ARTIFICIAL INTELLIGENCE TRENDS FOR INTELLIGENT DECISION SUPPORT SYSTEMS

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ABSTRACT

Making decisions is a fundamentally human behavior that can have major effects. It is perhaps not unexpected that researchers have worked to enhance and extend human capabilities through the development of computer technologies. This objective has been achieved in several applications thanks to advancements in artificial intelligence (AI). Intelligent decision support systems (IDSS), also known as AI-integrated decision-making support systems, are rapidly being utilized to help decision-making in industries like banking, healthcare, marketing, commerce, command and control, and cybersecurity.

Systems that in some way imitate human cognitive abilities are said to as intelligent. AI tools are used by these systems to reason, learn, recall, plan, and analyze. By, for instance, surveying and selecting pertinent data from extremely large and dispersed data sources, applying analytical tools to unstructured data, creating generalized solutions from rule-sets and probabilities, and identifying associations in data from multiple sources that may influence a decision, AI tools can be used to augment human capabilities. When used in conjunction with decision support systems, tools like Artificial Neural Networks, Fuzzy Logic, Intelligent Agents, Agent Teams, Case-Based Reasoning, Evolutionary Computing, and probabilistic reasoning can assist a decision maker in assessing and choosing options. These systems are especially useful for complex non-deterministic issues with lots of data and ambiguity. This study's goals are to describe current developments in the field of using AI approaches as a tool for intelligent decision support systems and to outline the potential for future research.

Keyword: - *Decision Making, Artificial Intelligence, Knowledge Base, Decision Support Systems.*

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1. INTRODUCTION

The influence of computer scientists in our culture is still growing. Greater impact means that major businesses and governmental organizations are backing and sponsoring computer engineers as they develop the newest technology in the world. More and more of our lives are being managed by computers, but we have not yet realized all its potential. To ensure that computer programme technologies will be secure and helpful to the general public, there is still no specific body and little in the way of regulations in place. Artificial intelligence (AI) is now a reality, but no one is certain of its future course. This paper will make the case that highly intelligent machines may be on the horizon considering recent advancements in intelligent programming methods like neural networking. More significantly, it will demonstrate that computer scientists have substantial ethical and political obligations to the general public.

The corporate world is being reimagined by artificial intelligence (AI), which is also fostering greater efficiency and innovation within enterprises. AI can help businesses make better decisions, products, and procedures. Organizations should be able to achieve organizational agility powered by AI using the technology that is already available.

Organizational leaders must continuously promote change and assess where and how complicated AI should be applied to support business objectives.

Across many industries, artificial intelligence is having an impact. There are several instances of applying AI to the supply chain, transportation, education, operations, marketing, and pretty much every other business that is transitioning to digitalization and moving away from manual to technologically aided tasks. Through the use of AI decision-making algorithms, which can also identify abnormalities and forecast future behavior, businesses are better prepared to combat crises. AI improves automation and lessens the tedious, labor-intensive, and human-intensive aspects of forecasting and prediction analysis.

The development of artificial intelligence has quickened the rate of change. Additionally, there is more demand on firms to react quickly to changing circumstances. This perspective change has led to a change in how organizational transformation and growth are perceived. Instead of being seen as one-time undertakings, they are now seen as ongoing activities to which all members may and should contribute.

Making decisions is a fundamentally human behavior that can have major effects. It is perhaps not unexpected that researchers have worked to enhance and extend human capabilities through the development of computer technologies. This objective has been achieved in several applications thanks to advancements in artificial intelligence (AI). Intelligent decision support systems (IDSS), also known as AI-integrated decision-making support systems, are rapidly being utilised to help decision-making in industries like banking, healthcare, marketing, commerce, command and control, and cybersecurity. We examine the existing AI techniques used in IDSS in this research. Various terminology, including Active DSS, Knowledge-Based DSS, Expert Systems, Intelligent Decision Systems, and Joint Cognitive Systems are used to describe these systems in the literature [1].

2. HISTORICAL BACKGROUND

Researchers who create DSS generally agree that the decision-making process outlined by Simon [3] consists of four stages: intelligence, design, choice, and implementation. The decision-maker obtains data and shapes their knowledge of the issue during the intelligence phase. During the design process, he or she establishes the criteria, creates the model, and evaluates potential solutions. During the choice phase, a decision or choice is made, and during the implementation phase, the decision maker acts on the decision and learns. The steps of the process often follow one another in a sequential fashion with feedback loops in between. The Observe, Orient, Decide, Act (OODA) loop, an analogous four-step decision-making procedure, is frequently used by decision support researchers in the military industry [4].

Depending on how certain the issue representation and solution are, decisions are classified as structured, unstructured, or semi-structured [5].

For IDSS, a number of architectures have been suggested. The decision-making processes are divided into three modules that represent input, processing, and output with feedback loops in a generic design [6,2]. The input module contains information that is directly related to the decision problem, knowledge bases that provide guidance in choosing among decision alternatives or interpretation tips, and model bases that serve as a repository for formal decision models and algorithms. The inputs are categorized, forecasts and recommendations are given, possible justifications are created, and a "best solution" is generated within the limitations in the processing module. Analyses can be reported, expanded upon, amended, and even used as input for additional analysis in the output module. Linger and Burnstein [7] offered a different kind of framework with two layers: a pragmatic layer and a conceptual one. The task's methods and organizational structure were related to the conceptual layer, while the pragmatic layer was concerned with how the task was actually carried out.

3. MANAGEMENT SYSTEM MODEL

The models of the management system that managers can use to guide their decisions, those are used to forecast demand for goods and services and make decisions about the organization's financial health.

Decision Support Database: a database from which information is taken out and statistically analyzed (without being changed) in order to support commercial or other decisions. In contrast, an operational database receives updates on a regular basis. An operational database would be used to calculate salaries using check accounts whereas a decision support database may provide information on the average pay for various worker kinds.

User Interface: A DSS's user interface has tools that make it easier for the end user to operate the system. When taken literally, the term interface refers to a "crossing point" or "boundary." The component of a computerized system that

enables user interaction is referred to as the interface in computer science. What customers see and use is it. Although user interface is crucial, it also makes user interaction easier.

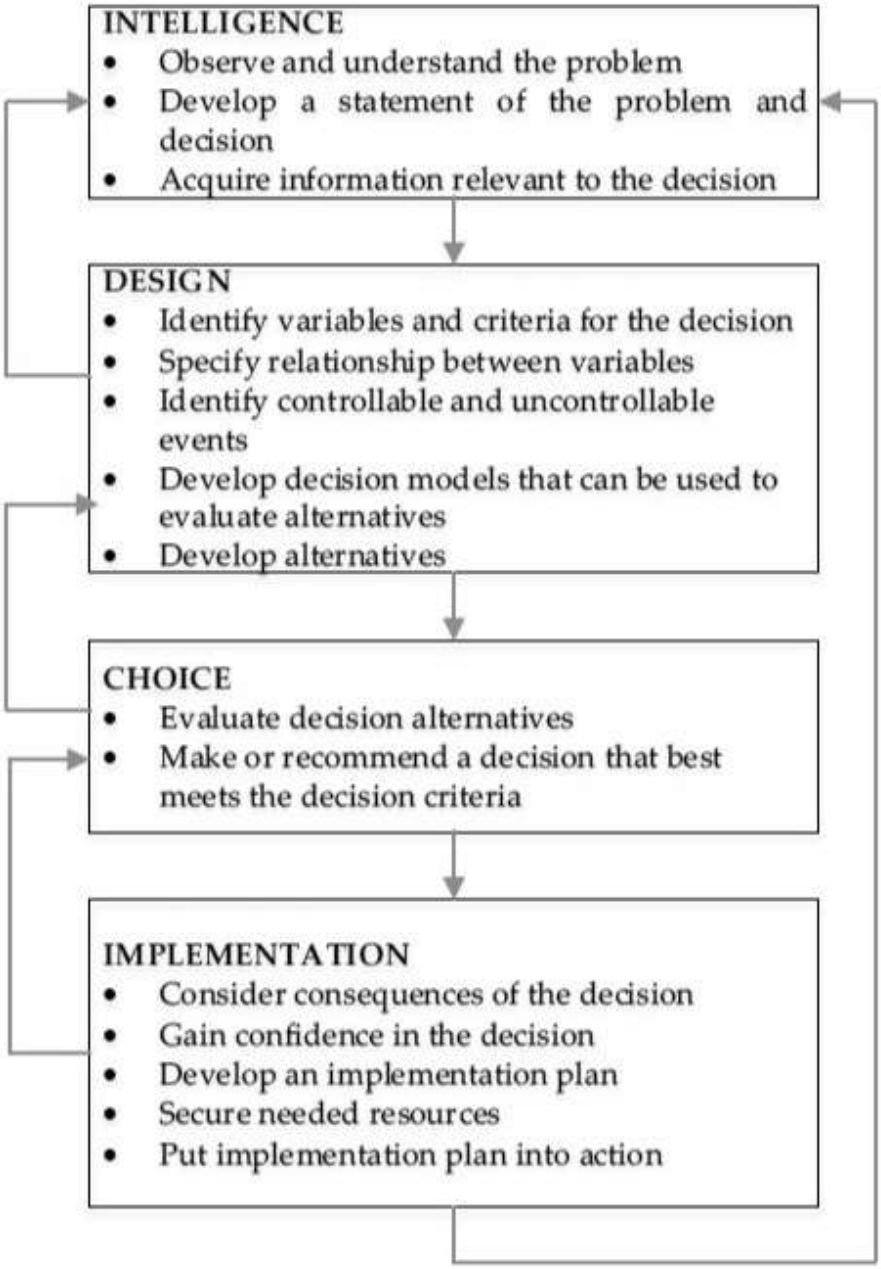

Fig -1: Four stages of decision-making

Knowledge Base: Information from both internal (information gathered in a transaction process system) and external sources is included in the knowledge base (newspapers and online databases). A knowledge-based DSS is a computerized information system that offers information and methodological knowledge (domain knowledge and knowledge of

decision methodology) through analytical decision models, access to data bases, and knowledge bases to assist a decision maker in making decisions in difficult to structure tasks.

Communication-driven: Enables businesses to support tasks that call for the participation of multiple people. It contains integrated technologies like Google Docs and Microsoft SharePoint Workspace.

Model-driven: Enables management and access to organizational, financial, and statistical models. By utilizing the data that users have provided, data is gathered and parameters are established. To analyze scenarios, the data is turned into a decision-making model. Decodes, an open-source model-driven DSS, is an illustration of a model-driven DSS.

Knowledge-driven: Offers specific, factual responses to problems utilizing procedures, rules, or active decision-making tools like flowcharts. The knowledge-driven DSSs encompass a wide variety of usage, including both users who work within organizational settings and others who engage with the business, including customers and suppliers, among others. It is employed to select services or goods or to offer management suggestions. This system is deployed using web, server systems, and software running technologies.

Researchers have tried to increase the effectiveness of decision-making by using AI. IDSSs, or integrated AI support systems, have been developed and applied in a number of industries, including healthcare and business.
To infer, learn, memorize, plan, and evaluate the data, these systems employ AI techniques. Figure 1 [8] illustrates process. The first step of the study, intelligence, calls for the decision-makers to grasp the issue and gather data pertinent to the decision-making. In a similar vein, the design step entails describing the data with key factors based on decision-related concerns, establishing the requirements for the decisions, and creating decision models that can be applied to assess alternative decisions. The third stage involves reviewing the options and selecting the aggregated decisions that satisfy the options. The decision-makers evaluate decisions at the last stage, which is occasionally referred to as evaluation.

6. CONCLUSIONS

At the use of AI tools to help decision making, particularly in the interfaces between humans and machines, the future offers research opportunities and problems. The potential for enhanced decision-making is substantial, especially in complicated situations when the environment is more complex than our capacity to understand and establish correlations between factors. Designing intelligent decision support systems that are affordable, offer concrete advantages, and yield outcomes that people can accept is a challenge. There is a strong push for adaptive systems that can adapt to varied users and recognize user intent in speech or action.
Trust in autonomous systems is one of the main obstacles to the implementation of intelligent decision support systems to real-world issues. Future studies must address issues like: What decisions are we ready to give computer systems autonomy over? What proof of precision do we require before assigning a decision to an autonomous system? Will we, and under what circumstances, permit autonomous systems to decide for themselves what to do? What level of security is required to ensure that the decisions made by computer systems don't go beyond our comfort zone? Do we actually believe that autonomous systems will always act in our best interests? The ability to make better decisions and address these issues is made possible by developments in AI decision support systems.

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