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БИБЛИОТЕКИ ЧЕТЕНЕ КОМУНИКАЦИИ

СБОРНИК С ДОКЛАДИ ОТ ДВАДЕСЕТ И ТРЕТАТА НАЦИОНАЛНА НАУЧНА КОНФЕРЕНЦИЯ С МЕЖДУНАРОДНО УЧАСТИЕ

на тема
Информационното осигуряване
пред предизвикателствата
на изкуствения интелект

14–15 ноември 2024 г.

Народна библиотека „П. Р. Славейков“
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Предговор

„Информационното осигуряване пред предизвикателствата на изкуствения интелект“ бе темата на XXIII национална научна конференция с международно участие „Библиотеки – четене – комуникации“, която се проведе на 14 и 15 ноември 2024 г. в гр. Велико Търново. Традиционно домакин на форума беше Регионална библиотека „Петко Р. Славейков“, а откриването се състоя в Голямата зала на Община Велико Търново, с участието на представители на държавни и общински институции, висши училища, библиотеки, културни организации и фирми от библиотечно-информационния сектор.

Темата на конференцията отразява едно от най-актуалните и динамично развиващи се направления в съвременния свят – навлизането на изкуствения интелект в процесите на създаване, съхраняване, достъп и разпространение на знание. Във време, когато библиотеките и културните институции са изправени пред необходимостта да преосмислят своята роля в обществото на информацията, именно въпросите за информационното осигуряване, критичното мислене, етичните норми и технологичните трансформации се превръщат в централни теми на професионалния и научния дебат.

В рамките на двата конференционни дни бяха представени над двадесет доклада от участници от България, Турция, Сърбия, Португалия, Полша и Германия. Форумът обедини специалисти от различни области – библиотекари, университетски преподаватели, изследователи, експерти по дигитализация и представители на културни институции, които споделиха своя опит и визия за бъдещето на библиотеките в контекста на технологичните промени.

Пленарен доклад изнесе проф. дпн Александра Куманова (УниБИТ, София), която очерта концептуалната рамка на темата чрез представяне на когнитивна платформа за информационно обезпечаване на знаниевото общество – модел, в който библиотеките се разглеждат като авангардни структури в изграждането на интелигентна информационна екосистема.

Сред чуждестранните участници особено впечатление направиха представителите на Университета Бартин (Турция) – доц. д-р Ахмет Алтай и доц. д-р Лале Ождемир Шахин, които разгледаха въпросите за етиката, рисковете и възможностите, произтичащи от навлизането на изкуствения интелект в библиотечното дело. Високо бяха оценени и презентацията на д-р Андреа де Поло Сайбанти (Zeutschel GmbH, Германия), представяща визията на водещата европейска компания за промяната на дигитализационните процеси чрез интегриране на ИИ решения, както и темата на Снежана Ненензич (директор на Народната библиотека в гр. Крушевац, Сърбия) за различните директни приложения на ИИ в дейността на библиотеките.

От българска страна бяха представени редица тематични доклади, които разкриха разнообразието на подходите и практиките в страната. Сред тях се откроиха трудовете на проф. дфн Иванка Янкова и нейният екип за ролята на ИИ в трансформацията на приобщаващото образование, на доц. д-р Любомира Парижкова и проф. дн Таня Тодорова за критичното мислене и предизвикателствата на ИИ, както и на гл. ас. д-р инж. Искра Цветанска за ролята на изкуствения интелект в съхраняването и възстановяването на писмени артефакти. Интерес предизвика и практическото представяне на фирма „Фокус Пойнт“ ЕООД, която демонстрира възможностите на платформата Omeka S и други технологични решения за автоматизация на библиотечните услуги.

Във втората сесия бяха разгледани теми, свързани с комуникацията, образованието и културните политики в условията на дигитална трансформация. Изказванията на д-р Серхио Горжао и Тереза Амарал (Национален дворец Мафра, Португалия), както и на Йоана Чапска (Регионална библиотека „Йероним Лопачински“, Полша), поставиха акцент върху международния обмен на опит и социалното измерение на библиотечните инициативи.

Вторият ден на конференцията бе посветен на иновативни подходи в образованието и културното наследство. Инж. Николай Господинов от РБ „Любен Каравелов“ – Русе, предложи модел на машинно обучение за персонализиране на читателското преживяване. Темите в областта на интелигентните градове, както и исто-

рико-културните изследвания, представени от проф. Димитър Кенанов, доц. д-р Александър Ковачев, Николай Поппетров и Дария Първанова придадоха на форума цялостен и многопластов облик.

Комплимент към участниците и гостите на конференцията беше художественият акцент – концерт на триото Silvan Stâncel от Румъния, който съчета поезията на Матей Вишниец с изтънчена музикална интерпретация, превръщайки научния форум в истински празник на словото, културата и изкуството.

Съорганизатори и дългогодишни партньори на конференцията отново бяха Великотърновският университет „Св. св. Кирил и Методий“ и Университетът по библиотекознание и информационни технологии – София, с подкрепата на Министерството на културата и Община Велико Търново.

XXIII-то издание на националната научна конференция „Библиотеки – четене – комуникации“ потвърди своето място като традиционен форум за научен и професионален обмен, който обединява различни поколения изследователи и практици в общото усилие да се търси баланс между човека, знанието и технологиите.

По традиция докладите от конференцията могат да се ползват и онлайн чрез електронния формат на сборника ISSN: 2683-0981 (online) на сайта на библиотеката в раздел Конференции, достъпен от URL:

https://libraryvt.com/bg/nauchna-konferentsia-biblioteka-veliko-tarnovo/2024-naucna-konferencia

От съставителите

Последиците от изкуствения интелект върху библиотеките: възможност или заплаха?

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The Repercussions of Artificial Intelligence on Libraries: An Opportunity or a Threat?

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***Abstract**: Technological advancements transform the lives of people at a rapid pace. Artificial intelligence (AI) is one of the most important and rapidly developing areas of these technological advances. AI refers to the ability of computer systems to mimic human intelligence to perform complex tasks such as learning, problem solving and decision making. The basic idea is that man-made machines can succeed not only in tasks that require physical strength, but also in abilities that require human intelligence, such as reasoning, analytical thinking and problem solving. Libraries are one of the institutions that are heavily influenced by AI applications, which are widely used in almost every field today. With the increasing application of AI technologies in library services, this has the potential to transform services in the field of librarianship. Advantages of this transformation include expectations of automating routine tasks, speeding up information retrieval processes, improving user experience, and easing workloads. On the other hand, concerns such as AI's depletion of the need for a human workforce raises concerns that the role of librarians will change or that the need for a human-centered workforce in libraries will diminish. In addition, librarians' concerns about ethical and security issues, privacy of personal data, and risks of misinterpretation have accelerated efforts to integrate AI tools into library systems.*

This study examines the threats and opportunities arising from the use of AI applications in libraries. In this context, the study will focus on the use of these applications in libraries through AI applications that are used or can be

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utilised in many processes in libraries, from reference services to cataloguing, from classification to indexing, from cultural activities to expert system applications in acquisition. The study will also try to create a perspective on the libraries of the future from the perspective of AI applications.

***Keywords**: AI, Library, Innovative Technologies, Digital Libraries*

Резюме: Технологичният напредък трансформира живота на хората с бързи темпове. Изкуственият интелект (ИИ) е една от най-важните и бързо развиващи се области на този технологичен напредък. ИИ се отнася до способността на компютърните системи да имитират човешкия интелект с цел изпълнение на сложни задачи като учене, решаване на проблеми и вземане на решения. Основната идея е, че създадените от човека машини могат да се справят не само със задачи, изискващи физическа сила, но и с умения, които предполагат човешка интелигентност, като разсъждение, аналитично мислене и решаване на проблеми.

Библиотеките са сред институциите, които са силно повлияни от приложенията на ИИ, които днес се използват широко в почти всяка област. С увеличаването на прилагането на ИИ технологии в библиотечните услуги, това има потенциала да трансформира самите услуги в областта на библиотекознанието. Предимствата на тази трансформация включват очаквания за автоматизиране на рутинни задачи, ускоряване на процесите по извличане на информация, подобряване на потребителското изживяване и облекчаване на натовареността. От друга страна, възникват опасения, че ИИ може да намали нуждата от човешка работна ръка, което поражда тревоги, че ролята на библиотекарите ще се промени или че необходимостта от човешко присъствие в библиотеките ще намалее.

Освен това притесненията на библиотекарите относно етичните и сигурностни въпроси, поверителността на личните данни и рисковете от неправилно тълкуване, са ускорили усилията за интегриране на ИИ инструменти в библиотечните системи.

Настоящото изследване разглежда заплахите и възможностите, произтичащи от използването на ИИ приложения в библиотеките. В този контекст, изследването ще се съсредоточи върху употребата на тези приложения в библиотечната дейност чрез ИИ технологии, които се използват или могат да бъдат използвани в множество процеси – от справочни услуги до каталогизиране, от класификация до индексиране, от културни дейности до експертни системи в областта на комплектуването. Изследването ще се опита също така да създаде перспектива за библиотеките на бъдещето през призмата на ИИ приложенията.

Ключови думи: изкуствен интелект, библиотека, иновативни технологии, дигитални библиотеки

Introduction

The concept of AI, which is one of the most important developments of recent times, can be briefly defined as the technological tasks that require intelligence when performed by people. AI which has a wide-ranging capacity can perform many functions such as reasoning, decision-making, and learning specific to people, which were assumed to be utopian until only a few decades ago, as the subject of films but are at the centre of our lives today. Some experts argue that AI can replace the human labour force (Huang and Rust, 2018, p. 155). However, this view has lost some currency, as even though AI can change the nature of the skills required by people, AI is developed by people and can only be used to the extent that AI developers allow.

Today, it is noteworthy that AI applications are widely used in all corporate structures. Information centres also make use of AI applications while providing their services, making their business processes more efficient and automated. Especially in libraries, the use of AI is becoming increasingly important in terms of improving user experience, accelerating access to information and optimising data management. AI helps libraries to provide services more efficiently and provides new possibilities in accessing information. However, the use of AI in the field of librarianship is not unproblematic. AI is the most difficult and exciting initiative ever undertaken by mankind and the greatest event in the history of civilisation. At the opening of the new AI Research Centre of Cambridge University in the UK in 2016, the famous physicist Stephen Hawking discussed AI in the following words (Hawking: AI…, 2016): 'The rise of a powerful AI could be the best or the worst thing to happen to humanity. But we don't know which it will be.' The same dilemma also applies to the use of AI in public libraries. 'The rise of a powerful AI could be the best or worst thing to happen to libraries. But we don't know which!'

Artificial Intelligence: A Conceptual Framework

Before addressing the conceptual framework of AI, it will be useful for the integrity of the subject to take a brief look at its historical development. AI was first discussed in the context of the question of 'Can machines think?' in the article 'Computing Machinery and

Intelligence' written by Alan Mathison Turing in 1950. Conceptually, the phrase was used for the first time at the Dartmouth conference in 1955. At this conference, Prof. John McCarthy introduced the concept of AI to literature with the discussion of 'machines that can think like humans and make decisions on their own, as well as having the ability to do the jobs that people focus on and to solve the problems they are trying to solve'. Between 1974 and 1980, a period called 'AI Winter' was experienced. The AI related event that literally changed the course of the development of AI all over the world was the defeat of the world chess champion Kasparov by the machine called Deep Blue made by IBM. Subsequently, Apple Siri was developed in 2011, and Google Assistant was developed in 2016. Another AI tool, AlphaGo, was the winner of the Go world champion in the game called 'Go', which is more complex than the game of chess. In addition, AI technologies were used in 2017 for space exploration (Yıldız and Yıldırım, 2018, p. 28, Gökkaya, 2022, p. 5–6, Sivri, 2023, p. 177). The term AI is difficult to define, and the concept has been debated for many years. Ray Kurzweil's (1992, p. 5) definition that 'AI is the art of creating machines that perform functions that require intelligence when performed by humans' is one of the most respected definitions in the literature.

AI refers to the development of computer software that normally requires human intelligence and mimics human behaviour. Until recently, receiving information, processing it and transforming it into a meaningful output had a biological form – that is, it was a human endeavour – while the computer did not have the ability to recognise emotions and place them in real situations. Therefore, it seemed almost impossible to transform some subcomponents of human intelligence into a system (Tohănean, 2018, pp. 84–85). With developing technology, AI has emerged as a branch of computer science and more as a research field that deals with the replication of human intelligence in computer systems such as speech recognition, deduction, initiative, creative behaviour, and the ability to learn from personal experiences.

The concept of AI covers a wide range of topics such as machine perception, Machine Learning, Natural Language Processing. In addition, there are different definitions of AI such as creating and engineering different computer programmes and creating intelligent

machines. AIs are also systems that can learn by drawing logical conclusions about the world they exist in, interpret what they have learnt, understand and produce natural languages, in short, achieve processes that require human intelligence (McNeal & Newyear, 2013, p. 5, Asemi & Asemi, 2018, p. 2, Öztürk & Özel, 2021, p. 355).

To understand how AI technologies are used in many fields, it is first necessary to mention the basic application areas of the concept of AI (Baş Güler, 2022, pp. 12–16):

Voice recognition: Speech recognition, which is one of the application areas of AI, is the perception and recognition of the human voice by a computer through a microphone and its translation into text.

Image Processing: Image processing, another application areas of AI, is a method used to obtain special images or extract information from the image by converting the image into digital data. Image processing provides information about the objects in the images thanks to a computer without any interaction with the environment. Many analyses are made with the help of image processing technology from digital images and spatial data, urban planning, geographical analysis data that allow image interpretation.

Natural Language Processing: The most important function of natural language processing is to understand, interpret and produce output.

Reasoning: Reasoning is the ability of machines with AI to make connections between verbal or numerical images and to think in multiple ways by looking from different angles.

Machine Learning: Machine learning is a subfield of artificial intelligence that uses algorithms trained on data sets to create models that enable machines to perform tasks that would otherwise only be possible for humans, such as categorizing images, analysing data, or predicting price fluctuations (What is Machine Learning? 2024)

Deep Learning: Deep learning is essentially known as a type of machine learning and deep learning is basically based on learning from data. Deep learning has been used in many fields such as image analysis, robotics, sound analysis, cancer diagnostics, gene analyses and

virtual reality. In deep learning, it is learnt to obtain a better result by making additions and changes on the previous result each time.

One of the institutions where AI applications can be most utilised are libraries. User services, technical services and managerial services, which are the basic services of today's libraries, are undergoing radical changes due to AI Technologies. Many AI applications such as expert system, machine learning, natural language processing, are used in business processes in library services and business processes such as cataloguing, classification, collection development, social and cultural projects. It also directly benefits the processes of digitising materials in the physical environment, strengthening information security and establishing an effective digital library system.

The Use of AI Applications in Libraries

Libraries, whose history is as old as the history of writing, are social institutions that have served as a bridge between knowledge and society for centuries. Libraries are also one of the most important institutions affecting science and culture. Libraries, whose existence started with the agricultural society and are one of the important institutions of the industrial society, are one of the strategic institutions of the information society, where information dominates the world as a great power, whether in the social or economic field (Altay, 2017, p. 91). It is unthinkable that AI, one of the most important reflections of the information society, does not affect libraries as social institutions. Libraries are increasingly utilising AI technologies to manage and access information resources. AI technologies are used in various ways to increase the efficiency of library services and improve the user experience. These technologies are playing an increasing role in the field of librarianship and transforming the tasks and ways of working of librarians (Oyelude, 2021, p. 3).

AI-enabled systems have the potential to improve library services. For example, intelligent assistants and chatbots reduce the workload of library staff by speeding up user requests for library services by providing quick responses to user queries (Barsha & Munshi, 2024, p. 8). While AI-based recommendation systems increase user satisfaction, AI-supported cataloguing and classification systems reduce the workload of staff and

create more accurate and consistent metadata (Arora et al., 2020, p. 7). In addition to its positive contributions to library services, the use of AI tools in libraries also brings challenges due to lack of technological infrastructure, lack of staff skills, and economic limitations (Owolabi et al., 2022, 298). It also leads to increased ethical and security issues such as bias, privacy violations, and misinterpretations (Vasishta et al., 2024).

How AI will change the roles of librarians and whether it will lead to potential job loss is also an issue that needs to be addressed. For example, the automation of traditional tasks such as cataloguing, classification and basic reference services may result in some librarians losing their job roles. However, the proliferation of AI may require librarians to specialise in new areas such as data analysis, digital content management and auditing of AI systems. These changes may significantly affect librarians' job roles. Librarians need to be alert to the challenges of this transformation and supported to acquire new skills. (Mishra, 2023) In this context, it is extremely important to ensure that librarians participate in training and professional development programmes on AI applications. This is because such training provides librarians with technical skills and awareness of how to utilise the advantages of these technologies.

Öztürk and Özel (2021, pp. 360–363) listed the AI applications commonly used in libraries as follows:

Expert Systems: Expert systems are computer systems that use real and heuristic tools in problem solving and decision making by utilising expert knowledge in a field and imitating the professional thinking system of that expert. The database of an expert system used for libraries contains all the information and rules that domain experts need to make decisions. The system can evaluate as much as a librarian, sometimes even more, through the inference mechanism in line with this data. This is because all kinds of information and expert experience about the field are transferred to the knowledge base of the expert system. AI systems are useful in different areas such as answering online questions, searching, directing users to resources within the scope of library engagement services.

Natural Language Processing: Natural Language Processing (NLP) is a computer technology that develops software for functions

such as concept generation, method finding, comprehension and generation to enable computers to better understand how people use language. Natural language processing can enable libraries to provide many services such as data mining to access more specific information from books and journals, user services, and multilingual translations. Another important application in the context of natural language processing is audio technology. Voice messaging systems are used in many libraries, especially for visually impaired individuals. Similar technologies enable disabled individuals to access databases and other computer systems. The use of cataloguing standards and computer-based standards in natural language processing enables automatic cataloguing. The metadata needed to create catalogue records are taken from reliable databases. This technology reduces word errors in the record structure and offers many syntactic supports.

Robotics: Long-standing developments in computer technology and software applications have paved the way for robotisation. Like many other fields, libraries also benefit from robotic applications in their services. Thanks to robotic applications, the need for librarians in voluminous and repetitive processes, especially in the context of information resource management, has decreased. These systems have enabled the organisation of information resources in libraries thanks to hardware implementation such as software, sensors, barcode reader, GPS, and robotic arm.

Pattern Recognition: Pattern Recognition (PR), one of the most important technologies for intelligent systems, is an application that categorises and matches images, sounds or signals. Pattern recognition is used in the realisation of many services such as document processing, language translation, electronic resources, automation, human – machine interaction, information retrieval, etc. offered in libraries.

Intelligent Agents: Intelligence Agents (IA) is task automation that communicates and operates with the user, system and other agent structures, performs a software process and has an autonomous working principle. Intelligent agent technology can be used effectively in libraries to provide electronic resources and information access, collection development, cataloguing and classification of information resources, circulation operations, consultation and training services. In addition,

in terms of cost, it offers better opportunities than many systems and technical equipment because it is suitable for library budgets and aids with users and librarians.

It is possible to consider the use of AI in libraries under four headings:

Hardware: The equipment used in library services soon will be characterised by the application of highly automated technologies and robots. Such equipment can flexibly adapt to other changes; robots will work in co-operation with library staff on common tasks. Almost all the hardware and equipment used in the provision of technical, user and administrative services in the library will be AI-enabled.

Human Resources: Existing jobs in library services and processes will be largely automated. Library staff will increasingly be required to use advanced technologies and will be involved in decentralised decision-making.

Process: Technologies such as 3D printing, will be increasingly used in processes in library services. It is possible to say that AI applications will become more prominent especially in the context of adding value to the social and cultural activities of libraries.

Collection Policy: With the widespread use of AI applications, libraries will be able to enhance user personalisation inferences about their users' publication preferences, develop user-specific collection policies, and furthermore, combine collection development processes with new services that offer functionality and access.

Global Artificial Intelligence Applications in Libraries

Below are global examples of the use of AI in libraries (Sivri, 2023, pp. 180–181):

- In a library of the Max Planck Institute in Luxembourg, a robot named Tory supports the library staff in inventory work. The books that students place on the wrong shelves are quickly detected during and Tory also informs the library staff about factors such as visitor density and room temperature.

- The Cologne City Library has been using the NAO robot since 2016. The robot has speech, object and voice recognition. It helps to find a specific book in the library.
- Quadcopter, a system built for libraries using AI technology, is designed to perform tasks such as book recognition, classification, inventory counting and shelf layout, damaged label detection by reading the QR code labels placed on the shelves and scanning the label on the book with optical character recognition (OCR).
- The Singapore Technology Research Agency has developed two robots that move between the shelves and scan the shelves for missing books. This robot, called AuRoSS (Autonomous Robotic Shelf Scanning System), scans the RfID (Radio Frequency Identification) tags on the books and ensures shelf order. It detects misplaced or lost books with 99% accuracy.
- In the Oodi library, which has around 10 000 daily users, a robot is used to teach children to read, to provide information about the library in many languages, and to help users find their way around the library. Through this robot, users can search for books. Thanks to Oodi, users who come to the library can obtain their preffered book in their own language and ascertain whether it is available. In this way, citizens of different countries will be able to use the library actively.
- In Türkiye the Ministry of Culture and Tourism has introduced artificial intelligence applications for public library users. The applications RAUNT and HIZLIGO are geared towards the Turkish public libraries' younger users. The HIZLIGO application is an exam preparation tool for high school students preparing for the central university exams. The HIZLIGO application is designed to improve the attention, concentration and focus skills of students, and with its functionality improves the reading speed of students studying for their exams (Ministry of Culture and Tourism, 2024). Whereas the RAUNT application

offers a bespoke study plan for students using AI. The application offers over 350 000 short study videos for high school students, and over a 1000 hours of lecture content (Ministry of Culture and Tourism, 2024).

With the widespread use of AI applications in libraries, business and service processes in libraries will be more efficient. Applications such as expert systems, natural language processing, pattern recognition, intelligent agents and robotics can be used most effectively in the discipline of librarianship; cataloguing, indexing, information retrieval, reference services, technical services, periodicals and electronic publications, etc.; in many areas that require decision and support analytics from services such as budget, planning, selection and provision.

Conclusion

Libraries must keep abreast of technological advances, and this necessitates the use of AI in libraries within a dynamic structure that changes rapidly. With the use of AI applications in libraries, the need for labour force will decrease with the establishment of autonomous system structure, managerial/administrative and business processes in the institution will be carried out more accurately and with less cost, and efficiency will increase especially in managerial services, technical services and user services. Libraries will become much faster and easily accessible information centres in every sense.

There are certainly risks associated with innovative technologies such as the risk of violating privacy, the possibility of discrimination in the use of AI among a plethora of other ethical concerns. In this context, it is very important to increase the knowledge, awareness and perception of librarians about the ethical use of AI technologies through training.

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