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# Investigations into the Use of AI Technology in Conventional Business Intelligence Systems

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**ABSTRACT**

This paper gives a detailed study of the main difficulties and limitations of traditional BI (Business Intelligence) systems. It combines the newest AI technology to prove the viability of employing Artificial Intelligence (AI) technology in traditional BI systems. The efficiency, calibre, and depth of data analysis can be enhanced by integrating AI with BI, supporting business development and decision-making for organisations in the big data era.

## INTRODUCTION

With the quick advancement of information technology in recent years, big data has progressively grown in importance.

Motivation for socioeconomic growth. Big data's advent has presented businesses and organisations with previously unheard-of opportunities and difficulties, necessitating improved processing, analysis, and use of these enormous volumes of data. However, processing and analysing large amounts of data frequently surpasses the capacity of conventional human techniques, necessitating the application of cutting-edge technology solutions.

In this regard, artificial intelligence (AI), a potent instrument, is progressively making its way into the big data space. In addition to opening up new avenues for data processing and analysis, the advancement and use of AI technology also give us vital assistance when dealing with massive datasets.

By using artificial intelligence (AI) technology, we can more rapidly and precisely find patterns and trends in data, assisting businesses in developing more progressive commercial tactics [1]. Furthermore, AI can speed up data processing, increase the effectiveness of data analysis, and help us uncover hidden information in data [2].

Thus, artificial intelligence, a crucial instrument in the big data era, has substantially aided the social economy's development process by creating new opportunities for data processing, analysis, and application. With AI technology's ongoing development and innovation, we are optimistic about attaining deeper and broader applications and greater breakthroughs in the big data era's more difficult problems.

### Traditional Business Intelligence (BI) Systems' Drawbacks and Difficulties

Dashboard reporting is the most common use of BI as an auxiliary tool for decision-making. The enterprise's management team may comprehend the operational state of the company through dashboard data and then use human analysis to make judgements and take appropriate action. Another extremely vivid metaphor for why it is called a dashboard is because it is similar to operating an aeroplane. To help them develop driving strategies, pilots use various equipment, including speedometers and altimeters, to assess the movement status of the aircraft [3].

Naturally, intelligence is merely a lovely ideal, but business intelligence mostly emphasises individual effort. Technically speaking, BI uses computers to gather, arrange, compile, and display data automatically. Thanks to this, employees are now mostly free from data-related work.

This does not imply, however, that BI can fully replace data work. Data analysis still requires human labour, and BI's primary function is to assist individuals in getting ready for the initial stages of data analysis. From a different

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angle, BI mostly provides answers to "what" and some "why" enquiries. "What is it?" primarily addresses the questions of what it is, who it is, where it is, when it occurs, and how much there is.

Examining the justifications for the "what" question is known as the "why" question. It is claimed to address the "why" issue partially because of the current BI.

Instead of actively and intelligently analyzing and determining the cause, tools typically preset data exploration procedures based on specific known analysis perspectives to confirm whether it is the genuine cause [4].

Business intelligence systems that employ conventional data processing and analysis techniques are referred to as traditional BI systems. These systems primarily analyze and mine data using tools like ETL, reports, queries, and multidimensional analysis to enhance decision-making [5].

Traditional BI systems usually include data warehouses, data mining tools, reporting tools, data analysis tools, and other tools.

When using these solutions, which are often offered by several suppliers, data must be pulled from various sources into a data warehouse, cleansed, converted, and loaded for data analysis. Figure 1 depicts the usual technological architecture of BI initiatives.

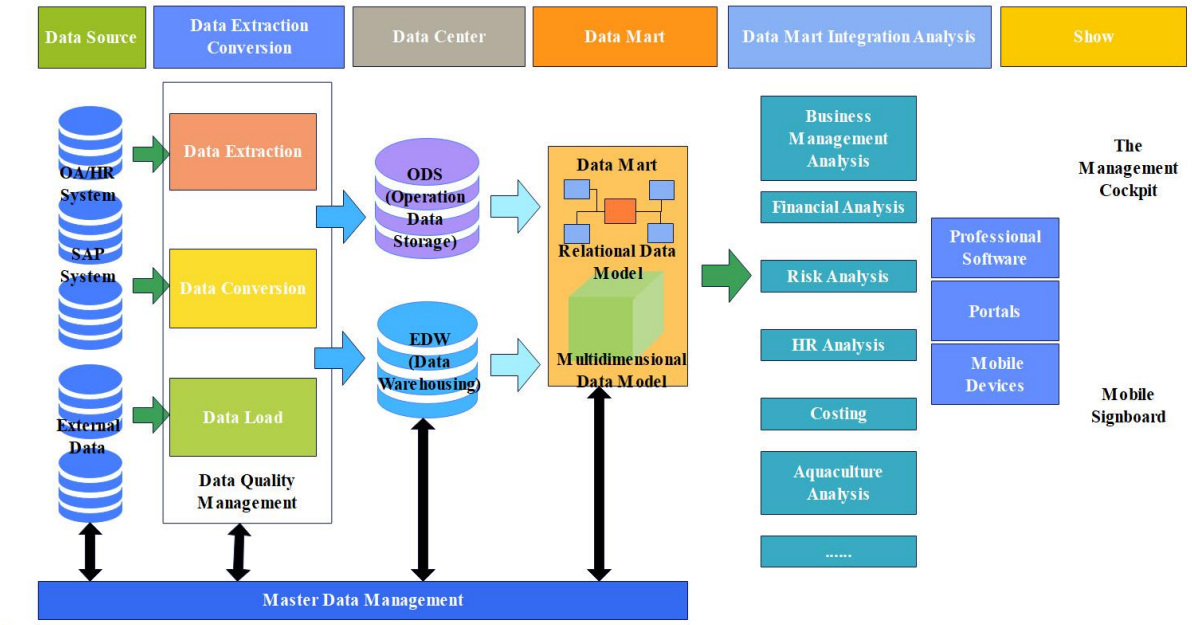


**Figure 1. Typical BI project technical architecture**

However, there might be certain difficulties and restrictions when dealing with contemporary corporate expectations, mostly involving three elements:

***A. Efficiency issues in data processing and analysis***

1) Slow data processing speed: Large volumes of data must normally be loaded into local or cloud storage systems before being processed and analysed by traditional BI systems. This could take days or weeks, leading to ineffective data processing and preparation.

2) The data processing procedure is laborious: Conventional business intelligence (BI) systems typically require manual data processing, including integration, transformation, and cleansing. This is error-prone and takes a lot of time and work.

3) Data analysis tools lack flexibility: Excel, Tableau, and other fixed data analysis tools are commonly used in traditional BI systems, and they might not be able to handle complicated data analysis requirements.

4) Data silos: Data from several departments or business lines may be dispersed over many systems in traditional BI solutions, which can result in greater challenges in sharing and integrating data.

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***B. Deep Analysis and Data Quality Limitations***

1) Problem with the data source: Guaranteeing data quality can be challenging due to the diversity and instability of traditional BI data sources.

2) Problems with data processing: Conventional business intelligence (BI) may have limited data processing capabilities, which leads to basic data processing and presentation without in-depth analysis.

3) Problem with data updates: Conventional BI data may not be accurate or timely, and it cannot offer dynamic, real-time decision support data.

4) Problem with data display: Conventional BI data display techniques could be too basic to satisfy consumers' demands for in-depth data analysis.

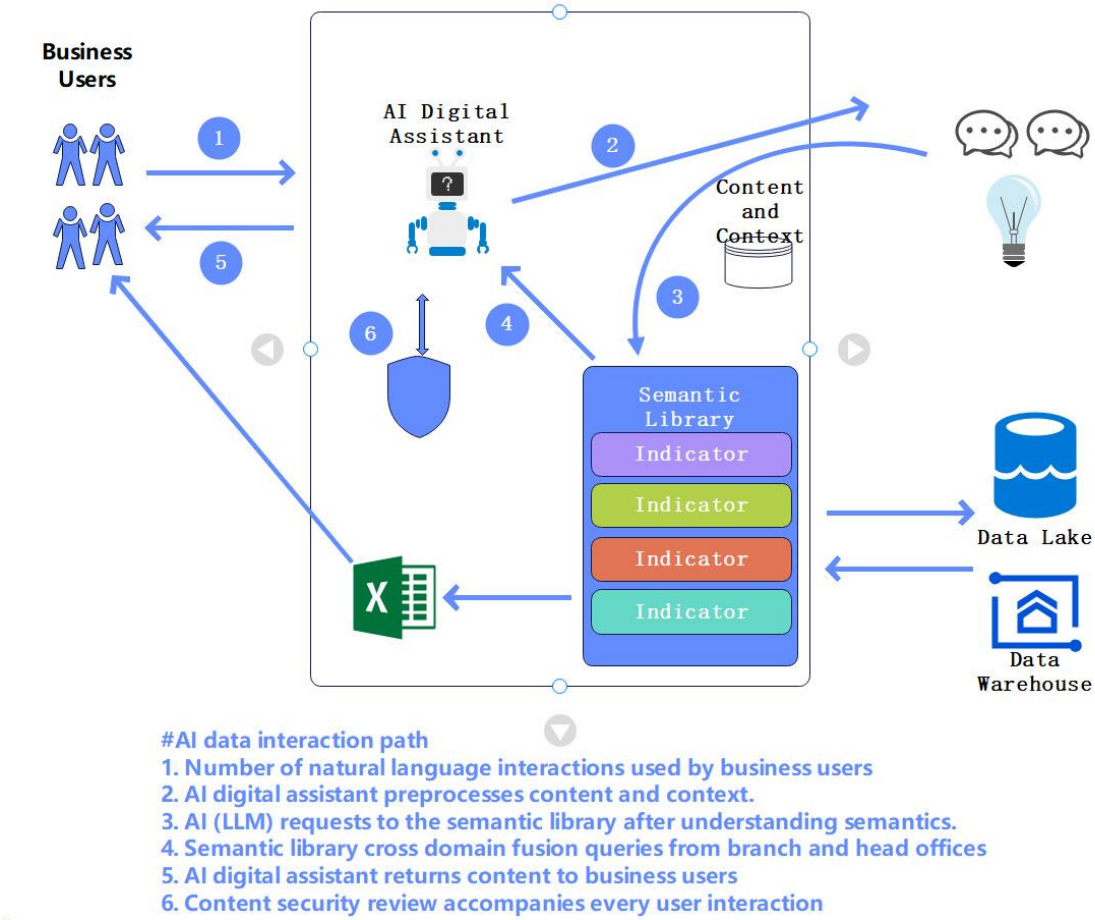


Figure 2 Natural Language Data Query and Interactive Exploration

5) Lack of individualised analysis: If traditional BI is unable to offer tailored data analysis based on user requirements, users may not be able to get data analysis results that correspond with their own business circumstances.

***C. Difficulties in the process of determining decisions***

1) Data quality: Problems with data quality have always been a significant obstacle in the BI decision-making process. Inaccurate and inconsistent data may result in biases in decision-making.

2) Data silos and integration problems: Businesses may have several data silos, which makes it hard to combine data efficiently and complicates BI decision-making.

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3) Inadequate data analysis capability: The effectiveness and precision of decision-making are constrained by the potential lack of sophisticated data analysis features, such as machine learning, artificial intelligence, etc., in traditional BI systems.

4) Business comprehension issue: BI decision-making requires the joint participation of business and technical personnel; however, due to the restricted technical level of business personnel, the decision-making process may be problematic.

5) Problem with user involvement: Conventional BI systems might not offer an intuitive interactive experience, which lowers user engagement and reduces decision-making efficiency.

Large Language Modelling (LLM) and AI agents, often known as agents, have emerged in response to the problems above, creating new avenues for future business intelligence advancement.

First, business intelligence systems can better comprehend and parse user query requirements thanks to the Large Language Model's (LLM) potent natural language processing capabilities. Without having to create intricate query statements or have a specialised understanding of data analysis, users may use LLM to express their analytical demands in natural language. This lowers the threshold for use and makes data analysis more intuitive and user-friendly.

Second, BI systems can better comprehend user intentions and respond more precisely, thanks to LLM's capability to understand context. While LLM can fully account for the user's contextual knowledge and provide more accurate responses and explanations, traditional BI systems frequently simply perform basic matching and return results based on user input keywords or query phrases.

Furthermore, as intelligent agents or agents, AI agents have the potential to be significant players in the business intelligence space. AI agents can actively gather, arrange, and evaluate data to deliver individualised data reports and analysis outcomes according to user requirements and preferences. They may improve their services over time, get insight from user behaviour and habits, and give users a better experience via data analysis.

AI agents can also be combined with other tools or systems for more sophisticated data analysis and applications.

For instance, they can be connected with business process management systems to provide automated data analysis and decision support, or they can be used in conjunction with machine learning algorithms for prediction and suggestion.

The advent of AI agents and large language modelling (LLM) has opened up new avenues for advancing business intelligence. They will increase business intelligence systems' intelligence, personalisation, and automation, giving businesses better and more accurate data analysis and decision assistance. However, to ensure data security and user privacy protection, these technologies also require attention to data security and privacy protection issues.

## ARTIFICIAL INTELLIGENCE APPLICATION IN BI SYSTEMS

Integrating AI Agent's intelligent services with LLM's natural language processing skills can give BI systems hitherto unheard-of capabilities, improving the efficiency of data analysis and the friendliness, intuitiveness, and personalisation of gaining business insights.

Figure 2 displays the interactive exploration mode and the natural language data query.

Data governance, data ETL, data modelling, data analysis, and other discontinuous tasks are all part of the business intelligence sector and necessitate cooperation amongst experts in several domains.

In addition to increasing the accuracy and timeliness of business insights, the combination of LLM and AI Agent may optimise the BI user experience and increase the efficiency of several business intelligence operations.

### A. Interactive Exploration and Natural Language Data Query

A major barrier for non-technical users is that data queries in traditional BI systems frequently call for specialised query languages and technical expertise.

This scenario has significantly changed since LLM was introduced. Users can now ask questions in natural language, such as "How much did our online sales increase last quarter?"

LLM understands these questions, and the intelligent agent automatically translates them into the appropriate data operations, providing precise analysis findings in a timely manner.

Text2SQL technology is selected as the agent in this article. One method for converting natural language questions into SQL query statements is called text2SQL technology. Natural language processing (NLP) and database query creation are essential processes in this procedure. First, natural language processing (NLP) technology is utilised to comprehend users' natural language queries and retrieve important data, including the query's intent, target objects, and query conditions. Using this information, the system then creates the appropriate SQL query queries to extract the needed data from the database. Figure 3 illustrates the SQL Agent concept.

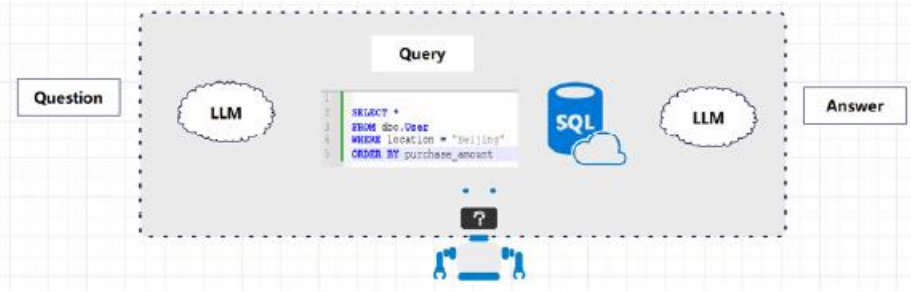


**Figure 3 SQL Agent**

This article uses the LangChain framework.

An application development framework for huge language models called LangChain may link big language models, tools, and other data sources.

It can both take on the output of large language models and enhance their input. Text2SQL applications can be easily developed with frameworks like LangChain, which enhances system performance and development efficiency.

Using natural language, LLM allows users to converse with BI systems, explore data in greater detail, and get prompt feedback. Based on the initial investigation's findings, users can progressively delve deeper into various data levels by posing more queries. In addition to making the data exploration process more flexible and intuitive, this interactive technique uncovers deeper insights concealed inside the data.

Based on customer concerns and input, the system may autonomously create a variety of visual charts and reports that give users a better intuitive grasp of the data's distribution, trend, and correlation.

In contrast to self-service BI and traditional data reporting, this method lowers users' technical hurdles, speeds up and simplifies data analysis, lowers the bar for users to access business intelligence, and improves user experience [6].

The threshold for use is raised by the fact that self-service BI tools and traditional data reporting frequently demand users to possess a specific technical background and data analysis skills [7]. Additionally, this method makes it simple for non-professionals to begin data analysis by streamlining the operation process and offering an intuitive visual interface [8].

**B. Automated and customised dashboard and report creation**

LLM and intelligent agents work together to automatically create comprehensive reports and dashboards from datasets that explain data trends, patterns, and important data indicators.

This automatically created report can significantly increase the effectiveness and calibre of decision-making by giving users at all decision-making levels instant access to comprehensive and detailed information.

Frontline executive staff members, in addition to senior decision-makers and intermediate management, can personalise and have their own decision dashboards, understand their work and performance completion status in real time, and use useful data to help them modify their work and promptly accomplish business goals.

Executive-level staff members can even design a unique user profile and management dashboard for each client [9].

The time and human resources needed for manual report writing will drastically decrease due to the automated generation process, the complexity of generating reports will be greatly reduced, and the availability will be greatly increased [10].

## CONCLUSIONS

We anticipate that when LLM and AI Agents are used more extensively, BI systems will become more intelligent, adaptable, and effective in the future, giving businesses and users of all stripes a stronger competitive edge.

For instance, as conversational AI advances, users' interactions with BI systems will become more accurate and natural. Developing strong, intelligent agents will also improve the efficiency and automation of user-BI interaction.

## REFERENCES

[1] Wang, Jian, et al. "A survey on artificial intelligence-driven business intelligence." International Journal of Computer Applications 177.1 (2018): 1-7.

[2] Mesiya, Mark, et al. "Recent advances in AI and machine learning in business intelligence and analytics." Procedia Computer Science 125 (2017): 216-223.

[3] Oussous, Ahmed, et al. "Big health data analytics: challenges and opportunities." Journal of King Saud University-Computer and Information Sciences 32.4 (2020): 395-405.

[4] Nguyen, Quoc Huy, et al. "Artificial intelligence in business: progress, best practice, and future challenges." Electronic Journal of Applied Statistical Analysis 10.2 (2017): 595-612.

[5] Sivarajah, U., Kamal, M. M., Irani, Z., & Weerakkody, V. (2017). Critical analysis of Big Data challenges and analytical methods. Journal of Business Research, 70, 263-286.

[6] Marr, B. (2019). How artificial intelligence is revolutionizing business in 2019. Forbes.

[7] Wang, F., Bandar, Z., & McLean, D. (2016). Business intelligence and analytics: from big data to big impact. MIS Quarterly, 40(4), 1165-1188.

[8] Shrestha, R., & Mahmood, A. N. (2018). Artificial intelligence and business analytics. Business Horizons, 61(6), 829-838.

[9] Taulli, T. (2019). AI: Its Impact on Business. AI and Machine Learning for Business: A No-Nonsense Guide to Data-Driven Technologies, 25-45.

[10] Davenport, T. H., Gu, Q., Jin, J., & Reinhart, A. (2018). Artificial Intelligence for the Real World. Harvard Business Review, 96(1), 108- 116. 190

[11]. Sunil Kumar Sehrawat. Intelligent Healthcare Management: Advancing Healthcare with Integrated AI and ML Solutions (2017), vol-17

[12]. Venkata SK Settibathini. Strategic analysis review of data analytics with the help of artificial intelligence.2023, Vol-26,1-10.

[13]. Gopichand Vemulapalli, Self-Service Analytics Implementation Strategies for Empowering Data Analysts.2023, Vol-4,1-14.