European Research Studies Journal
Volume XXVIII, Issue 3, 2025

pp. 859-868

The Unseen Role of AI in Everyday Decision-Making

Submitted 20/06/25, 1st revision 09/07/25, 2nd revision 18/08/25, accepted 10/09/25

Gabriel Tarasiuk[1]

Abstract:

Purpose: *The aim of this article is to analyze the applications of artificial intelligence in less visible aspects of human life, with particular emphasis on travel, social media, online shopping, and digital entertainment.*
Design/Methodology/Approach: *The study reviews scientific literature on algorithms used in these areas, including methods of machine learning, deep learning, and natural language processing.*
Findings: *The results indicate that AI significantly enhances the personalization of user experiences, thereby improving the efficiency of interactions across various digital systems.*
Practicaal implementations: *The conclusions highlight the growing importance of AI in everyday life, as well as its potential for further automation and optimization of user processes.*
Originality/Value:

Keywords: *Artificial Intelligence (AI), machine learning, active recommendation, personalized services, technological innovation, intelligent systems, AI adoption in technology.*

JEL codes: *O33, J24, M15, D24, L86.*

Paper type: *Research article.*

[1]*Akademia Bialska im. Jana Pawła II, Poland, ORCID 0009-0003-8303-0968,*
e-mail: gabrieltarasiuk3@gmail.com;

1. Introduction

In recent years, a noticeable slowdown in the pace of innovation within the technology sector has been observed. Over time, however, this gap has been filled by a rapidly developing technology that, in a short period, has become the primary driver of technological progress. This technology is, of course, artificial intelligence.

Not long ago, AI existed only in science fiction films, whereas today it constitutes an integral part of our reality. Technology companies, recognizing the enormous potential of this technology and seeking to adapt their offerings to the evolving needs of users, decided to integrate AI algorithms into their products, thereby improving the outcomes expected by their customers.

As consumers began to benefit from increasingly tailored solutions, they grew accustomed to the results provided by AI, which in turn started to be implemented in more and more areas - often in places where no one had anticipated its presence.

From planning a travel route with navigation apps, to browsing personalized content on social media, making online purchases, or managing email - AI accompanies us continuously. Surrounded by artificial intelligence on a daily basis, we often fail to realize just how many aspects of our lives are supported by it.

2. What is Artificial Intelligence?

Artificial intelligence (AI) is an informatic construct that creates systems capable of performing tasks and making independent decisions typically requiring human intelligence[2]. Among these tasks one may distinguish, for instance, machine learning, natural language recognition, predictive analytics, planning, and pattern recognition.

In the context of the aforementioned distinctions, it is worth noting that traditional algorithms operate according to a predetermined set of instructions, and their results are predictable as long as the input data remain unchanged. To modify their behavior, manual intervention by a programmer is required.

In contrast, artificial intelligence is able to learn from provided data, thereby recognizing patterns and adapting its decisions to new conditions without the need for reprogramming. It can thus process unstructured data, such as images or text, and apply the "knowledge" acquired during the learning process to solving new, similar

[2]*Shabbir, J., & Anwer, T. (2018). Artificial Intelligence and its Role in Near Future. arXiv:1804.01396v1, p. 1-2.*

problems[3]. In this way, AI proves effective in tasks requiring prediction and complex situational analysis, while traditional algorithms are best suited for repetitive, strictly defined operations.

To achieve this, the use of machine learning is essential, as it enables computers to independently discover patterns and relationships within data, and to use this knowledge for decision-making and information classification. This mechanism can be divided into three main types of learning: supervised, unsupervised, and reinforcement learning[4].

One of the most widely applied machine learning algorithms is supervised learning. It involves providing artificial intelligence with training data that contain clear information about the correctness of the expected output. In this way, the model learns the relationships between input and output data, in order to later predict responses for new, previously unseen data.

Supervised learning is particularly effective in data recognition tasks, such as determining whether an email qualifies as spam, or in the classification of information in images, for instance, grouping animal species based on photographs[5].

The second type of learning is unsupervised learning, which is based on data lacking labels that indicate the correctness of outputs. Thus, during the learning process, the algorithm is not provided with correct answers and must independently identify structures and relationships among the data. The aim of unsupervised learning is to discover connections between data, understand differences, and detect anomalies. In everyday life, unsupervised learning can be applied in areas such as fraud detection in the banking sector or handwriting recognition[6].

The third type of machine learning is reinforcement learning, which focuses on learning decision-making based on a system of penalties and rewards. When the obtained result diverges from the expected outcome, the system signals the discrepancy to the algorithm, steering its operation toward the desired result. Conversely, when the output matches the expected outcome, the system rewards the algorithm, confirming the correctness of the task performed. This mechanism motivates the algorithm to maximize the cumulative reward within a defined timeframe, relying on observation and causal analysis of the generated responses.

---

[3]*Rajula, H.S.R., Verlato, G., Manchia, M., Antonucci, N., & Fanos, V. (2020). Comparison of Conventional Statistical Methods with Machine Learning in Medicine: Diagnosis, Drug Development, and Treatment. Medicina, 56(455), p. 3.*

[4]*Koteluk, O., Wartecki, A., Mazurek, S., Kołodziejczak, I., & Mackiewicz, A. (2021). How Do Machines Learn? Artificial Intelligence as a New Era in Medicine. J. Pers. Med. 11, p. 4-6.*

[5]*Ibid., p. 2-5.*

[6]*Ibid., p. 2-6.*

The process is strikingly similar to training a dog to perform new tricks using treats as rewards. Examples of reinforcement learning applications include the financial sector, where it is used to optimize investment strategies, as well as urban traffic management, in line with scheduling systems[7].

3. Intelligent Navigation and Travel Planning

On a daily basis, most of us, when determining the route to work or to a holiday destination, do not consider that advanced artificial intelligence algorithms are responsible for planning the optimal path. Importantly, the use of AI is not merely a curiosity, but a significant change that enables drivers to save time.

Navigation applications such as or employ artificial intelligence to make thousands of micro-decisions based on weather data, road conditions, and feedback from drivers. The objective of this process is to determine the most suitable route, tailored to the user's preferences.

In this context, Graph Neural Networks (GNNs) are applied, as they naturally represent maps where nodes correspond to significant points - such as intersections, bus stops, or landmarks - while edges represent routes between points, i.e., roads or paths. The nodes communicate with neighboring nodes, acquiring information such as traffic density, which may help alleviate traffic congestion in a given area[8].

These data are processed through neural network layers, followed by an internal update of the node state, and subsequently propagated further. This process is known as "message passing."[9]. Thanks to GNNs, can more accurately estimate the Expected Time of Arrival (ETA), which is calculated based on the declared starting point of the journey and the intended destination.[10]

The authors of the article "ETA Prediction with Graph Neural Networks in Google Maps", presented a GNN-based model that was implemented in . Their research demonstrated that this modern approach significantly improved ETA prediction accuracy: "Here we present our graph neural network model for ETA prediction,

---

[7] *Ibid., p. 2-7.*

[8] *Diao, Z., Wang, X., Zhang, D., Liu, Y., Xie, K., & He, S. (2019). Dynamic Spatial-Temporal Graph Convolutional Neural Networks for Traffic Forecasting. Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (AAAI-19), p. 892.*

[9] *Zhao, S., Chen, Z., Xiong, Z., Shi, Y., Saha, S., & Zhu, X. X. (2024). Beyond Grid Data: Exploring Graph Neural Networks for Earth Observation. arXiv preprint arXiv:2411.03223, p. 4-5.*

[10] *Derrow-Pinion, A., She, J., Wong, D., Lange, O., Hester, T., Perez, L., Nunkesser, M., Lee, S., Guo, X., Wiltshire, B., Battaglia, P.W., Gupta, V., Li, A., Xu, Z., Sanchez-Gonzalez, A., & Li, Y. (2021). ETA Prediction with Graph Neural Networks in Google Maps. CIKM '21, Proceedings of the 30th ACM International Conference on Information & Knowledge Management, p. 3768.*

which we deployed in production at Google Maps, observing significant reductions in negative ETA outcomes across all trips worldwide - above 40% in cities like Sydney - compared to the previous production baseline."

A negative ETA prediction refers to a situation in which the estimated arrival time worsens during the journey. In other words, the user receives an update indicating that they will arrive later than initially predicted.

Therefore, by reducing the number of such negative outcomes, it is possible to directly improve the experience of users relying on the application, particularly those planning trips within strict time constraints.

The tasks of artificial intelligence in navigation systems are not limited to determining optimal routes or calculating accurate arrival times. Modern algorithms are capable of dynamically adjusting routes according to user preferences - for example, avoiding highways, toll roads, or selecting scenic routes.

To achieve this, a method known as habit-based learning is employed. It involves analyzing a driver's history of route choices in order to predict future decisions. An example of this technique is the Deep-Cross-Recurrent Network (DCR) model, which integrates two types of neural networks: DCN v2 (Deep and Cross Network), responsible for analyzing complex relationships between user and route features, and LSTM (Long Short-Term Memory), a recurrent network capable of analyzing sequences of decisions made by the driver during a trip[11].

This combination allows the system to generate more personalized route recommendations, reducing the number of inaccurate suggestions by as much as 8.72% compared to traditional models based solely on minimum estimated travel time (ETA).[12].

4. Personalization and Influence in Social Media

In recent years, an increasing number of aspects of human life have shifted into the virtual sphere, and direct interaction with others has begun to occur primarily through social media.

Social platforms have thus become one of the most advanced domains in which artificial intelligence performs a specific task: the personalization of displayed content, grounded in machine learning methods.

---

[11]*Huang, Y., Jin, X., Fan, M., Yang, X., & Jiang, F. (2024). Personalized Route Recommendation Based on User Habits for Vehicle Navigation. arXiv:2409.14047v1, p. 5-6.*
[12]*Ibid., p. 7.*

By analyzing user interactions on the platform, algorithms can learn without human intervention, employing unsupervised learning techniques[13]. In this way, AI attempts to predict which content is likely to be of interest in the future. At the same time, methods of clustering users with similar interests are applied.

This process, also based on unsupervised learning, involves grouping users into clusters according to comparable behaviors - for example, browsing similar content or following the same online creators[14]. In doing so, the algorithm can recommend materials that proved engaging for other users with similar preferences.

Meanwhile, reinforcement learning mechanisms operate by adapting to user responses. Algorithms analyze every interaction (e.g., clicking on a post or watching a video until the end), treating it as a reward. If a given piece of content captures attention, it is deemed effective, and similar materials are subsequently shown more often. Through this process, artificial intelligence continuously refines its recommendations, striving to maintain user attention for as long as possible[15].

Once user interests are identified and individuals are grouped according to specific characteristics, the next stage - advertising targeting - can be applied. Based on search history or location data, artificial intelligence selects personalized advertisements that are likely to attract user interest.[16]. By tailoring ads in this way, the probability of clicking on a link leading to the advertiser's website increases, thereby raising the potential profit for the social media platform.

However, such a high level of personalization can also lead to the creation of information bubbles in which users with similar preferences remain confined. This results in the phenomenon of "echo chambers," where individuals are exposed only to like-minded opinions, a process that may contribute to societal polarization[17].

Over the long term, this can shape one's perception of reality by reinforcing a one-sided worldview. Furthermore, the likelihood that users will become more vulnerable to disinformation also increases, as they encounter fewer materials that verify or challenge their existing beliefs.

---

[13]*Saura, J. R. (2024). Algorithms in Digital Marketing: Does Smart Personalization Promote a Privacy Paradox?. FIIB Business Review, 13(5), p. 499.*

[14]*Darwish, K., Stefanov, P., Aupetit, M., & Nakov, P. (2020). Unsupervised User Stance Detection on Twitter, p. 2.*

[15]*Zhao, X., Xia, L., Tang, J., & Yin, D. (2019). Deep Reinforcement Learning for Search, Recommendation, and Online Advertising: A Survey. SIGWEB Newsletter, Spring, p. 1–2.*

[16]*Muralidharan, S. (2024). Impact of AI on Personalised Targeting in Social Media Advertising. Journal of Informatics Education and Research, Vol. 4, Issue 2, p. 629.*

[17]*Noordeh, E., Levin, R., Jiang, R., & Shadmany, H. (2020). Echo Chambers in Collaborative Filtering Based Recommendation Systems. arXiv preprint arXiv:2011.03890v1, p. 1.*

5. Smarter Online Shopping Experiences

Similar to social media, one of the key applications of artificial intelligence in online shopping is recommendation systems. Their operation is based on the analysis of user searches and purchase history in order to suggest products that best match individual preferences[18].

For instance, a customer who has purchased running shoes may receive suggestions for sportswear or training accessories, thereby increasing the likelihood of subsequent transactions. These algorithms draw not only on the data of a single consumer but also on purchasing patterns of larger groups with similar interests. As a result, recommendations become increasingly precise and personalized, more effectively supporting sales.

Equally important is the application of artificial intelligence in dynamic pricing. To better tailor offers, AI algorithms analyze prices in competing stores as well as the level of interest in specific products, measured, for example, by the number of searches for particular keywords. On this basis, they dynamically adjust the store's offer - for instance, by modifying prices, prioritizing products, or adapting recommendations.

Consequently, airline ticket prices or hotel offers may vary depending on the current market situation and the user's location. On the one hand, this enables sellers to maximize profits; on the other, it ensures that consumers receive offers aligned with their potential needs[19].

Another solution that is steadily gaining importance is the use of virtual assistants, commonly known as chatbots, in the field of customer service. Chatbots interact with online store customers using advanced Natural Language Processing (NLP) techniques based on machine learning. This enables them not only to answer simple questions, acting as first-contact support and relieving customer service teams, but also to analyze conversational context and user intent.

Natural Language Understanding (NLU) mechanisms allow chatbots to extract intentions and key information from unstructured customer input[20]. Furthermore, they are capable of tracking the context of a conversation, which allows them to conduct coherent, multi-stage dialogues that incorporate prior statements and adapt

[18] *Alabi, M. (2024). AI-Powered Product Recommendation Systems: Personalizing Customer Experiences and Increasing Sales. ResearchGate, August 18, p. 6.*
[19] *Awais, M. (2024). Optimizing Dynamic Pricing through AI-Powered Real-Time Analytics: The Influence of Customer Behavior and Market Competition. Qlantic Journal of Social Sciences, p. 102–103.*
[20] *Adamopoulou, E., & Moussiades, L. (2020). An overview of chatbot technology. In I. Maglogiannis et al. (Eds.), Artificial Intelligence Applications and Innovations, p. 377.*

accordingly. This functionality makes it possible to perform more complex tasks such as tracking order status, recommending products, or assisting with the complaint process[21].

The continuous development of these technologies is gradually blurring the line between conversations with humans and interactions with AI-driven systems.

6. Email Management and Spam Detection

One of the less visible, yet among the earliest, applications of artificial intelligence is email management. Modern systems offered by global providers such as Google, Microsoft, and Yahoo employ machine learning algorithms to filter messages that may be classified as spam[22].

Unlike traditional filters based on static rules or keyword lists, AI-powered solutions are capable of analyzing email content in a more complex and dynamic manner. Moreover, AI-supported filters, leveraging vast datasets, can adapt to evolving spamming techniques. According to Google, the use of artificial intelligence in Gmail's anti-spam filters has significantly increased detection accuracy: "Google says that its spam rate is down to 0.1 percent, and its false positive rate has dipped to 0.05 percent."[23].

Importantly, the applications of these models extend beyond the elimination of unwanted content. Increasingly, they are also employed for the automatic categorization of correspondence, enabling messages to be assigned to appropriate folders such as "Primary," "Social," or "Promotions." A notable example is the BERT architecture, which, once fine-tuned to email-specific datasets, demonstrates high effectiveness in binary classification tasks, such as distinguishing between spam, legitimate emails, and phishing content.

Furthermore, the model also performs well in multi-class classification, where messages are allocated to thematic categories. This mechanism relies on the vector representation of words and sentences, followed by the analysis of their relationships within the broader context of the message. As a result, the model can detect subtle semantic differences and the sender's intent - for example, distinguishing promotional emails from social notifications. Through the fine-tuning process, in

---

[21] *Ibid., p. 379 - 380.*

[22] *Liu, X. (2024). Deciphering spam through AI: From traditional methods to deep learning advancements. Proceedings of the 1st International Conference on Engineering Management, Information Technology and Intelligence (EMITI 2024), p. 553–555.*

[23] *Metz, C. (2015). Google Says Its AI Catches 99.9 Percent of Gmail Spam. Wired.com, July 9, p. 1. Retrieved from [https://www.wired.com/2015/07/google-says-ai-catches-99-9-percent-gmail-spam/].*

which BERT is adjusted on specialized email datasets, systems achieve high accuracy in categorizing messages while reducing the risk of misclassification[24].

For instance, studies have shown that BERT achieves average classification performance with an F1-score of 97.8% on the SpamAssassin dataset, 98.6% on Enron, and over 99% on the Ling-Spam and SMS Spam Collection datasets. Such high effectiveness stems from the model's ability to deeply understand context and from the optimization of its parameters on well-annotated data, enabling the reliable recognition of both simple and complex communication patterns[25].

7. Conclusion

Artificial intelligence is one of the most versatile technological innovations of recent years. Its capacity for continuous learning allows it to be applied to an ever-growing range of tasks, and technology companies, recognizing the potential of this progress, are increasingly eager to implement it across various services and software applications.

The wide scope of AI applications means that it is now embedded in users' everyday lives, often in unobtrusive ways. Among the most common applications are the determination of optimal travel routes with precise arrival times, the personalization of social media content, the adaptation of online store offerings to user preferences, and the protection of email accounts against unwanted messages. Such a broad spectrum of applications demonstrates that AI is no longer merely an advanced technological tool.

Although it often operates imperceptibly to the user, it provides substantial support in daily life, facilitating both simple, routine activities and more complex decision-making processes. Its presence across diverse domains - from travel and social media to online shopping and email management - shows that artificial intelligence is becoming an integral element of contemporary individual and organizational functioning.

References:

Adamopoulou, E., Moussiades, L. 2020. An overview of chatbot technology. In: I. Maglogiannis et al. (Eds.), Artificial Intelligence Applications and Innovations, IFIP Advances in Information and Communication Technology, Springer Nature Switzerland AG, p. 377.

Alabi, M. 2024. AI-Powered Product Recommendation Systems: Personalizing Customer Experiences and Increasing Sales. Research Report, self-published, accessible via ResearchGate, p. 6.

[24] *Sahmoud, T., & Mikki, M. (2022). Spam Detection Using BERT. [Preprint]. Computer Engineering Department, Islamic University of Gaza, Palestine, p. 2-3.*

[25] *Ibid., p. 2.*

Awais, M. 2024. Optimizing Dynamic Pricing through AI-Powered Real-Time Analytics: The Influence of Customer Behavior and Market Competition. Qlantic Journal of Social Sciences, p. 102-103.

Darwish, K., Stefanov, P., Aupetit, M., Nakov, P. 2020. Unsupervised User Stance Detection on Twitter, In: Proceedings of the Fourteenth International AAAI Conference on Web and Social Media (ICWSM 2020), Association for the Advancement of Artificial Intelligence (AAAI), p. 2.

Derrow-Pinion, A., She, J., Wong, D., Lange, O., Hester, T., Perez, L., Nunkesser, M., Lee, S., Guo, X., Wiltshire, B., Battaglia, P.W., Gupta, V., Li, A., Xu, Z., Sanchez-Gonzalez, A., Li, Y. 2021. ETA Prediction with Graph Neural Networks in Google Maps. CIKM '21, Proceedings of the 30th ACM International Conference on Information & Knowledge Management, p. 3768.

Diao, Z., Wang, X., Zhang, D., Liu, Y., Xie, K., He, S. 2019. Dynamic Spatial-Temporal Graph Convolutional Neural Networks for Traffic Forecasting. Proceedings of the Thirty-Third AAAI Conference on Artificial Intelligence (AAAI-19), p. 892.

Huang, Y., Jin, X., Fan, M., Yang, X., Jiang, F. 2024. Personalized Route Recommendation Based on User Habits for Vehicle Navigation. arXiv:2409.14047v1, p. 5-6.

Koteluk, O., Wartecki, A., Mazurek, S., Kołodziejczak, I., Mackiewicz, A. 2021. How Do Machines Learn? Artificial Intelligence as a New Era in Medicine. J. Pers. Med., 11, p. 4-6.

Liu, X. 2024. Deciphering spam through AI: From traditional methods to deep learning advancements. Proceedings of the 1st International Conference on Engineering Management, Information Technology and Intelligence (EMITI 2024), p. 553-555.

Metz, C. 2015. Google Says Its AI Catches 99.9 Percent of Gmail Spam. Wired.com, July 9, p. 1. Retrieved from: https://www.wired.com/2015/07/google-says-ai-catches-99-9-percent-gmail-spam/.

Muralidharan, S. 2024. Impact of AI on Personalised Targeting in Social Media Advertising. Journal of Informatics Education and Research, Vol. 4, Issue 2, p. 629.

Noordeh, E., Levin, R., Jiang, R., Shadmany, H. 2020. Echo Chambers in Collaborative Filtering Based Recommendation Systems. arXiv preprint arXiv:2011.03890v1, p. 1.

Rajula, H.S.R., Verlato, G., Manchia, M., Antonucci, N., Fanos, V. 2020. Comparison of Conventional Statistical Methods with Machine Learning in Medicine: Diagnosis, Drug Development, and Treatment. Medicina, p. 3.

Sahmoud, T., Mikki, M. 2022. Spam Detection Using BERT. Computer Engineering Department, Islamic University of Gaza, Palestine, p. 2-3.

Saura, J.R. 2024. Algorithms in Digital Marketing: Does Smart Personalization Promote a Privacy Paradox? FIIB Business Review, 13(5), p. 499.

Shabbir, J., Anwer, T. 2018. Artificial Intelligence and its Role in Near Future. arXiv:1804.01396v1, p. 1-2.

Zhao, S., Chen, Z., Xiong, Z., Shi, Y., Saha, S., Zhu, X.X. 2024. Beyond Grid Data: Exploring Graph Neural Networks for Earth Observation. arXiv preprint arXiv:2411.03223, p. 4-5.

Zhao, X., Xia, L., Tang, J., Yin, D. 2019. Deep Reinforcement Learning for Search, Recommendation, and Online Advertising: A Survey. SIGWEB Newsletter, Spring, p. 1-2.