these different tools helps organizations to develop different tools that manage each stage of the decision-making process, including complex problems, model designing for problem analysis, alternatives development, and the available alternatives choosing complexity.

Research shows that different levels of management in organizations call for different use of the decision support system. Because of this, different types of decision support systems exist, and a thorough analysis, of the different types of these systems, will provide us with an overview of the major development of the DSS system that exists, what are the available gaps that exist and how will this research exercise help us build important approaches to mend these gaps. The first type of decision support system and automated support algorithm is the model-based decision support system [5]. The model-based decision-based system is a system that is termed a standalone system. The standalone system is a system that is not connected with any major corporate information system. And because of this, the model-based system's capacity for analysis is usually supported by some strong model through which organizations have a user interface that enables them to use this system. Different models underlying this system help organization perform many types of information analyses including the what-if analysis. Therefore, because of this, the model-based decision support system is used to create simulation models that have underlying tasks of performing production planning and scheduling and creating the financial reports and statistical reports as well.

Previous research also confirms that the data-based decision support system is also a current trend type of decision support system and automated support algorithm. This type of system is used to analyze huge amounts of different data in organizations such as data from enterprise systems and data from the web. This data-based decision support system collects data from different sources and stores it in data warehouses such that managers and organizations can use it here for problem analysis. A data warehouse in this case is a type of database that can store past and present extracted information that is extracted from various operational systems. This in turn provides different certain query tools and reporting tools.

The two types of decision support systems apply the use of different techniques that are of interest to this research paper. The techniques applied here are mainly used in data analysis are data mining techniques and the online analytical process (OLAP). The data mining technique for instance is used to help organizations extract useful information through a systematic finding of rules from extracting data, also termed data patterns [7](Sojan et al., 2014). This technique helps in the retrieval of information that is then used to predict behaviors and future trends that may occur. On the other hand, the online analytical processing technique (OLAP) is effective in that it uses queries and can provide fast answers to complex organizational requests. This technique helps managers and analysts to examine and manipulate available data in data warehouses from different viewpoints interactively.

In his article [2], gives meaning to the role of algorithms in decision-making. According to the article, decision-making is a huge part of our lives and the contribution of algorithms to this is a huge part of this accountability. Therefore, major developments have been made in this sector to better decision making, and [2], suggests the increasing development of machine learning from big data as part of these trends. Research shows that there have been objections to the full transparency and accountability of the systems as part of the major trends that are surrounding the decision support system. According to this article, there has been a loss of privacy when datasets become public, and because of this, the disclosure effects of algorithms in this decision support system as well as the decision-making system become limited. This has effects on the existing firms and companies that depend on it, leading to losses, loss of information, and other related effects that are a result of loss of transparency. Fully transparency for oversight bodies remains the only option that extends to the public at large as the only solution that can bring accountability to the existing problems surrounding the decision support system and algorithms. The contribution of algorithm decisions should also become more understandable, and the only way to make it possible is to introduce the models of machine learning as an effective way of helping the employees to interpret most of the ex-post or design ex-ante that comes as a result of the unaccountability and lack of transparency in the decision support system. Therefore generally, an introduction of artificial intelligence in this system not only forms a trend but is also an important factor to consider, even as we build an understanding of these ideas, something that makes this article relevant to this case analysis.

Research methods and design. Research methods and design form the most important part of any research paper [4]. This is a secondary research paper, and because of this, I dueled greatly on the use of internet sources and school library sources to find data and information for my research. The research design that seemed effective in this case study was the secondary quantitative research, a type of research that uses already existing data also termed secondary data. A close analysis of this existing data, summarizing, and picking up important points to supplement my research made the overall efficacy of this research.

The available information online gave me an overview of the current trends that are underlying the DSS. Data here was obtained from journals and magazines that capture important information on the latest business news and technology. The school library sources included books and school magazines. Through a multivariate data analysis tool, the applied use of cluster analysis helped me to comprehend comprehensive DSS literature that was available in different sources over the years 1991 to 2022. Only but few authors were involved in the raw cocitation matrix, with the help of the statistical analysis systems.

Selecting authors to duel within the research was also an important part of this research. The technique of best fit, authors with the most relevant information supplementing my research was the most effective. No official citations or criteria were used to sample the authors.

Ethical issues and limitations of the study. This is secondary research, and because of this, its limitations were many [1]. One of the limitations that I faced as I researched was the lack of relevancy throughout the study. I could not easily find the data that I needed to supplement my research and because of this, most data and information that I applied here may lack relevancy and accuracy. Another form of

irrelevancy may be subjected to the inaccuracy use of the objectives and methodology that I used to collect my data, such that they may not be effective and appropriate for the problem at hand.

Another limitation of study for my research was the lack of accuracy. Relevant and accurate secondary research must pay attribute to important factors such as research design, sampling design, sources, rate of change of studied topics, and analysis of points of view. Because of these many qualifications, a slight deviation of any may result in inaccuracy, rendering the whole research exercise to be ineffective. For instance, I extensively applied the use of self-explanatory techniques in research design and because of this, I may have interpreted my information and data wrongly, making my research not accurate enough.

Secondary data usage in research requires high ethical practice. This is effective in maximizing the value of data collection investment, ensuring replicability and disclosure of sensitive information. Because of this, my data analysis and research had to meet major secondary research ethical conditions that have been proposed. Some of these ethical conditions include the following;

- Data usage in research must not lead to any type of distress or damage.
- The study subjects must reach presumed reasonable consent.
- The re-identifying of participants must not be allowed by the outcomes of the analysis.
- Before releasing to the researcher, data must be de-identified.

Therefore, my research was limited to these ethical issues and limitations of the study.

Statistical processing and discussion of scientific results. Based on the analysis of existing literature and available information, it is clear that the decision support system and the automated algorithm support require improvement and an underlying effort to ensure better decision-making in organizations. Through the existing literature, it is evident that the incorporation of full transparency in the whole algorithmic cycle all through the organization is an important trend that can help zip up the available gaps in this system. However, it is hard this integrates this element into the system unless major software development of the algorithms and the DSS is made. This can only be possible if the information software is supplemented with the modern form of artificial intelligence. Research shows that the important development of the artificial intelligence system is the backbone of an effective decision support system as well as the automated support algorithm. Through artificial intelligence, the capacity of many machines to mimic human intelligence and draw conclusions from incomplete information is possible [6]. This is important especially when there is a need to create transparency in the systems using machine-generated information without depending on human intelligence, a major development in the DSS.

Another helpful tip of artificial intelligence that seems relevant to this research is that of machine learning. Machine learning is a subfield of artificial intelligence, defined as the ability of a machine to imitate human behavior. At the start of this research paper, we found out that humans have failed the decision-making process through attached human incompetence that includes information loss and lack of transparency. If machine learning takes over the decision support system, such mistakes can be avoided drastically. For instance, a huge part of the interpretability of algorithms depends on data and information analysis, and because of this, the dominant trajectory of developing algorithms becomes less accurate if artificial intelligence is not used. It's good to understand that human intelligence does not have to be underestimated, but for transparency and accountability, artificial intelligence always outshines this human intelligence.

Conclusion and recommendation. The decision support system and automated support algorithm form an important part of decision-making in organizations. Through research, most problems that are facing organizations are those of accountability and transparency, most of which are attributed to human mistakes and errors that are directly linked to human intelligence. Through a close analysis of the techniques used in the decision support system, most of the techniques only duel on the ability of managers and organization management systems to form complex business queries from available data in the data warehouses. The managers and managing bodies that exist and are responsible for this data analysis are the ones that form available gaps that the existing trends, and because of this, my research shows that the incorporation of machine learning and other forms of artificial intelligence in these systems can help reduce such risks attributed to transparency and accountability.

Therefore, I recommend that this research be supplemented by the ability of the machine and technological improvements to offer this choice of machine learning in the decision support system.

REFERENCES:

1. Cole, A. P., & Trinh, Q. D. (2017). Secondary data analysis: techniques for comparing interventions and their limitations. *Current opinion in urology*, *27*(4), 354–359. https://doi.org/10.1097/MOU.0000000000000407
2. de Laat, P. B. (2018). Algorithmic decision-making based on machine learning from big data: Can transparency restore accountability? *Philosophy & Technology*, *31*(4), 525–541. https://doi.org/10.1007/s13347-017-0293-z
3. Eom, S., & Kim, E. (2006). A survey of decision support system applications (1995–2001). *The Journal of the Operational Research Society*, *57*(11), 1264–1278. https://doi.org/10.1057/palgrave.jors.2602140
4. Marshall, G., Cox, M.J. (2008). Research Methods: Their Design, Applicability and Reliability. In: Voogt, J., Knezek, G. (eds) International Handbook of Information Technology in Primary and Secondary Education. Springer International Handbook of Information Technology in Primary and Secondary Education, vol 20. Springer, Boston, MA. https://doi.org/10.1007/978-0-387-73315-9_62
5. Nissenbaum, H. (1996). Accountability in a computerized society. *Science and Engineering Ethics*, *2*(1), 25–42. https://doi.org/10.1007/bf02639315
6. Singh, A., Thakur, N., & Sharma, A. (2016). A review of supervised machine learning algorithms. *2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom)*, 1310–1315.
7. Sojan, S., Raphy, S. K., & Thomas, P. (2014). Techniques used in decision support system for CRM-a review. *International Journal of Information Technology Infrastructure*, *3*(1). https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.453.9765&rep=rep1&type=pdf