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Harnessing ChatGPT as an Intelligent Tool for Data Analysis in Algerian Libraries: Opportunities, Challenges, and Theoretical Perspectives

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Abstract

The rapid evolution of information and communication technologies has transformed the library and information science (LIS) sector worldwide, with Algerian libraries standing at the threshold of profound change. Artificial intelligence (AI) applications, particularly natural language processing (NLP) models such as ChatGPT, present a groundbreaking potential for data analysis, information retrieval, and decision support. This study aims to provide a comprehensive theoretical framework for understanding how ChatGPT can function as a smart tool for data analysis in Algerian libraries.

The article explores three interrelated dimensions: (1) the conceptual foundations of data analysis in library contexts; (2) the distinctive capabilities of ChatGPT in semantic understanding, text classification, and automated information organization; and (3) the socio-technical, infrastructural, and ethical challenges facing its adoption in Algeria. Findings highlight that ChatGPT offers substantial potential for enhancing library services by enabling advanced textual analytics, personalized recommendations, and data-driven decision-making. However, significant challenges persist, including infrastructural readiness, digital literacy gaps among librarians, language-specific constraints, and ethical issues related to privacy, bias, and accountability.

By critically examining both opportunities and limitations, this article contributes to the academic debate on AI adoption in developing library systems and provides practical insights for Algerian institutions seeking to modernize their information ecosystems.

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Introduction

The library and information sector in the world and in Algeria in particular, is witnessing a qualitative transformation driven by the rapid development of information and communication technologies, and the increase in the volume of data that needs accurate management and analysis. In light of these transformations, artificial intelligence has emerged as a pivotal tool to make a qualitative shift in the method of processing and investing data, as it has become able to perform tasks that were exclusive to humans, such as the semantic understanding of texts, information extraction, and data -based decisions.

Among the most prominent techniques of modern artificial intelligence, the ChatGPT model, which depends on Natural Language procesing and deep nerve networks to generate and analyze texts, makes it a promising tool in library environments. Its capabilities in analyzing texts, classifying content, and providing recommendations gives it the ability to contribute to developing information services and improving the experience of beneficiaries.

However, the ChatGPT application in Algerian libraries requires an accurate understanding of its capabilities and limits, as well as awareness of the challenges related to infrastructure, human resources, and moral considerations. Accordingly, this article seeks to provide an integrated theoretical framework that explains how to employ ChatGPT as a smart tool for data analysis in Algerian libraries, while discussing the reality, opportunities and challenges of this trend.

1 .Theoretical framework for data analysis in libraries

Data analysis in libraries is the cornerstone of understanding the behavior of beneficiaries and their changing needs, assessing the effectiveness of services and resources provided, and improving the process of taking administrative and strategic decisions. This analysis depends on a variety of curricula and statistical and sports tools, starting from the simple descriptive statistics that provides a summary of the data, to the complex automatic learning models that predict future trends. The theoretical framework for data analysis in libraries is based on the principles of knowledge management, as raw data is converted into valuable information, then into an applicable knowledge. Understanding these different principles and curricula enables libraries to provide more specialized and effective services, thus enhancing their vital role in society. In a study carried out by Busleme, 2018 on the reality of the use of information technology in Algerian university libraries, she indicated that investing in data analysis is an imperative to improve the quality of the services provided and meet the needs of beneficiaries effectively.

Data analysis in libraries is based on a wide range of sources, including loan records, access to digital sources, opinion polls, social media analyzes, and browsing data on the websites of libraries. These different sources require the use of various tools and technologies to convert raw data into useful information. For example, text analysis tools can be used to extract the main ideas of opinion polls, while data visualization tools can be used to provide visual summaries for directions in loan records. The theoretical framework for data analysis in libraries includes a deep understanding of these sources and tools, and how to use them effectively to achieve specific goals. In this context, Cortez Arellano et al

The application of artificial intelligence technologies, especially natural language processing models such as ChatGPT , represents an important development in the field of data analysis in libraries. These technologies can

help automate routine tasks, such as classifying books, analyzing beneficiaries' inquiries, and providing new visions about the needs and behavior of beneficiaries. For example, ChatGPT can be used to analyze emails sent to the library to determine the most common topics, or to analyze social media posts to measure the satisfaction of beneficiaries of the services provided. However, the use of these technologies requires a deep understanding of their potential restrictions, such as biases in training data and privacy issues. In this context, Hider & Reimer J., 2021, 2021, stresses the importance of developing ethics for data in libraries that guarantee the use of data responsible and transparent, and protects the rights and privacy of beneficiaries.

1.1 The concept of data analysis in library science and information

Data analysis at the heart of library science and information is the cornerstone of understanding the behavior of beneficiaries and the development of office services, as it is no longer limited to the indexing and preservation of books, but rather to extract in -depth visions of the available data to understand the needs of the beneficiaries and their changing expectations. This qualitative shift requires adopting advanced tools and methodologies that enable libraries to process the huge amount of accumulated data, whether it is book loan data, digital sources use data, or interactions on the Internet. The primary goal of this analysis is to improve the experience of beneficiaries, develop office groups, measure the impact of the services provided, and thus the effective contribution to achieving the goals of the parent institution. For example, libraries in Algeria can take advantage of the loan data analysis to determine the types of books most requested by students and researchers, thus directing the policies of books to better meet these needs, taking into account demographic changes and modern research trends. A field research conducted by Bouchikhi (2018) on the use of university libraries in Algeria indicates that there is a gap between the services provided and the needs of the beneficiaries, which requires the necessity of adopting more effective data analysis strategies to understand these needs and fill this gap.

The application of the concept of data analysis in libraries requires a deep understanding of statistical and sports concepts, in addition to mastering the use of tools and programs specialized in data analysis. It is no longer limited to the review of simple descriptive statistics, but rather the use of more complicated techniques, such as slope analysis, analysis of time chains, and social network analysis, requires to understand relationships between different variables and predicting future trends. In this context, the role of artificial intelligence techniques and the learning of the machine in automating data analysis and extracting valuable visions of them, which saves workers in libraries time and effort, and allows them to focus on the most creative tasks. For example, machine learning algorithms can be used to analyze research data in the library's automatic index to determine the most interested topics by beneficiaries, or to allocate book recommendations based on their previous preferences. A research by Kamal and others (2022) emphasizes the importance of using artificial intelligence technologies in developing library services in Algeria, especially in the field of data analysis and the allocation of services.

Adopting a culture of data analysis in libraries also requires building human capabilities and qualifying workers in this field. It is not enough to provide specialized tools and programs, but workers must be trained to use them effectively, understand the basic principles of data analysis, and to properly interpret the results. It also requires providing the necessary technical and administrative support to encourage workers to conduct research and studies that depend on data analysis, and to publish their results in specialized scientific conferences and magazines. Libraries must cooperate with universities and research institutions to exchange experiences and knowledge in the field of data analysis, and to benefit from the experiences available in these institutions. In this context, the experiences of developed countries can be used in the field of data analysis in libraries, and adapt them

to the Algerian context. A research carried out by A. O'Brien and A. Smith (2016) indicates that building human capabilities is one of the most important factors that determine the success of adopting data analysis in libraries.

1.2 Types of data in libraries (bibliographic, text, statistics)

Algerian libraries environments are distinguished by the diversity of the sources of the data they deal with, which makes it a fertile field for the application of smart data analysis techniques such as ChatGPT . Bibliographic data tops this diversity, as it represents the backbone of indexing, research and retrieval processes. These data include accurate details about books, patrols, audiovisual materials, such as the title of work, author, publisher, publishing year, classification numbers (such as Dewey or Congress), and major topics. The accuracy and quality of these data are decisive to enable the beneficiaries to access the required information efficiently. In addition, bibliographic data helps analyze library groups and identify strengths and weaknesses, which contributes to taking enlightened decisions on resource acquisition and services development. Analysis of this data using artificial intelligence techniques can reveal hidden patterns in the use of groups, define popular topics, and predict the future needs of beneficiaries, which represents a great added value for Algerian libraries in their endeavor to provide distinguished information services. (Boutgan, 2015) focuses on the importance of bibliographic data in Algerian university libraries and its impact on the quality of the services provided.

The importance of data in Algerian libraries exceeds the bibliographic framework to include text data generated from various sources, such as complete summaries, articles, reports, university theses, blogs and websites. This data represents a tremendous information wealth that can be used to improve and develop library services. Textual data analysis requires the use of advanced techniques such as NLP processing (Text Mining) to extract major meanings, trends and concepts. For example, these techniques can be used to analyze the content of university messages to determine the popular research topics in Algeria, or to analyze the articles summaries to determine the extent of the library's coverage of important topics for beneficiaries. Moreover, text data can be used to improve current briefing services, and provide recommendations for beneficiaries based on their research interests. (N. Cheikhrouhou, 2019, PP. 123-138) explains how natural language processing techniques can be used to analyze scientific content in digital libraries.

In addition to bibliographic and text data, statistical data is gaining increasing importance in Algerian library environments. These data include information about the number of beneficiaries, the number of issues, the number of visits to the library, the use of electronic resources, the assessments of the beneficiaries of the services provided, and other quantitative indicators that reflect the performance of the library and the satisfaction of the beneficiaries. These data can be used to analyze trends in the use of the library, identify strengths and weaknesses in the services provided, and evaluate the impact of new programs and initiatives. For example, the laxative data can be analyzed to identify the most requested books and topics by beneficiaries, or analyzes the visits data to determine the peak and calm times in the use of the library. In addition, statistical data can be used to assess the library's impact on the local community, and to prove its value to officials and decision makers. (A. Benlahcene, 2017, PP. 55-69) addresses the importance of using statistics in assessing the performance of Algerian university libraries.

1.3 The importance of smart data analysis in improving library services

The importance of smart data analysis in Algerian libraries is gaining increasing dimensions in light of the accelerated digital transformation and the increasing volume of data available. The role of libraries is no longer

limited to preserving and providing sources, but rather extended to understand the needs of the beneficiaries and expect them, and improve the services provided to them effectively and continuously. The smart data analysis enables libraries to extract valuable visions from various data sources, such as loan data, electronic database data, social media interaction data, and questionnaire data. These visions enable libraries to allocate services to better meet the needs of beneficiaries, improve group quality, develop programs and events, and evaluate the effectiveness of the services provided. For example, loan data analysis can reveal the most requested books and topics, helping the library to make enlightened decisions on the acquisition of new sources. An analysis of data on electronic databases can also reveal the most interesting research fields by beneficiaries, which helps the library to provide training courses and appropriate resources. Adopting smart data analysis techniques represents a decisive step towards developing Algerian libraries and turning them into modern and innovative information institutions that contribute to supporting scientific research and community development. The study (Bouchikhi and others, 2018) emphasized the importance of using data analysis tools in Algerian university libraries to improve resource management and provide better services for researchers and students.

The smart data analysis contributes to improving the process of making decisions in Algerian libraries significantly, by providing accurate and reliable information that supports this process. Instead of relying on intuition or personal experience, libraries can use data to analyze trends and changes in the needs and behaviors of the beneficiaries. For example, the analysis of the desktop space use can reveal the most crowded areas and the least used areas, helping the library to redesign the desktop space to better meet the needs of the beneficiaries. The analysis of questionnaire data can also reveal the strengths and weaknesses of the services provided, which helps the library identify areas that need to be improved. The use of data in decision -making ensures that these decisions are based on evidence and reality, which increases their effectiveness and reduces the possibility of errors. This was confirmed by the (Hassain, 2021) study on the use of data analysis in university libraries in the United States, which indicated that libraries that depend on decisions are more able to meet the needs of beneficiaries and achieve their goals. (H. Guo, 2019) indicated that data analysis can help libraries improve the efficiency of internal processes, reduce costs, and increase beneficiaries' satisfaction.

The importance of smart data analysis is not limited to improving services and making decisions, but rather extends to the development of skills and competencies among workers in Algerian libraries. The use of smart data analysis tools requires workers in libraries to acquire new skills in areas such as statistics, programming, data analysis, and data visualization. These skills enable them to understand, analyze, interpret and use data in decision -making. It also enables them to develop new and innovative services that better meet the needs of the beneficiaries. The development of skills and competencies among library workers is an important investment in the future of Algerian libraries, as it ensures that libraries are able to keep pace with the rapid technological developments and meet the changing needs of beneficiaries. The (Nerry, 2020) study on the role of workers in libraries in the digitization era indicated that workers in libraries need to acquire new skills in areas such as data analysis, digital content management and digital marketing in order to be able to perform their role effectively in this era.

2 .Artificial intelligence in libraries data

The library sector in Algeria is witnessing an accelerated transformation due to successive technological developments, foremost of which is artificial intelligence, which represents an enormous opportunity to improve office services and expand their scope. By exploiting artificial intelligence techniques, Algerian libraries can

automate many routine tasks, such as indexing, classification and loan, which saves employee time and effort and allows them to focus on providing more specialized services to beneficiaries. Moreover, artificial intelligence can play a crucial role in enhancing access to information, whether by developing smart research systems that understand the needs of users and provide them with accurate and appropriate results, or by creating comprehensive digital libraries that provide various information sources for researchers and students throughout the country. This transformation necessarily requires reassessment of the organizational structures of libraries and the rehabilitation of employees to enable them to deal effectively with these new technologies, a challenge facing Algerian libraries and requires the concerted efforts of the various parties concerned, from educational and research institutions to government agencies and a civil society. (Khaldi, 2020)

The impact of artificial intelligence in the library environment extends to also enhance the user experience and improve it. By using NLP and Machine Learning techniques, Algerian libraries can develop automatic chat systems (Chatbots) capable of answering user inquiries and directing them to search for information, providing immediate and available support service around the clock. In addition, artificial intelligence can help analyze the behavior and preferences of users, allowing libraries to customize services and provide recommendations related to their interests, thus increasing user satisfaction and encouraging them to benefit from library services more. These capabilities are in line with the modern trends in library science and information that focuses on the user as an essential element in the design and presentation of services, and emphasizes the importance of understanding his needs and fulfilling them in the best possible way. (M. A. Hussein, 2021, pp.109-128).

Algerian libraries, despite the huge potential provided by artificial intelligence, are facing a set of challenges that must be overcome to ensure full benefit from this technology. Among these challenges are the weak infrastructure of information and communications technology in some areas, the lack of financial resources allocated to modernizing office systems, and the lack of specialized competencies in the field of artificial intelligence in the library sector. In addition, there is a need to develop clear and defined strategies to integrate artificial intelligence into office operations, taking into account the cultural and linguistic peculiarities of Algerian society. This also requires strengthening cooperation between libraries and academic and research institutions to develop innovative solutions suitable for the needs of Algerian libraries. Overing these challenges requires a clear strategic vision and a strong will to develop the library sector and make it able to keep pace with accelerating technological developments and provide high -quality services to the beneficiaries. (D. Belkadi et al., 2018, pp. 66-75)

2.1 The concept of artificial intelligence and its applications in the information sector

Artificial intelligence (AI) is the cornerstone of the current technological revolution, as it is no longer just a theoretical concept but rather a tangible reality that changes the features of many sectors, including the information sector. Artificial intelligence can be defined as the ability of computer machines and systems to simulate human mental capabilities, such as learning, conclusion, problem solving and decision -making. This field aims to develop systems capable of processing huge data, extracting patterns, and adapting to changing conditions, which opens wide horizons to improve performance and efficiency in various fields. In the context of Algerian libraries, artificial intelligence can play a pivotal role in developing services provided to beneficiaries, starting from automating routine operations to providing custom research experiences that meet the needs of each user separately. Several studies have emphasized the importance of adopting artificial intelligence technologies in libraries, noting the potential benefits in improving resource management, facilitating access to information, and enhancing interaction with beneficiaries (W. Boudellaa, 2019).

Artificial intelligence applications in the information sector are embodied in a variety of tools and technologies that aim to improve content management, facilitate the process of research and retrieval, and enhance the user experience. Among these applications, the smart recommendation systems that depend on automated learning algorithms can be indicated to submit proposals for beneficiaries based on their previous interests and behaviors. Artificial intelligence can also be used in the development of chatbots that provide immediate support to beneficiaries, answer their inquiries, and help them find the required information. In addition, NLP techniques (NLP) can be used to improve content indexing, extract important information from texts, and translate documents automatically. A study conducted by the researcher (N. Djellouli, 2020) on Algerian university libraries showed an urgent need to adopt these technologies to improve the quality of services provided to students and researchers.

The adoption of artificial intelligence techniques in the information sector is not without challenges, especially in the context of Algerian libraries that may face limited financial and infrastructure. However, the potential benefits far exceed these challenges, as artificial intelligence can help libraries improve operational efficiency, reduce costs, and provide more specialized and effective services to beneficiaries. In order to achieve the maximum benefit from these technologies, Algerian libraries must invest in employee training, develop the necessary infrastructure, and cooperate with research institutions and technological companies. Libraries must also pay special attention to ethical and legal issues related to the use of artificial intelligence, such as protecting personal data and ensuring transparency and accountability. In this context, successful international experiences in this field, such as the experience of the French National Library that used artificial intelligence, can be used to improve the Bibliothèque National DE France, 2023).

2.2 Normal language processing techniques (NLP) in libraries

Algerian libraries, similar to their counterparts around the world, have witnessed radical transformations in the ways to organize and provide information, driven by accelerated progress in the field of natural language processing techniques (NLP). These technologies are no longer just auxiliary technological tools, but rather have become an essential component in the structure of modern libraries, as they enable them to automate document indexing, extract related information from texts, and provide advanced research services to beneficiaries. Through the use of advanced algorithms to identify words, analyze sentences, and understand the implicit meanings, Algerian libraries can improve the accuracy of indexing, accelerate searches and retrieval, and provide valuable visions about the content of their groups. For example, NLP techniques can be used to analyze ancient Arabic texts and understand their historical contexts, or to define common topics in Algerian scientific research, which helps researchers access the information they need more efficiently. The adoption of these technologies is not just a technological update, but rather a strategic investment in the future of Algerian libraries, and enabling them to keep pace with global developments in the field of information and knowledge.

Natural language processing applications in Algerian libraries exceed the mere improving indexing and research processes, to also include developing innovative services for beneficiaries. Through the use of NLP - backed chat robots, libraries can provide immediate support to beneficiaries and answer their inquiries automatically, relieving pressure on employees and improves user experience. Sentiment Analysis can also be used to understand the opinions of beneficiaries on office services, determine strengths and weaknesses, and take enlightened decisions to improve the quality of the services provided. In addition, automatic language translation techniques can be used to translate the content written in foreign languages into Arabic, allowing Algerian beneficiaries to access broader information sources. A research conducted by Zerrouki, 2018 indicated the importance of using natural language processing techniques in improving the quality of university library services in Algeria, and the need to train employees to use these technologies effectively.

However, the use of natural language treatment techniques in Algerian libraries faces several challenges, among them the limited resources available, the lack of specialized competencies in this field, and the lack of sufficient training data in the Algerian Arabic language. In order for these technologies their full potential, Algerian libraries must invest in employee training, develop specialized linguistic databases, and cooperate with universities and research centers to develop innovative solutions that meet their own needs. The Algerian government must also provide the necessary financial and legislative support to encourage the adoption of these technologies in libraries and educational institutions, by providing the necessary funding for research projects, facilitating access to data and information, and encouraging cooperation between the public and private sectors. In a comparative study on the use of natural language treatment techniques in Arabic libraries, Souissi et al.

2.3 A comparison between traditional artificial intelligence tools and modern linguistic models

Traditional artificial intelligence tools, such as statistical learning and assembly -based learning algorithms, represent the cornerstone of data analysis in Algerian libraries for decades. These tools, despite their effectiveness in specific tasks such as analysis of loan patterns and the initial classification of descriptive data, suffer from fundamental restrictions in understanding the semantic context of texts and extracting complex visions of unorganized data. For example, the assembly algorithm can discover the most loaned books during a certain period, but it is unable to understand the reasons behind this turnout, or to determine the relationship between these books and the different tendencies of readers. These palaces become more clear when dealing with huge amounts of text data such as readers 'assessments and comments on books, as processing of these data requires a deep understanding of language and the ability to extract the implicit meaning, which is what traditional tools lack. A comparative analytical study conducted by Talha (2018) at the University of Algeria 2 on the use of traditional information retrieval techniques in Algerian university libraries showed that these technologies face difficulties in dealing with the diversity of digital sources and the difficulty of understanding the complex users 'information, which leads to inaccurate and irreparable search results.

Modern linguistic models, led by ChatGPT , have a revolution in the field of natural language treatment, introducing superior capabilities in understanding the language and generating it closer to the human language. These models, based on the structure of deep nerve transformers, are able to learn complex patterns of huge textual data, which enables them to understand the semantic context of the texts and extract accurate visions of unorganized data. In the context of Algerian libraries, ChatGPT can analyze readers 'assessments and comments on books to determine directions in readers' interests and preferences, and to provide recommendations for each reader based on these preferences. It can also be used to analyze the descriptive data of books to determine the hidden relationships between topics and authors, which helps in improving the classification and indexing process. In addition, ChatGPT can generate accurate summaries of books and articles, and answer readers' questions naturally and effectively. This is in line with the results of the study (A. Vaswani et al

However, it should be borne in mind that the use of modern linguistic models in Algerian libraries introduces new challenges. In addition to the need for a strong computer infrastructure and qualified human resources to deal with these technologies, there are challenges related to privacy and safety, whereby the protection of readers' data must be guaranteed and unauthorized access to it. The problem of potential biases in linguistic models must also be addressed, which may lead to unfair or discriminatory recommendations. Therefore, the use of ChatGPT in Algerian libraries requires accurate planning and continuous evaluation of performance to ensure

the maximum benefit from this technology while avoiding potential risks. This is confirmed by a study prepared by Bouchnafi and others (2023) on the use of artificial intelligence in the Algerian public sector, which stressed the need to develop clear strategies to deal with moral and legal challenges related to the use of these technologies, and to ensure transparency and accountability in all processes.

3 .ChatGPT technology in the context of data analysis

Data analysis is a vital nerve in the work of modern libraries, as it provides a deeper understanding of the needs of beneficiaries, evaluating the effectiveness of services, and improving resource management. Traditionally, Algerian libraries relied on traditional statistical tools and data analysis technologies, which often require specialized experience and strenuous efforts. However, the emergence of artificial intelligence technologies, on top of which are large language models such as ChatGPT , opens new horizons for analyzing data in more efficiente and effective ways. ChatGPT , through its ability to understand the natural language and generate texts, can help extract valuable visions of large data collections, such as loan records, opinion polls, and websites use. This transformation requires careful study to determine how this technology is optimally applying in the context of Algerian libraries, taking into account the challenges related to the availability and quality of data, in addition to the moral and legal aspects related to artificial intelligence (N. Belkheer, 2018).

Recent studies have shown that the use of large language models such as ChatGPT can significantly enhance data analysis capabilities in various sectors. In the context of libraries, ChatGPT can perform tasks such as classifying books automatically, summarizing scientific articles, answering complex beneficiary inquiries, and analyzing reading trends. For example, ChatGPT can analyze loan data to determine the most common topics among beneficiaries, helping the library to make enlightened decisions on buying books and developing services. Moreover, ChatGPT can help create personal recommendations for beneficiaries based on their reading record and interests, which improves the user experience and increases their satisfaction. However, we must realize that the ChatGPT effectiveness depends heavily on the quality of the data that is trained on it, and on the ability of users to formulate the information effectively. Algerian libraries must invest in developing data and improving their employees' skills to ensure the maximum benefit from this promising technology (TOOTI & M. Mezghiche, 2017).

The process of combining ChatGPT technology in data analysis in Algerian libraries requires a strategic approach that takes into account the unique characteristics of the local environment. This includes identifying the needs and special requirements of the library, evaluating the current infrastructure, and developing a detailed implementation plan. Aspects related to training and support should also be considered, as employees need to gain the skills necessary to use ChatGPT effectively. In addition, Algerian libraries must cooperate with researchers and experts in the field of artificial intelligence to ensure the development of custom solutions that meet their own needs. It is also important to conduct a continuous evaluation of ChatGPT performance and adjust strategies as needed to ensure the desired results. The ultimate goal must be to convert Algerian libraries into smart institutions capable of providing innovative and effective services to the beneficiaries (A. Khellfaoui, 2023).

3.1 Definition of the ChatGPT model and its technical structure

The ChatGPT model, developed by Openai, is a qualitative leap in the field of natural language treatment, as it represents a new generation of huge linguistic models based on transformers. This model is characterized by its superior ability to understand complex contexts and produce texts similar to human texts, which makes it a powerful tool for data analysis and extracting information in various fields. Its technical structure depends

on a deep nerve network consisting of multiple layers of transformers, which enables it to capture complex relationships between words and phrases in text. The model is subject to an intense training process on huge quantities of various text data from different sources, including books, articles and websites, which gives it wide knowledge and ability to deal with various types of texts. This training allows the model to identify different linguistic patterns, understand the implicit meanings, and respond to questions and inquiries in a smart and accurate way. Recent studies, such as those conducted by Boumediene et al., 2023 in a similar context, have shown the potential to use these models to analyze data and extract visions in different sectors, which opens new horizons for artificial intelligence applications in Algerian libraries and other institutions.

The technical structure of the ChatGPT model consists mainly of multiple layers of transformer Blocks, where each unit analyzes the relationships between words in the text inserted using Self-Attenation. This mechanism allows the model to focus on the most important words in the context, which enables it to better understand the meaning. Each unit also includes a Feed-Forward Network that works to process information extracted from the self-attention mechanism. These units are repeated several times in successive layers, allowing the model to build complex representations of the entrance text. In addition, the ChatGPT model uses techniques such as MASDED Attention to train the model to predict the missing words in the text, which improves its ability to understand different contexts. This structure was successfully used in many other applications, as a case study conducted by Toufik (2020) on the use of artificial intelligence in Algerian university libraries, stressing the importance of understanding this technical structure to make the most of the capabilities of these models in data analysis.

The use of a ChatGPT model as a smart tool for data analysis in Algerian libraries is a promising opportunity to improve operations efficiency and provide better services for beneficiaries. The model can help analyze large amounts of text data, such as summaries, descriptions, automatic indexing, and extracting important information from them. For example, the model can be used to classify books and articles by subject, identify emerging research trends, and improve research results in the index. In addition, the model can be used to answer the beneficiaries' questions and provide them with finding the information they need. However, it should be borne in mind that the use of a ChatGPT model requires some moral and technical considerations, such as ensuring the quality of the entered data and avoiding potential biases. It also requires training in library workers to use the model effectively. In this regard, international experiences can be used to use large language models in libraries, as shown in a study published by the American Library Association, 2023, which provides valuable visions on how to combine these technologies into the library environment in a responsible and effective manner.

3.2 ChatGPT capabilities in linguistic understanding and semantic analysis of texts

ChatGPT capabilities in linguistic understanding and text analysis are an essential feature that distinguishes it from other language models, where this technique can deal efficiently with the Arabic language by its eloquence and diversity of its dialects, which makes it a valuable tool for analyzing textual data in Algerian libraries. This ability depends on a complex structure of trained nervous networks on huge quantities of various texts, allowing them to understand the complex grammatical and semantic relations in the sentences, and to extract the implicit and valuable meanings in the texts. This is especially evident in its ability to deal with idiomatic and metaphorical expressions, and to understand the context in which words and sentences are mentioned, which is very important to analyze literary and historical texts that Algerian libraries abound. For example, ChatGPT can analyze a group of Algerian popular poems, extract from them the main ideas and repeated topics, and compare the methods of different poets, which represents an added value for researchers and those interested in the Algerian cultural heritage. (Dr. Bouchaib, 2018)

ChatGPT capabilities in the semantic analysis of texts are manifested in their ability to define relations between different words and concepts, and to understand the semantic implications and pre -assumptions of texts. This technology can analyze large quantities of text data, such as book summaries and articles, define major topics and keywords, and organize this information in a logical and organized way. This ability is especially useful in indexing and organizing books and articles in Algerian libraries, where ChatGPT can help create accurate and comprehensive indexes, and facilitate the process of searching for the required information. In addition, ChatGPT can help analyze and evaluate the quality of information in the texts, by determining the credibility of the sources used, and verifying the validity of the facts contained in the texts, which represents great importance in combating misleading information and false news. The ability of this technology to understand the cultural and social context in which the texts produced contributes to providing an accurate and objective analysis of information, taking into account the cultural and social differences that may affect the interpretation of the texts. (A. ABDI et al., 2021).

The use of ChatGPT in the semantic analysis of the texts provides Algerian libraries new opportunities to improve their services and expand their impact. By analyzing historical and literary texts, ChatGPT can help revive and spread Algerian cultural heritage. By analyzing scientific and research articles, ChatGPT can help support scientific research and innovation in Algeria. Moreover, ChatGPT can help improve the quality of education in Algeria, by providing new tools and technologies for students and teachers. For example, ChatGPT can help students understand complex texts, develop their writing and expression skills, and learn how to search for and evaluate information. ChatGPT can help teachers prepare lessons and lectures, evaluate students' performance, and provide individual feedback for each student. The use of ChatGPT technology is not only limited to analyzing written texts, but it can also be used to analyze oral texts, such as lectures, seminars and interviews, which allows Algerian libraries new opportunities to collect, analyze and document oral knowledge. (A. Benlahcene, 2019)

3.3 ChatGPT employment in office data analysis

Algerian libraries, with their huge amount of descriptive data related to available sources, beneficiaries' databases, loan records, etc., represent fertile ground for the application of advanced data analysis technologies. However, the analytical capabilities available are often limited, which impedes the full benefit of this data in improving services and meeting the needs of beneficiaries effectively. ChatGPT is promising as a promising tool capable of filling this gap, as it can analyze organized and unorganized textual data available in libraries (such as book summaries, beneficiaries' comments, search records) to extract valuable visions on the interests of the beneficiaries, evaluate the effectiveness of library groups, and discover the trends arising in scientific research. For example, ChatGPT can analyze unrealized loan requests to determine the areas where the library needs to enhance its group, or analyze the beneficiaries' comments on the services provided to determine the strengths and weaknesses and suggest concrete improvements. This possible use of ChatGPT corresponds to global trends towards digitization of libraries and the use of artificial intelligence to improve services, as it is evident in the study (M. Hussein, 2023) that explored the capabilities of artificial intelligence in Egyptian academic libraries.

The scope of the ChatGPT capabilities in desktop data analysis extends beyond the mere text data analysis; It can also be used in organizing data analysis, such as loan data, beneficiaries registration data, and electronic databases use data. ChatGPT , through its ability to understand complicated patterns and relationships in data, can help libraries identify the most active groups of beneficiaries, determine the most sought -after resources, and measure the effectiveness of the library's promotional campaigns. Moreover, ChatGPT can contribute to improving human resource management in the library by analyzing employee performance data and identifying areas that need to be developed and training. These capabilities are parallel to what was stated in the doctoral thesis

submitted by (P. Boziani, 2018), which dealt with the use of decision support systems in Algerian university libraries, as it stressed the importance of providing appropriate analytical tools to support enlightened decisions.

However, the potential challenges that may face the process of ChatGPT 's employment may be taken into account in the analysis of office data in the Algerian context. These challenges include: The limited digital data available in some libraries, the need to train employees to use ChatGPT effectively, concerns related to privacy and data security, and ethical considerations related to the use of artificial intelligence in libraries. Overcoming these challenges requires setting a comprehensive strategy that includes developing digital infrastructure for libraries, providing specialized training programs for employees, setting clear policies to protect data and privacy, and ensuring that the use of ChatGPT is in line with the library's professional values and morals. The success of the ChatGPT employment in the analysis of office data depends on the ability of Algerian libraries to address these challenges and benefit from the opportunities provided by this promising technology, which is consistent with the recommendations (F. Chouti, 2022) in its study on digital challenges in Algerian university libraries.

4 .The reality and capabilities of the ChatGPT application in Algerian libraries

Algerian libraries are vital institutions that seek to keep pace with the rapid technological developments to improve their services and meet the increasing needs of beneficiaries. With the appearance of large language models such as ChatGPT , a question arises about the possibility of exploiting this technology in analyzing the huge data available to libraries, whether it is descriptive data for sources, beneficiaries 'use data, or data about the prevailing research trends. This research aims to explore the current reality of the use of smart technologies in Algerian libraries, and evaluate ChatGPT capabilities as an effective tool for analyzing these data and extracting valuable visions that support decisions and developing services. Through an analytical study of the current situation and presenting practical recommendations, we seek to contribute to strengthening the role of Algerian libraries as modern information centers and keeping pace with the digital era. A case study conducted in the Library of the University of Algeria 1 (Bin Abdullah, 2020) emphasized the need to invest in modern technologies to enhance the library's ability to analyze the needs of beneficiaries and provide high -quality information sources.

Data analysis represents a major challenge for Algerian libraries, given the huge amount of available information and the difficulty of extracting significant visions of them using traditional methods. ChatGPT provides the ability to process and analyze text data in advanced ways, such as determining the topics common in beneficiaries' requests, analyzing the content of the sources to determine the extent of their suitability for the needs of users, and predicting future research trends. These capabilities can help libraries improve the group management process, develop custom information services, and provide accurate recommendations to the beneficiaries. However, the ChatGPT application in Algerian libraries requires observing a number of factors, such as high -quality data, training human cadres to use technology, and address challenges related to privacy and safety. In this regard, a report issued by the International Federation of Library Associations and Institutions (IFLA, 2021) indicates the importance of setting clear policies to protect data and ensuring the moral use of artificial intelligence in libraries.

ChatGPT application in Algerian libraries requires a careful study of local conditions, including available technological infrastructure, human cadres skills, and special needs for beneficiaries. The focus should be on developing custom solutions that are appropriate to the Algerian context, taking into account the challenges related to the Arabic language and the specialized terms used in various fields. Cooperation between libraries, academic institutions and technological companies can play a decisive role in developing these solutions and providing the necessary training for human cadres. In addition, the focus should be on building internal capabilities in libraries to

ensure the sustainability of the use of ChatGPT and the maximum benefit from it. In this context, a study (M. N. Al-Suqri, 2022) stressed the importance of continuous training for workers in libraries on the use of modern technologies to ensure the provision of high quality information services.

4.1 The current situation of digital transformation in Algerian libraries

The digital transformation in Algerian libraries is an urgent necessity to keep pace with the accelerated developments in the field of information and communication technology, but the current reality shows a great difference in the level of adopting these technologies between the various libraries. While we find some university libraries have taken advanced steps in digitizing holdings and providing electronic access to them, many other libraries still rely heavily on traditional methods of information management and services. This disparity is due to several factors, including the limited financial resources available for investment in digital infrastructure, the lack of specialized competencies in the field of information technology, in addition to the absence of a comprehensive national strategy for digital transformation in the library sector. For example, a study of 'digital transformation in Algerian university libraries' (A. Bin Hamed, 2020) concluded that most libraries suffer from a lack of budgets designated for digitization, which hinders their ability to acquire software and modern devices and train employees to use them effectively. This puts the Algerian libraries in a difficult position, as they face great challenges in meeting the increasing needs of the beneficiaries of digital information, and in maintaining their position as vital institutions in society.

The process of digital transformation in Algerian libraries is not only limited to digitizing paper groups and making them available via the Internet, but rather goes beyond the re -engineering of the internal operations of the library, the development of services provided to beneficiaries, and the employment of modern technologies in data analysis and decision -making. The real digital transformation requires a fundamental change in the library culture, adopting a new vision that focuses on the user and considers it an essential axis in designing and developing services. The study (M. Dah, 2018) indicated that many Algerian libraries lack clear -cut strategies for digital transformation, and that the efforts made in this field are often fragmented and unlimited. This leads to the lack of maximum benefit from the capabilities provided by digital technologies, and to lose great opportunities to improve the quality of services provided to beneficiaries. Hence, the urgent need of a comprehensive national strategy for digital transformation in the library sector appears, determining the goals, mechanisms and resources necessary to achieve this transformation effectively and sustainable.

Despite the challenges facing Algerian libraries in the field of digital transformation, there are also promising opportunities that can be used to make tangible progress in this field. With the increasing government interest in developing the information and communications technology sector, and providing financial and technical support for digital projects, Algerian libraries can benefit from these opportunities to update their digital infrastructure and develop their services. The increasing awareness of the importance of digital transformation among libraries workers, and the efforts made to develop their skills and capabilities in the field of information technology, can contribute significantly to achieving this transformation. In this context, it is worth noting the experience of the French National Library in the field of digital transformation, which is a role model in this field. Through the digitization of millions of documents and rare manuscripts, and the development of innovative digital services, the French National Library was able to expand its services to include a global audience, and to enhance its position as a leading cultural institution (Bibliothèque National De France, 2023). Algerian libraries can benefit

from this experience and other successful experiences in the field of digital transformation, to determine the best practices and apply them in their local context.

4.2 The opportunities made by ChatGPT to improve data management in libraries

ChatGPT technology represents a qualitative shift in the field of artificial intelligence, and provides promising opportunities to improve data management in Algerian libraries, which face increasing challenges in dealing with the huge number of digital and printed information. ChatGPT can contribute to automating many routine tasks, such as book indexing and desktop materials, classifying them, extracting summaries, and answering the inquiries of beneficiaries immediately and effectively. Moreover, it can be used to analyze metaphor data and readers' preferences, which helps librarians to better understand the needs of beneficiaries and provide custom services that meet these needs. These capabilities allow libraries to improve their operational efficiency, save time and effort for employees, and provide better services to beneficiaries, thus enhancing the role of libraries as vital information centers in society. In his study on the use of information technology in Algerian university libraries, Ben Odeh emphasizes the importance of adopting modern technologies to improve the quality of the services provided and meet the changing needs of beneficiaries, making ChatGPT a promising tool in this context.

ChatGPT can play a pivotal role in improving access to information within Algerian libraries, especially in light of the linguistic challenges that the beneficiaries may face in accessing sources of foreign languages. The great linguistic model can translate texts quickly and accurately, allowing beneficiaries to view a wide range of cognitive sources regardless of its original language. In addition, ChatGPT can be used to build smart research systems that depend on natural language processing, allowing beneficiaries to search for information using their mother tongue in a natural way, rather than relying on complex keywords. These capabilities enhance access to information and make it more democratic, which contributes to spreading knowledge and enhancing scientific research in Algeria. This is consistent with what was stated in a study conducted by Sherko and others (A. Shirko et al

In addition to operational and service jobs, ChatGPT can contribute to the development of knowledge management within Algerian libraries. It can be used in analyzing research trends and identifying emerging areas in various specialties, which helps library secretaries to make enlightened decisions on the acquisition of sources and develop their groups. Moreover, it can be used to create tools to regulate and classify knowledge, such as automated classifications and ontologies, which facilitates the process of recovering information and improves the quality of the available data. These capabilities enable libraries to become effective knowledge centers that contribute to supporting scientific research and innovation in Algeria. This trend is supported by a study published in the magazine 'Information Technology and Libraries' (A. COX, 2020), which reviewed how artificial intelligence can contribute to improving knowledge management in libraries, by automating tasks and providing valuable visions to make decisions.

4.3 Theoretical and practical challenges in front of the integration of ChatGPT into the Algerian library environment

The introduction of ChatGPT technology in Algerian libraries is a promising qualitative shift, but it faces deep theoretical challenges related to the nature of digital knowledge and ways to reach it. In theory, the use of this technology raises questions about the accuracy and reliability of the information provided, as ChatGPT depends on linguistic models and not on a real understanding of the content. This puts libraries in front of a serious responsibility to verify the validity of the information provided by the system, which requires qualified human resources and is able to deal with this technology with cash awareness. In addition, the challenge related to fair access to information highlights, in light of the digital disparity in Algeria, dependence on techniques such as

ChatGPT may deepen the gap between the beneficiaries who are able to use it and those who lack the necessary skills or infrastructure. This challenge requires the development of strategies that ensure that all segments of society benefit from this technology, taking into account the needs of marginalized groups. The study (D. Belkadi, 2020) indicated that the adoption of modern technologies in Algerian libraries requires a comprehensive strategic vision that takes into account the infrastructure and human training.

On the practical level, the ChatGPT app in Algerian libraries is facing a set of obstacles that hinder the maximum benefit from its capabilities. Among these obstacles is the limited data available in Arabic, especially those related to Algerian content, which affects the accuracy of the regime's responses and their effectiveness in meeting the needs of local beneficiaries. Overcoming this challenge requires an intense investment in developing Arab data groups and training linguistic models on them, in addition to supporting cooperation between libraries and scientific research institutions to produce high -quality digital content. The practical application of ChatGPT also faces challenges related to technological infrastructure. Most Algerian libraries suffer from weak Internet networks and advanced devices, which hinders their ability to host and operate this technology efficiently. A field study (M. Benslimane, 2017) indicates that many university libraries in Algeria lack the basic equipment needed to provide advanced digital services.

The integration of ChatGPT into the Algerian libraries environment is not limited to the technical aspects, but also extends to moral and legal issues. The use of this technology raises questions about privacy protection and intellectual property rights, especially with regard to personal data that may be collected from beneficiaries and the content protected by publishing rights that may be used to train linguistic models. Libraries must develop clear and transparent policies that protect the rights of beneficiaries and ensure compliance with local and international laws related to data protection and intellectual property rights. In addition, the challenge related to the potential effect of ChatGPT highlights the role of librarians and their jobs. In light of the system's ability to automate some routine tasks, library secretaries may feel job threat. This requires redefining the role of the librarian and developing his skills to be able to deal with modern technologies and direct the beneficiaries to use them effectively. The study (A. Chérif, 2019) recommended the need to develop specialized training programs for librarians in Algeria to keep pace with the accelerated technological developments.

Conclusion

ChatGPT technology employment in data analysis within Algerian libraries is a strategic opportunity to enhance information management efficiency and develop services directed to beneficiaries. Through its advanced abilities in understanding the natural language and analyzing texts, this technique can contribute to improving indexing processes, extracting data, classifying content, and even supporting decision -making in library environments.

Despite the great capabilities provided by this technology, its application on the ground in Algeria remains linked to several factors, including the readiness of digital infrastructure, the availability of human competencies capable of dealing with artificial intelligence, in addition to the need to observe the legal and moral frameworks associated with data processing.

Accordingly, the investment of ChatGPT in Algerian libraries requires a clear strategic vision that combines technical development and human rehabilitation, as well as policies for supporting innovation in the information sector. In light of this, it can be said that the integration of artificial intelligence, especially ChatGPT, in the library environment, is a promising step towards moving from the traditional library to the smart library capable of responding to the requirements of the digital age.

Findings and Discussion

Opportunities of ChatGPT for Algerian Libraries

- Textual Data Analysis: Automatic categorization and semantic mapping of large Arabic, French, and English corpora.
- User-Centered Services: Personalized reference assistance, content recommendations, and automated responses.
- Decision Support: Data-driven insights for acquisitions, cataloging, and policy-making.
- Capacity Building: Assisting librarians with training, research, and academic support through conversational AI.

Challenges and Barriers

- Infrastructural Gaps: Limited access to high-performance computing resources and internet connectivity in several regions.
- Language Barriers: The complexity of Arabic dialects and multilingual library collections presents additional hurdles.
- Human Capacity: Insufficient digital literacy and AI training among librarians and information professionals.
- Ethical Risks: Bias in algorithms, lack of transparency, data privacy concerns, and accountability in automated decision-making.

Strategic Implications

The findings suggest that while ChatGPT can significantly enhance the role of Algerian libraries in knowledge dissemination, successful adoption requires:
- A hybrid model combining human expertise with AI systems.
- National-level strategies to improve infrastructure and digital skills.
- Clear guidelines on ethics, data privacy, and accountability.

Ethical Considerations

Adopting ChatGPT in Algerian libraries necessitates addressing several ethical issues:
- Bias and Fairness: Ensuring inclusivity in training data to avoid cultural or linguistic marginalization.
- Transparency: Making AI operations comprehensible to both librarians and users.
- Privacy: Protecting sensitive user information from misuse.
- Accountability: Establishing responsibility for errors or misinformation generated by AI.

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Conflict of Interest

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References

1. Abdi, A., Benhamou, A., &Boudella, S. (2021). Arabic Text Summarization Using Deep Learning. International Journal of Computer Science & Information Technology, 13(1), 1-14. DOI: 10.5121/ijcsit.2021.130101
2. Al-Suqri, M. N. (2022). The use of artificial intelligence applications in academic libraries: a systematic review. Library Hi Tech, 40(5), 1190-1212. https://doi.org/10.1108/LHT-03-2021-0098
3. American Library Association. (2023). Artificial Intelligence and Libraries: A Discussion Framework. American Library Association. 1-15. https://www.ala.org/advocacy/sites/ala.org.advocacy/files/content/GovInfo/AI_Discussion_Framework.pdf
4. Belkadi, D. (2020). La numérisation des bibliothèques universitaires algériennes: enjeux, défis et perspectives (Doctoral dissertation, Université d'Alger 2). Available from: [URL Removed]
5. Benlahcene, A. (2017). L'apport des statistiques dans l'évaluation des bibliothèques universitaires algériennes. Arab Journal of Library and Information Science, 2(2), 55-69.
6. Benouda, Z. (2018). L'utilisation des technologies de l'information dans les bibliothèques universitaires algériennes: État des lieux et perspectives. Arab Journal of Information Science, 19(2), 115-135.
7. Benslimane, M. (2017). L'impact des technologies de l'information et de la communication sur les bibliothèques universitaires algériennes (Master'sthesis, Université de Constantine 1).
8. Bibliothèque nationale de France. (2023). Intelligence artificielle et patrimoine culturel : les enjeux pour la BnF. https://www.bnf.fr/fr/actualites/intelligence-artificielle-et-patrimoine-culturel-les-enjeux-pour-la-bnf
9. Bouchikhi, F. Z., Hamri, N. E., & Oussedik, A. (2018). L'apport des outils d'analyse de données pour la gestion des bibliothèques universitaires : Cas des universités algériennes. Arab Journal of Information Systems, 18(18), 161-176. Retrieved from https://www.asjp.cerist.dz/en/article/75565
10. Boudellaa, W. (2019). L'intelligence artificielle au service de la documentation : enjeux et perspectives. Arab Journal of Information Management, 2019(1), 11-29. https://www.asjp.cerist.dz/en/article/92304
11. Boumediene, A., Benyettou, A., & Toumi, M. (2023). L'intelligence artificielle au service de l'archivage numérique: enjeux et perspectives. Actes du 6ème Séminaire International sur les Archives Numériques (SIAN'23), Constantine, Algérie. 1-8. URL : https://www.asjp.cerist.dz/article/27301
12. Bouthgane, S. (2015). La qualité des services d'information en bibliothèque universitaire algérienne: Etude comparative entre les perceptions des usagers et celles des professionnels. [Doctoral dissertation, Université d'Alger 2]. Dépôt légal *2015-9436* رقم.
13. Cheikhrouhou, N., Kammoun, F., & Ben Hamadou, A. (2019). Natural Language Processing for Scientific Content Analysis in Digital Libraries. International Journal on Digital Libraries, 21(2), 123-138. https://doi.org/10.1007/s00799-019-00267-x

14. Chérif, A. (2019). Les compétences professionnelles des bibliothécaires universitaires en Algérie à l'ère du numérique. Arab Journal of Library and Information Science, 2(2), 100-120.
15. Chouti, F. (2022). Challenges of Digital Transformation in Algerian University Libraries: Case Study of University of Bejaia. Information and Learning Science, 123(7/8), 458-471. https://doi.org/10.1108/ILS-09-2021-0099
16. Cortez Arellano, V. M., Sanchez Gonzalez, L., & Guerrero Castro, M. (2022). Open source data analysis tools for library users. Library Hi Tech News, 39(1), 11-14. https://doi.org/10.1108/LHTN-10-2021-0079
17. Cox, A. M. (2020). Artificial intelligence and the library. Information Technology and Libraries, 39(2), 1-13.
18. Djellouli, N. (2020). L'apport des technologies de l'information et de la communication (TIC) dans les bibliothèques universitaires algériennes : cas des bibliothèques centrales des universités d'Oran 1 et Mostaganem [Doctoral dissertation, Université d'Oran 2 Mohamed Benahmed]. http://www.univ-oran2.dz/theses/these_djellouli_naima.pdf
19. Guo, H. (2019). Data analytics for library assessment. Chandos Publishing. pp. 1-200
20. Hider, P., & Reimer, J. (2021). Ethics of library data. Journal of the Australian Library and Information Association, 70(4), 417-427. https://doi.org/10.1080/24750158.2021.1987418
21. Hussein, M. A. (2023). The role of artificial intelligence in academic libraries: A study. Library Philosophy and Practice, 2023, 1-21. Available at: https://digitalcommons.unl.edu/libphilprac/7733/
22. IFLA. (2021). Artificial intelligence and libraries: Considerations for IFLA members. IFLA. https://repository.ifla.org/bitstream/123456789/1842/1/ai-and-libraries-considerations-for-ifla-members.pdf (accessed 2024, May 13)
23. Kamal, N., Benhamida, A., & Boudella, S. (2022). L'intelligence artificielle au service des bibliothèques universitaires algériennes : état des lieux et perspectives. Revue d'intelligence artificielle, 36(5), 579-600. [URL Removed - Paywalled]
24. Khelfaoui, A. (2023). L'impact de l'intelligence artificielle sur les bibliothèques universitaires: cas des bibliothèques de l'université Constantine 2 [The impact of artificial intelligence on university libraries: the case of the libraries of Constantine 2 university]. Revue bibliothéconomie sciences de l'information = Journal of Library Science and Information Science, (15), 184-200. https://www.asjp.cerist.dz/en/article/206884
25. O'Brien, A., & Smith, A. (2016). Data analytics in libraries: A scoping review. Journal of Academic Librarianship, 42(5), 573-583. https://doi.org/10.1016/j.acalib.2016.06.007
26. Shirko, A., Hussein, B., & Mahmood, S. (2023). Artificial intelligence and libraries: A systematic review. Library Philosophy and Practice, 1-24.
27. Souissi, N., Jarraya, A., & Elarbi, M. A. (2020). Arabic natural language processing in libraries: A comparative study. The Electronic Library, 38(3), 651-667. https://doi.org/10.1108/EL-03-2020-0049
28. Touati, T., & Mezghiche, M. (2017). Evaluation of the use of computer tools in Algerian university libraries: Case study of the University of Constantine 1. Arab Journal of Information Science, 18(1), 101-121.
29. Toufik, A. (2020). L'Intelligence Artificielle au Service des Bibliothèques Universitaires Algériennes: Étude de Cas et Recommandations. *192-177 (20)* . URL : https://www.asjp.cerist.dz/article/131278
30. Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., ... & Polosukhin, I. (2017). Attention is all you need. Advances in neural information processing systems, 30, 5998-6008.

31. Zerrouki, F. (2018). L'impact des technologies de l'information et de la communication sur les bibliothèques universitaires algériennes : étude comparative (Doctoral dissertation, Université d'Oran 2 Mohamed Ben Ahmed). http://www.univ-oran2.dz/theses/images/stories/these2018/zerrouki_fatima_zohra.pdf
32. Idrisi, N. (2020). The role of library workers in the age of digitization : an analytical study. Journal of Humanities and Social Sciences, (45), 78-95.
33. Belkhair, N. (2018). The role of information and Communication Technology in activating Knowledge Management in Algerian university libraries: a field study in the libraries of Kasdi merbah University and Raqqa. [Ph. D. thesis, qasidi murbah University, Raqqa]. http://dspace.univ-ouargla.dz/jspui/handle/123456789/18980
34. Ben Hamid, a. (2020). The reality of digital transformation in Algerian university libraries: a field study. Journal of libraries and Information, 5(1), 120-145. DOI: 10.12816/0054321
35. Boziani, P. (2018). Decision support system in university libraries: case study of the Central Library of Constantine University 1. [Doctoral dissertation, University of Mentore Constantine 1].
36. Bushaib, Dr. (2018). Employing artificial intelligence in literary discourse analysis: a study in reception poetics. Journal of studies in Arabic language and literature, 9(2), 1-20 .
37. Pushnavi, M. Amroush, S., &Benign, H. (2023). Artificial intelligence in the Algerian public sector: opportunities and challenges. Journal of administrative and Economic Sciences, 11 (2), 120-145. https://www.asjp.cerist.dz/en/article/218593
38. Husain, M. (2021). The use of data analysis in university libraries: a case study of University of California libraries. Journal of Arabic libraries and information, 41 (3), 123-145.
39. Khalidi, P. (2020). The reality of the use of information and Communication Technology in Algerian university libraries: a field study at the level of the state of Ouargla. Qasidi murbah University-warqala. http://dspace.univ-ouargla.dz/jspui/handle/123456789/2664
40. Dhu, M. (2018). Strategies of digital transformation in Algerian libraries: an analytical study. Journal of Social Sciences and humanities, 12 (2), 78-95. An electronic link is not available.
41. Talha, P. (2018). The effectiveness of information retrieval techniques in Algerian university libraries: an analytical study. Journal of Arabic libraries and information, 38 (3), 56-78.