

**THE IMPACT OF WIDELY USED ALGORITHMS OF LARGE
LANGUAGE MODELS ON INFORMATION RETRIEVAL
AND THE ASSOCIATED POTENTIAL RISKS**

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ABSTRACT

Thesis. The aim of this work is to perform an analysis concerning the subject of artificial intelligence integration and its application in modern knowledge acquisition. The article will be an overview of scientific research and papers to raise a discussion of the advantages and potential hazards associated with the widespread implementation of large language models.

Concept. The main part of the article will focus on describing the AI enhanced tools available on the market and common ways of utilising them. This knowledge will be juxtaposed with psychological research on human consciousness in the context of decision-making, creativity, and held beliefs to list potential threads related.

Results. The analysis of tools that have recently been enhanced with algorithms unequivocally indicates the dominance of the sector providing informational and creative support. These tools possess a measurably high level of reliability among the public, resulting in a reduced number of verification actions. A review of existing literature and research on human psychology shows a very strong correlation between the influence of previous social authorities on decision-making behaviour and an uncritical approach to information obtained through AI. Studies have shown that access to these tools, without proper controlling actions of results, exposes users to bias, manipulation, or susceptibility to marketing activities. Alternatively, with proper and rational use of these implemented algorithms, humans are able to obtain extraordinarily precise and knowledge-based support in decision-making. Similar polarisations of results have been observed in the context of creativity, innovation, and inquisitiveness.

Originality. The article addresses topics that relate to the psychological nature of humans in the context of new and expanded AI augmented tools. The results of the exploratory study clearly indicate that programmes supported by algorithms show potential in terms of both scientific and social development. Unfortunately, they also present many potential dangers for both, which, discussed in the foundation, provide the groundwork for more in-depth research.

Keywords: Artificial intelligence, Learning, Psychology, Manipulation

INTRODUCTION

Acquisition of knowledge has been associated with the transmission of information or obtaining it from sources possessing a wealth of it for centuries. In the early phases of civilization, this was achieved through imitation and orally transmitted wisdom. The breakthrough came with the advent of pictographic writing and the alphabet. Pictograms on rocks or manuscript scrolls left a tangible trace that could be utilised long after the author's death (Martin, 1994). This physical legacy enabled the rapid development of science, and successive works written on sheets of paper provided the means to draw upon the achievements of previous generations at any moment.

Technological advancements, particularly the computer and the internet, are gradually transforming our approach to acquiring and utilising knowledge. Physical books are being supplanted by their electronic versions, and the information contained within them is gathered in various platforms and programmes, making it widely accessible. For the first time in human history, science is not solely reliant on humans. Software development has contributed significantly to accelerating this progress. By employing logical sequences, algorithms can perform previously impossible or time-consuming experiments in the form of simulations, comparisons, and estimations. Computer programmes have the potential to introduce countless additional possibilities in every area and field of life. This is why digitisation has been swiftly implemented and developed over the past decade (Owen, 2007). It has reached a level where humanity began to use its benefits on a daily basis. However, it was heavily dependent on human input. For optimal functioning and satisfactory results, humans had to

input data considering every possible variable, which was entirely dependent on knowledge and acquired information.

In recent years, this concept has been further transformed due to the trend of minimising user input (Wang et al., 2019). The culmination of these efforts can be termed a revolution initiated by the introduction of large language model algorithms (LLMs). The prevalence of these algorithms, popularly known as artificial intelligence (AI) algorithms, has grown in digital products from negligible amounts to the level of key functions (Kaddour et al., 2023).

ALGORITHMIC MACHINE LEARNING

Idea behind artificial intelligence (AI)

In simple terms, artificial intelligence algorithms are programming techniques that involve providing the algorithm with a vast amount of data for comparison. By recording responses and cross-referencing them, the algorithm can progressively achieve results that better match the programmer's requirements. It is through these individual "training" sessions that we can obtain more accurate answers. Additionally, the entire process can proceed more quickly and precisely due to the data provided.

AI applications

The adaptation of AI algorithms into various fields of life has been conducted with an overwhelming pace within the past few years. People try to utilise its benefits to decrease work effort, omit recurring tasks, increase the pace of technological innovation or try to exclude human error.

The widespread list of advantages is appealing for various tasks, that is why AI models are used in:

- Engineering (automotive with autonomic vehicles, aerospace, structural simulations, fluid simulations, manufacturing, chemistry, material science, biology)
- Medicine and healthcare (medical imaging analysis)
- Agriculture
- Storage and management
- Security and surveillance
- IT
- Art and cinematography
- Education
- Daily life, such as: virtual assistants, smart homes and chatbots (Zawacki-Richter et al., 2019; Reddy, 2019; Yongjun et al., 2021).

The most advanced Large Language Models (LLM) are being introduced as a web search engine enhancement or artificial assistant's evolution. Despite the fact, that the programming required for these tools to perform is a state-of-the-art technology, the working principle of tools themselves that are the

interface on top of these algorithms is relatively trivial and user friendly. The idea is to imitate a conversation between the user and the AI models to perform question and answer format. The input from a user (called prompt) is a text sentence in a form of question or task that the user is trying to execute. The role of AI tool is to read data saved in its memory for patterns that would result in a ready solution, otherwise browse the internet to deliver search data related to the topic the most.

Benefits in knowledge acquisition

The LLM models, also called AI chats, in their concept and pure form, are extremely powerful tools for fast and effortless gaining of information. Chatbots have found their way into most popular web search engines, bringing generated and compiled data to users. The algorithms are utilised in helpdesks to deliver answers for most frequent issues. They are being introduced to call centres as a substitution for human call advertisement or even bank and government websites to provide support with the knowledge.

The benefits relate not only to provision of faster and widely accessible services, which results in a positive company image to the customers but also brings financial cost decrease by reduction of employees formerly responsible for these tasks. The popularity of chatbots may be accurately visualised by the numbers. Considering the fact that the market revenue of these tools has grown from 2022 to 2024 from 106.6 to 179.9 million U.S. dollars, with forecast to more than double the number by 2027 (Cherniak, 2024), it is irrefutable proof of market demand and user acceptance. The latter benefits from chat accessibility at any point of time, quick generating period and accurate results that deliver thorough information.

Accordingly, the AI chats, whose task is to enhance the capabilities of web search engines have similar working principle, with the most noticeable difference being the databases that they have access to during their operation. Marketing or informational chatbots are trained to use details that refer to the particular service for which they were implemented. Differing from the database of the web search engine AI chats is all the information that the algorithms were fed during the programming phase with the addition of internet network sources. That gives access to countless websites having the information on any topic that humankind has ever published online.

The tool analyses users' input and searches the websites of similar subjects to gather the information on a topic that was specified in a prompt. It then compares several sources, compiles the results and generates the answer to the input in a shortened form (Wang et al., 2019). All of the above is delivered in from a few to several dozen seconds. As a reference, the time required for a human to conventionally find, browse and read multiple websites to achieve similar outcome would be several times longer. That significant time difference provides crucial advantage to the users. The results are obtained quickly, in an understandable and friendly manner with highlighted information on most important points. The user effort is reduced to minimum, and the information is being displayed automatically.

Threads on human free opinion

AI generated, quick and effortless results, despite clear advantages that are brought to the table, have several considerable hazards to the user and humanity. For the algorithms to deliver the answer, the results have to be analysed and compiled. To perform that, multiple filters have to be applied on a core of the AI tool (Kaddour et al., 2023). The information that contains context on topics concerning safety, security, legislation, sexual content or harassment / discrimination have to be thoroughly formulated, adjusted or even omitted.

Despite morally justified implementation of mentioned filters, the subject of abuse of these control measures has to be considered. When, by any manner, the control over these filters will be aimed towards specific subject, the manipulation mechanism will have to be considered. This situation may occur due to the software company regulations, cyberattacks or even government involvement.

The danger of such a bias in delivery of information may become high stake in its significance as the LLM models will gain more share in daily workflow of users. According to the principle of least effort, known also as Zipf's Law, people often seek the easy option, the path of least resistance for the tasks that require their input. This rule is also applicable to information obtainment. When studying a given subject, it is very likely that the first logical answer that people would receive, will not be verified in the second source. This phenomenon is dependent on multiple factors, including personal knowledge, willingness to receive thorough information or trust in data source. In compilation with Primacy Effect, which is a tendency to recall the first information from the set of data (Morrison, Conway, & Chein, 2014) and effect of Confirmation Bias, which is characterised by the favour of the beliefs that confirms the pre-existing views and downplaying the opposite arguments (Suzuki and Yamamoto, 2021), the slight manipulation of information delivered may direct people's opinion on given subjects.

Apart from the intentional misleading, the mistake in searching or result compiling may take place. The software may experience glitch or bug in its code thus generate or insufficient training data of algorithms. The hazards from such occurrence are identical to the ones mentioned above and introduce another field for open discussion regarding the quality control over the products that may cause significant damage to society.

Paid advertisement within LLM chats

Research conducted by Eurostat in 2021 has shown that on average 47% of Europeans respondents aged between 16-74 has been exposed to the untrue or doubtful information online and 77% of all has not verified any information found on online news sites or social media within the three months preceding the survey (Eurostat, 2021).

The statistics emphasise the vulnerability of human opinion, due to low awareness on threads and overall trust. The data is a worrying sign, not only for wider pread of fake news but also for society to be exploited by the advertisement policies of the software companies running AI tools of usage.

From experience, we may notice that during any search on popular web search engines, the first few results are paid advertisement with the intention to be on top of the list of links. With the clear marking, users are able to easily distinguish ones from others, but in a plot of words generated by the AI chat tools, much of the information may not be highlighted sufficiently enough leading to potential misinterpretation. That may result in false rankings or ratings in case of materialistic values by the marketing companies.

Trustworthiness towards AI tools

The idea of trust as a notion is a wide and subjective perception that is different for each individual and is based on their psychology, educational background, life experience, emotions and mood (Simpson and Vieth, 2022). There is a notion of "an expectancy held by an individual or a group that the word, promise (...) of another individual or group can be relied upon" (Rotter; 1967). It can also be aimed towards material assets. Being such a broad concept with multiple dependencies, any given notion is extremely difficult to assess. Conversely, the outcome of this feeling can be subjected to measures of proof. The trust in artificial intelligence algorithms also depends on specific factors.

The trust in judgements made by algorithms largely depends on the stake of a decision. People in general tend to be extremely sceptical with hard feelings and high doses of suspicion towards the higher stakes AI-supported decisions. This situation shifts however, if algorithmic assistance refers to verdicts of a less significant impression to a recipient (Ashoori and Weisz, 2019). Such a tendency might have a basis in human feelings. The individual emotions, uncertainty as to the reliability or sense of loss of control is collated to the objective lack of empathy about AI tools. All of that being complemented with unwillingness to changes brings a notion of uncertainty towards new products with implementation of AI models. This scepticism becomes a general thought while considering the outcome of AI algorithms when the consequences are predicted to be severe. The less significant the implications are, the easier it is for a person to adopt the suggestions or information given by the external source. This phenomenon can be visualised on the example of a car purchase or the weather. People will more likely believe in the outcome of generated responses for the weather forecast than car offer suggestion as it provides risk to more valuable assets.

Personal information safety

This change of human attitude towards the AI for low-importance outcomes may be concerning from ethical perspectives. The more trust the society gets in generated information of low stake, the more critical prompts will be assigned to the chats. The data delivered to the software providers will increase in size and significance.

The increasing library of information on singular users provides multiple threads against personal privacy, cyber profiling, aimed advertisement or even manipulation. It is due to the widespread tendency in today's cyber world for account creation to be needed in order to obtain the possibility to utilise the

features of the software or discounts in the store. That phenomenon has already been implemented, and the user data is already being stored in the shape of “cookies” files and interexchange between parties for statistical purposes (Wagner, 2020). Addition of machine learning algorithms to this mass data may be extremely profitable for the service provider,, making users vulnerable to profiling of cyber identity having full data of:

- latest purchases (from online shopping websites),
- types of groceries or clothes (from loyalty cards),
- profession (from internet search engines),
- personal interests (from social media),
- or even material status (from type of devices possessed).

The further implementation of tracking will increase human vulnerability to marketing, which in a society already aiming towards consumerism that would further deepen this state. With humanity facing the problem of environmental pollution and recycling capabilities, the software itself may lead to visible increase in waste creation.

Creativity and innovation as cooperation with AI

With implementation of artificial intelligence tools to newer fields of science and life, the repeating tasks will become automated and applied by the programming algorithms. Such a shift of duties towards computational mechanisms will free significant amount of resources that have been occupied with these tasks before. These resources may be considered as time, money or human accessibility.

The latter , with decrease of trivial work, will have the possibility to shift their focus to innovation and creativity. For every step of science and society, the effectiveness in development will be notable. With scientific work, the data that was manually gathered and compared will be plotted effortlessly by the software tools. Additionally, the extended visualisation capabilities will find their use in simulations and analyses.

Having human input not restricted by means of any organisational measures, development can thrive. The same systematic may be implemented for educational purposes. The conventional way of teaching experience would be enhanced by various technological assets by introducing functional active support to the students delivering interactive practical knowledge (Rong, Lian, & Tang; 2022).

CONCLUSION

Artificial intelligence (AI) is a set of programming actions that aim to deliver desired data output by comparing libraries. The development, usage and market share of these algorithms has significantly increased over the past few years with the prediction to grow further with application in science, healthcare, agriculture, IT, daily life and many more areas.

The implementation of algorithmic enhancements to the tools humanity will utilise on a daily basis brings a long list of benefits into the debate. With the change of users' habits and increased trust in these tools, AI in various forms can provide unprecedented help in knowledge acquisition, development of scientific research, filmography, graphics, consulting or even the way humans interact with technology even on a basic level. The virtual assistants introduced to our smartphones or laptops are already able to cooperate with home assistants allowing full remote control over smart homes.

The tendencies towards automation are also visible in engineering or manufacturing used for decreasing the human effort during the design processes which results in faster product to market time span and increased innovation capabilities of human resources that have been previously occupied by repetitive work.

With increasing numbers of human - AI interactions that are forecast during the years to come, the research measures on the topic of influence of these tools on the human psychology should be conducted. The topic of advertisement manipulation on human psychology are already a standard in television or social media. With the development of AI chatbots or graphics creation the same methods may be implemented. With the personal data gathered at any possible app, the possibilities of profiling for the implementation of aimed and personalised delivery of ads can have an extremely negative impact.

The attempt to influence the subconscious decisions of society may become a real hazard to free will and creation of opinions as marketing may not be the only topic subjected to intentional alteration. Not only the ads, but also news or articles may be directed towards radicalisation or implementation of any sort of propaganda. These methods can deliver manipulation capabilities on the worldwide scale.

With the implementation of state-of-the-art AI tools, there are many unknowns regarding the positive and negative influence in society. The subject needs further research and investigation to implement healthy relationship between AI and human users. The potential hazards provide multiple topics for legislation activities to ensure that the user will always be the most important part of the equation and any abuse can be eliminated.

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