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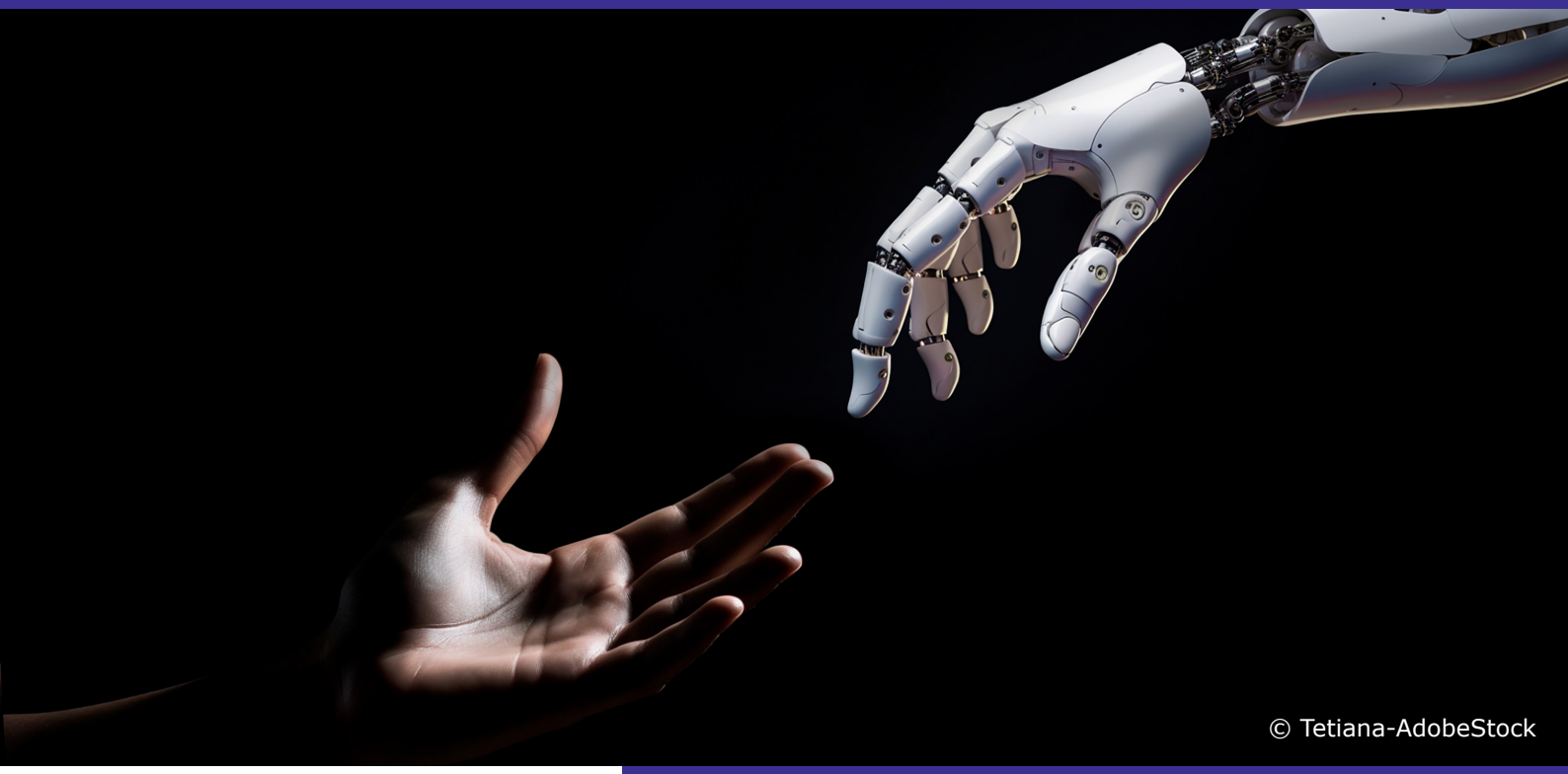

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LIGHTS - Technology

AI service robots in the marketplace: A human-centric approach

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AI service robots in the marketplace: A human-centric approach

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Abstract

The integration of AI service robots in various sectors promises cost efficiencies, customization, and improved task coverage. While these technologies offer substantial economic and efficiency benefits, they also raise various ethical concerns. Indeed, to ensure a human-centric use and implementation, challenges related to privacy, transparency, and fairness in decision-making processes need addressing. In healthcare, AI and robotics enhance patient care, offering personalized treatment plans and support, notwithstanding certain considerations for maintaining emotional connections. In education, AI fosters personalized learning experiences, yet risks undermining critical thinking skills if over-relied upon. In finance, AI enables tailored services and investment advice, though biases in historical data pose discrimination risks. In hospitality, AI and robots streamline tasks, offering new stimuli while allowing staff to focus on personalized guest interactions. However, challenges during integration in customer interactions remain. Overall, a balance between automation and human involvement is crucial for maximizing the benefits of AI and robotics across sectors while prioritizing human well-being and inclusivity.

Keywords: Human-centric AI, AI ethics, Service robots

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Introduction

The emergence and integration of artificial intelligence (AI) service robots in the marketplace brings many forms of optimization in terms of cost efficiencies, customization of offers and performance of monotone and repetitive task. AI service robots are autonomous agents that can be physically embodied or virtual and that can interact with customers in a variety of service areas (Blut et al., 2021). Not surprisingly, many companies aim to exploit the potential of these technologies, which is expected to contribute $13 trillion to the global economy in the coming decade (Fountaine et al., 2019). However, there is also a dark side to AI service robots, with vast ethical implications (Silberg & Manyika, 2019). A growing body of work indicates that AI can entail challenges regarding privacy and data ownership, transparency and accountability and fairness in AI-driven decision-making processes (Lepri et al., 2021). As such, businesses and policymakers should strive toward the goal of implementing "human-centric" AI service robots. A human-centric approach entails a foundation that is fair and inclusive with a primary focus on enhancing the well-being, capabilities, and experiences of human users. This article discusses how human-centric AI service robots can be used in various sectors such as healthcare, education, finance, and hospitality.

Healthcare

The healthcare sector is paramount for society as it provides individuals with access to vital medical services, promoting well-being and longevity. AI and robotics possess transformative potential in revolutionizing patient care by infusing it with a more human-centric approach. These technologies, when integrated thoughtfully into healthcare systems, can augment the capabilities of healthcare providers, allowing them to devote more time and attention to patients' emotional and psychological needs. For example, AI can contribute to human-centric care through personalized medicine. By analyzing vast amounts of patient data, AI can generate tailored treatment plans that account for individual variations in genetics, lifestyle, and preferences. This customization goes beyond standard treatment methods that may not suit every patient, thus improving medical outcomes. Researchers argue that increasing availability of biomedical data, electronic health records, medical imaging, wearable and ambient biosensors will be used to feed artificial intelligence solutions and thus capture the complexity of human health and disease (Acosta et al., 2022). Consequently, they will be able to provide enhanced personalized care and treatment, remote monitoring of patients, and even pandemic surveillance. Additionally, robotics play a crucial role in enhancing the patient experience by automating routine tasks, such as medication delivery and record-keeping, which allows healthcare professionals to focus on building meaningful connections with patients. Robots can also assist in rehabilitation exercises, providing consistent support and motivation to patients undergoing recovery. The benefits of such technological inclusion are clearly evident. First, due to the additional resources to provide the medical service, patients are able to receive care in a more timely manner. Waiting times are reduced and more frequent treatments are provided, thus likely enhancing the overall treatment quality. Second, as mentioned, human medical staff are able to dedicate more time to individual patients, in particular they are able to offer also much-needed emotional support. Studies indicate that although robots are improving rapidly in terms of their emotional support capabilities, patients generally still prefer human-to-human interactions, especially in moments of stress (Schönmann et al., 2024). However, despite of

these benefits, in some instances, AI-enabled over-reliance on cost and operational efficiencies will cloud over patient needs. Therefore, healthcare managers need to try to find the right balance between economics and a human-centric application, in particular during interactions that mainly rely on the caretakers' emotional empathetic capabilities.

Education

The educational sector is crucial for humanity as it empowers individuals with knowledge, skills, and critical thinking abilities necessary for personal growth and societal advancement. AI and robotics hold immense potential to revolutionize education, making it more human-centric by personalizing learning experiences, fostering creativity, and enhancing student engagement. One significant way AI contributes to human-centric education is through personalized learning platforms. By analyzing students' learning styles, strengths, and weaknesses, AI algorithms can tailor educational content and pacing to meet individual needs. This individualized approach ensures that each student receives the support and challenges necessary for their academic growth, fostering a sense of connection and empowerment. Such applications can assist teachers in overcoming challenges related to inadequate teacher/student ratios, which do not allow addressing the needs of those students who are behind or excel in the classroom. In addition, AI-powered chatbots and virtual assistants offer personalized support to students outside the classroom. They can answer questions, provide feedback, and offer study resources. These virtual companions create a supportive learning environment that is accessible 24/7, empowering students to take ownership of their education and seek help when needed. Indeed, recent research shows promising results from using a chatbot assistant to teach basic AI concepts to students (Chen et al., 2023). The authors argue that AI chatbots can be a tool that provides engaging and responsive conversational learning, thus supporting inclusive and customized learning. Nevertheless, over-reliance on AI for educational purposes also entails its risks. For instance, ChatGPT has taken the world by storm in 2023. While ChatGPT offers immense potential as a support tool, it also raises questions in terms of students losing the ability to think critically for themselves. Therefore, it is essential to carefully integrate such tools into the learning experience. Educators need to ensure that these tools are used to enhance the quality of the generated outputs in combination with a critical evaluation and editing capability by the student, rather as the sole and final source of "truth".

Finance

The financial sector facilitates economic transactions, underpinning the functioning of markets, enabling businesses to thrive, individuals to access capital, and governments to finance essential services. Artificial Intelligence (AI) and robotics are revolutionizing the insurance and financial services industries by offering more human-centric approaches. Through advanced algorithms and machine learning, AI can personalize insurance and financial products, tailoring them to individual needs and preferences. Moreover, chatbots powered by AI can handle routine inquiries, provide instant support, and even assist in the claims process. This automation frees up human agents to focus on more complex tasks, improving efficiency and reducing wait times for customers. This not only enhances customer satisfaction but also ensures that clients receive the most relevant and beneficial services. Noteworthy though is that in order to offer human-centric financial services, the notion of the human in the loop that builds on collaboration between AI and humans, should be considered. This approach entails that AI is first leveraged on the basis of its analytical strengths to evaluate a large set of investment opportunities, while analyzing risk factors that suit the investor. Subsequently, the human investment adviser

will evaluate the AI recommendations together with the client. This second step ensures that other, perhaps non-analytical factors, can be considered in the advising process, thus offering the client an optimized solution. Research supports this approach, as AI is generally perceived as more objective in analyzing large data sets, while being less efficient for tasks that require subjective knowledge or even benevolent intent (Garvey et al., 2023), which is rather a human characteristic. In addition, historically there has been a divide in terms of access to financial services, because these services were mainly offered to high-income individuals. Although customized services may still target more affluent segments, AI-powered robot-advisors are gaining popularity. These robot-advisors offer cost-effective investment solutions and continuous portfolio monitoring, making financial planning more accessible to a broader range of individuals. However, a key challenge of integrating AI and robots in financial services is the potential discrimination caused by biased historical data. Algorithms trained on biased datasets can further perpetuate inequalities, leading to unfair outcomes for certain demographics. Tackling this issue requires careful data selection, transparency, and ongoing monitoring and updating of data bases to ensure fairness and equity.

Hospitality

Lastly, the hospitality sector plays a vital role in society by facilitating travel, leisure, and cultural exchange. It provides essential services, employment opportunities, and contributes to economic growth and development in communities worldwide. AI and robots hold immense potential for revolutionizing the hospitality industry while maintaining a human-centric approach. Robots can augment the capabilities of hospitality staff by performing repetitive and mechanical tasks, such as room cleaning, food delivery and luggage handling. Automating these tasks enables employees to dedicate more time to personalized and emotionally driven guest interactions, enhancing overall customer satisfaction. In addition, AI can personalize guest experiences by analyzing data on preferences, behavior, and past interactions. This information can be used to tailor services, amenities, and promotions to meet the unique needs and desires of each guest, creating a more personalized and memorable stay. Indeed, recent research shows that the inclusion of AI into hospitality contexts can create environments that offer new stimuli, feelings and hedonic value compared to more traditional contexts, thus positively affecting customer engagement (Yin et al., 2023). This includes intelligent lighting and heating, facial recognition, 3D videos and AR experience, ultimately creating a vivid environment. Furthermore, AI and robots offer promising avenues to enhance social inclusion for disabled individuals in the hospitality sector. Robotic assistants equipped with AI capabilities are able assist disabled guests in hotels and restaurants. For instance, AI-driven platforms can provide virtual tours and accessibility information for hotels and restaurants, allowing disabled individuals to assess venue suitability before making reservations. By offering comprehensive accessibility information, AI empowers disabled guests to make informed decisions and ensures that their needs are met during their stay. Besides supporting disabled guests, AI and robots can also be used to support disabled workers. The Dawn Avatar Cafe in Tokyo offers a smart alternative through robots, giving disabled people an opportunity to actively participate in the workplace by remotely serving customers. As such, the robot provides the disabled person with an opportunity to augment their physical abilities, by immersing themselves from a distance into the workplace. This practice is supported by a recent study showing that immersive augmentation through inclusive-AI service robots produces higher levels of supportive tipping behavior and buying intentions in hospitality settings (Gonzalez-Jimenez & Pinto, in progress).

Conclusion

Despite these human-centric applications, incorporating AI and robots into hospitality settings still poses challenges. Ensuring a smooth integration with existing systems, addressing concerns about job displacement, managing data privacy and security risks, while maintaining a human touch in guest interactions are essential for success. Balancing automation with personalized service remains a key consideration in this sector as in any service-oriented industry. Ultimately, the main goal should not be to replace human staff. Instead, the integration of these technologies should focus on augmenting human capabilities to add value to as many stakeholders as possible.

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