ARTIFICIAL INTELLIGENCE AT THE BULGARIAN LIBRARIES – PROS AND CONS

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Abstract: The institutions from the GLAM domain, contrary to the belief that they are very conservative, constantly redesign and digitize many of their services. The author explores the pros and cons of implementations of the chatbots at the library's work. The application of AI in library services is entirely unknown to the Bulgarian library community. Only Varna Public Library announced that there is a chatbot in its services. This paper points several arguments about chatbot relevance, tasks chatbots can take, and some objections against them. The conclusions address various essential tasks that chatbots can perform in the library.

Keywords: Artificial intelligence, chatbots, GLAM, libraries.

1. Introduction

The creation of artificial creatures and the hope of reaching God is a dream that humanity has had since ancient times. Evidence of artificial beings can be found in antiquity: in myths about the mechanical servants of Hephaestus, the Greek god of blacksmiths, whom he built from gold, or in the tale of Pygmalion and his favorite statue of Galatea, on which the goddess Aphrodite breathed life. The desire for man to create artificial people is also present in the fiction of the XIX and XX c. Some of the most vivid examples are a) the English writer Mary Shelley and her mechanical monster Frankenstein, described in the novel of the same name; b) the Czech playwright and critic Karel Čapek and the play RUR (Rossum's Universal Robots), where the term "robot" was first mentioned (later borrowed by science and literature.

The significant scientific discoveries of the XX century made in neurology, information theory, and computing provoked severe discussions about creating an artificial brain. John McCarthy coined the term *artificial intelligence* at a scientific conference at Dartmouth College in 1956. Later, artificial intelligence became an academic discipline, and John McCarthy, Marvin Minsky, Alan Newell, Arthur Samuel, and Herbert A. Simon the first to lead research in this area. The programs created by them, and their students arouse unprecedented interest: computers defeat people in chess, prove logical theorems and speak English. At the time Herbert A. Simon's[1] and Marvin Minsky's[2] made two fundamental predictions about the rise of artificial intelligence: *Machines will be capable, within 20 years, of doing*

any work a man can do and *Within a generation, the problem of creating artificial intelligence will substantially be solved.* Unfortunately, neither has comes true.

The greatest successes in the field of artificial intelligence were achieved in the 90s of the XX century. The main areas that are developing the fastest and on a large scale are machine learning, data mining, medical diagnostics, machine translation, natural language understanding, logistics, planning, virtual reality, etc.

At the beginning of the XXI century, technology changes our life at a remarkable speed. Artificial intelligence and robots are now part of our lives. The mass entry of humanoid robots is imminent, and probably soon, we will have a personal relationship with them.

"Hello, can I help you?" is such a famous phrase that has become the equivalent of one of the most popular cultural institutions – the Library. Whether the information desk librarian greets the readers/visitors or those who provide access to library resources, librarians are always ready to help. The institutions from the GLAM /Galleries, Libraries, Archives, Museums/ domain, contrary to the belief that they are very conservative, constantly redesign and digitize many of their services to adapt to the changing reality.

Internet bots, and particularly chatbots, are a popular tool that needs to be added to the organizations' existing digital services in the GLAM domain.

2. AI and chatbots at the library

Recently Cox et al. [1], Woods and Evans [2], Wang [3], and Phillips [4] examined the library managers'attitudes to AI, which in a broader sense, can affect chatbots. In general, it seems that libraries have already noticed the latest technology expansion, but often without specific implementation. In many cases, there is a critical attitude towards technological changes rather than a positive one.

"So if you are delivering stuff in your library that could be delivered by a chatbot, you are probably not actually doing the things that you should be doing with your humans." (Cox et al., 2019, p. 428).

On a psychological level, the perception in the society that the library work is old-fashioned, and could eventually be replaced by the Internet, influences the decisions for or against the adoption of new technologies. On the one hand, respondents in the survey carried out by Woods and Evans (2018, p. 6) stated that AI will have little or no impact on libraries and that significant changes are only expected in the next 30 years. Phillips pointed that 85% of the librarians were confident that robots, which also include chatbots in this study, cannot take on librarians' role at all or at most only partially (Phillips, 2017, p. 43). It must also be mentioned that most of the

librarians are concerned that their professions are in danger from technological changes (Wang, 2017, p. 13).

The author examines the pros and cons of the AI and chatbots using "Pencho Slaveykov" Public Library chatbot statistics and library staff personal impressions. Pros and cons are investigated through the arguments about chatbot relevance, tasks chatbots can take, and statistics about usage frequency.

Some objections against chatbots are also included.

The chatbots at the GLAM organization: relevance.

The transformation of public infrastructure and increasing numbers of e-services reflect changes in the organizations' positioning in the GLAM sector and particular libraries. They need to predispose the information space to meet public and personal needs.

A lot of users prefer to use social networks instead of traditional phones or written correspondence. Fast communication is no longer strictly fixed within working hours. The new philosophy of information retrieval is "I need this information now," following the idea that people want their responses immediately and, if possible, 24/7.

This behavior pattern invokes the need to maintain staff ready to respond to all inquiries and deliver information immediately. Keeping in mind the nature of the librarian's work (searching for information in library databases, literature inquiries, and general questions), it is indisputable that staff could work remotely.

Libraries provided multiple reasons to create chatbots:

- Expansion of the information service.
- Repetitive questions.
- Users help – website and catalog search.
- 24/7 service.
- Workflow reduction.
- Cost reduction.

Cox et al. examined the attitude librarians have toward their "intelligent library" in their study. The authors conclude that the latest AI technologies (which include chatbots) do not come to the libraries so quickly. The "intelligent library" will not (yet) replace the traditional library, and the relevance of the topic is still manageable. (Cox et al., 2019, p. 18).

Woods and Evans (2018) found in their interviews with more than 300 librarians that almost half of all respondents (around 44%) believe that AI has little or no influence on library functions (Woods, Evans, 2018, p. 5).

According to Hanselmann [5], many libraries (over the world) are not fully satisfied with the quality of their chatbots. Also, the lack of time, funding, and human resources to maintain the chatbots contribute to the negative image that technology is not up-to-standard.

There is no precise statistic on what kind of tasks chatbots can take over. Most of the researchers examined case studies rather than raw data. The primary task chatbots can take over are FAQ (Frequently Asked Questions). Some other essential tasks include navigating the library website and library catalog, assisting with book borrowing, book searches and general research, and surprisingly small talk. The chatbots are hardly used as an organizational assistant for daily work or book cataloging and indexing.

3. AI implementation in Bulgarian libraries

What is the situation in Bulgaria? Unfortunately, the implementation of AI in library services is entirely unknown to the library community in Bulgaria. Only one public library announced chatbot usage – the "Pencho Slaveykov" Public Library in Varna.

Varna Public Library statistics show that AI can answer a considerable number of customer inquiries with accurate information. Therefore, the decision to use a chatbot as a virtual assistant librarian is quite logical.

It is not easy to obtain representative data usage since only one library in Bulgaria maintains a chatbot. Here the author will analyze the information provided by Hanselmann and the statistic provided by "Pencho Slaveykov" Public Library in Varna.

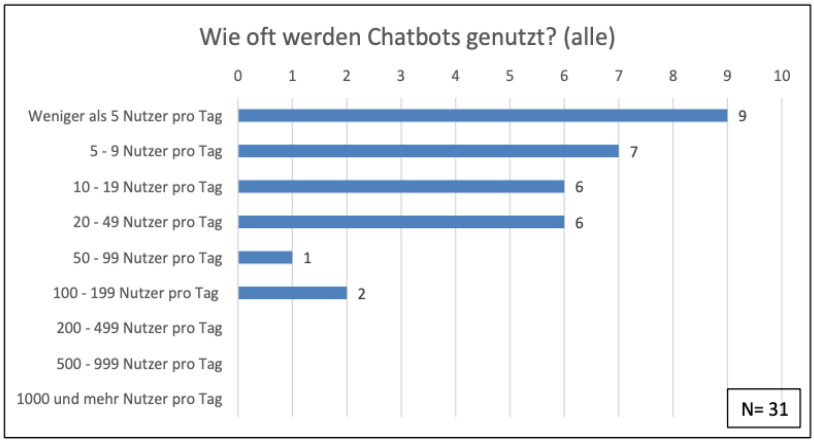

Fig. 1. Frequency of use of chatbots in the libraries. Source: Hanselmann, 2020, p. 41

Hanselmann's study points (Fig. 1) that most libraries (9 responses) state that less than five users per day access their chatbots. In 7 libraries, 5 to 9 users accessed the chatbot per day. Six libraries saw 10 to 19 users of the function and six libraries of 20 to 49 users per day. 50 to 99 users per day using one specific chatbot, while two chatbots have an impressive 100-199 user views per day. The average number of users in total cannot be calculated using this information.

In 2019 "Pencho Slaveykov" Public Library launched its chatbot, *Ellie* (based on NLU algorithm), as a virtual assistant librarian. The chatbot implementation into the library services was taken as part of the restructuring and optimization of the library divisions.

As it is shown in Fig. 2, female users are more active on messenger. This statistic is coherent with the library users' statistic, which shown almost the same ratio.

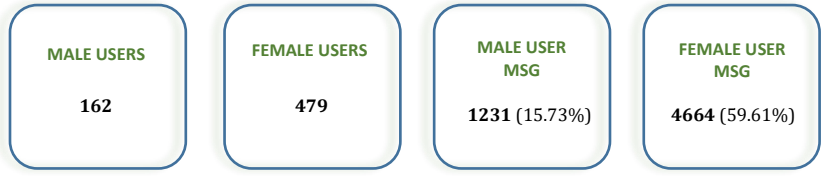

Fig. 2. Varna Library's chatbot average number of messages by gender. Source: "Pencho Slaveykov" Public Library

Figure 2. shows the number of monthly library users of the chatbot by gender and how many interactions (MSG – messages) each gender has had with the chatbot. The percentage indicates that female users are more active than males.

From March 2020, when the Corona-crisis began, the "Pencho Slaveykov" Public Library managers found out that the bot is "the right person" to answer all questions users ask 24/7. It takes the responsibility that the Library never intend to. Ellie, who was hardly known, became very popular soon.

Figure 3. shows the average questions the chatbot answered monthly (in 2020). All answers are in blue, while searches are in red and clicks in grey. As shown in this figure, the bot answered 600 questions (approx. 20 questions per day) in March, while in May, these have doubled.

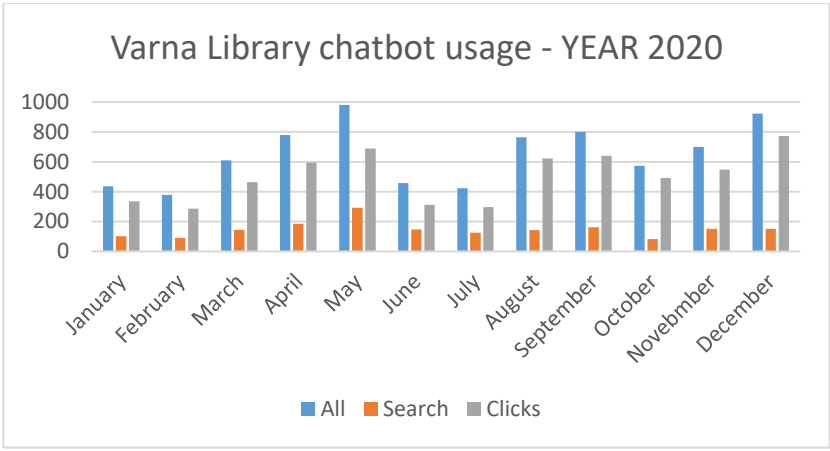

Fig. 3. Average use of Varna Library's chatbot by months. Source: "Pencho Slaveykov" Public Library

The chatbot usage is not constant over the months. In 2020 the author, in her capacity of a "Pencho Slaveykov" Public Library Director, noticed a distinct connection between the Corona pandemic situation and the number of user interactions, which were significantly higher during the "lockdown". The first lockdown in Bulgaria started at half-end of March and ended in middle May, and the second one was November-December 2020. The picks during these months are visible on the graph.

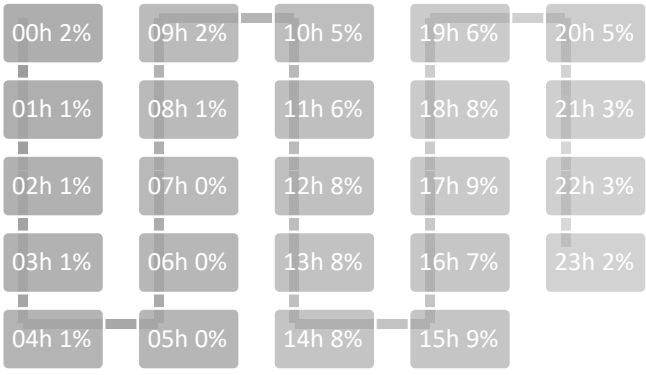

Fig. 4. Average use of Varna Library's chatbot by hours. Source: "Pencho Slaveykov" Public Library

One of the chatbot's essential features – to be available online 24/7 is visible in Fig. 4. *Ellie*, the chatbot, was assigned to answer all questions users might have. As it is shown on the graph, library users are very active twenty-four hours. Almost 26% of the users would like and talk to the library when closed, and the chatbot perfectly fits the gab.

Objections against chatbots.

A significant number of library professionals consider human interaction better than human-chatbot.

A survey taken among several libraries in Bulgaria in 2020 asked the librarians about chatbot weaknesses. Most of them clearly stated that users prefer human interaction and, in general, there is no evidence that it happens. Cost reasons or simply no interest also play a role. A lack of know-how and skills in setting-up a chatbot, or the fact that the AI technology is not good enough, are often mentioned.

4. Conclusions

This paper demonstrates statistics and analysis, which claim that Bulgarian libraries have the potential for the development and expansion of AI in their services. The following advantages and disadvantages can be summarized:

- *Better service for the users.*
  The communication between the chatbot and library users guarantees immediate and personalized help 24/7. There is no need to engage an employee to respond to users' inquiries constantly.
- *Extend working hours.*
  Consumer activity statistic shows that the time zones in which an active communication between user and librarian is not limited to ordinary working hours but extended in the range of 17 – 24 h. There are sporadic inquiries in the time zone 0 – 5 h, but they are likely accidental than practice. The observation proves the thesis that bot successfully fits into the concept of "extended" working hours and successfully replaces employees in the specified time range.
- *Improving the user service.*
  The chatbot allows taking full advantage of technologies that save time. The library can process a tremendous amount of information in a short time and, thanks to sophisticated algorithms to be useful for both its users and the library itself.
- *Assigning specific library functions*.

Library materials may be borrowed for a specific period. Usually, most of the circulating items may renew. In Bulgarian libraries, this routine function is generally performed by the librarians. "Pencho Slaveykov" Public Library service "Renew library materials" is accessed via various communication channels – in-person, by phone, by email, through "My Library" services, and since the beginning of 2020 through *Ellie* the chatbot.

Statistics show that three months after the chatbot's launched, Ellie took 30% of book renewing orders.

- *Attract users.*

  The chatbot is part of the library's general strategy to attract new users through its timely and personalized help. Implementing it on the website and the library's Facebook has become an ideal tool for increasing the reader's interest and the library's authority.
- *Increase the volume of communication in a messenger*.

  After Ellie's activation, the "Pencho Slaveykov" library saw an exponential increase in communication between readers and the library in FB Messenger. Before starting the chatbot, the Messenger channel usage was negligible. Within the first quarter of 2020, the number of exchanged messages increased to an average of 600 messages per month, but the Library has 800 to 1000 messages per month in the second half-year.

Disadvantages:

- *Inconsistent answers*

The most significant issue is that the AI (chatbot) is not interpreted questions but answers formally. The biggest challenge to the Library is to define all questions that the chatbot must answer and to formulate the correct answers. Otherwise, the answers are inconsistent, and the chatbot is ridiculous but not helpful.

The need for digitalization of the library services, proven during the Corona crisis year, assume more and more intensive research in introduction and implementation of AI in the libraries in Bulgaria.

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