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EDITORIAL

Scientific writing with artificial intelligence: key considerations and alerts

Escrita científica com inteligência artificial: principais considerações e alertas

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ABSTRACT

The integration of artificial intelligence (AI) text generators in scientific reports demands careful evaluation of specific ethical considerations. While these AI technologies offer text generation support, addressing the ethical implications is vital. This editorial highlights the need for a thoughtful and responsible approach, emphasizing the establishment of guidelines and best practices by researchers and scientific communities. Collaborative efforts between AI developers, researchers, and ethical committees can ensure the seamless integration of AI technologies while upholding the integrity, quality, and ethical standards of scientific reporting. This text comprehensively summarizes the key considerations to be followed when utilizing artificial intelligence text generators in scientific reports.

KEYWORDS

Artificial intelligence; Dental society; Ethics; Forecasting; Scientific society.

RESUMO

A integração de geradores de texto de inteligência artificial (IA) em relatórios científicos exige uma avaliação cuidadosa de considerações éticas específicas. Embora essas tecnologias de IA ofereçam suporte à geração de texto, abordar as implicações éticas é fundamental. Este editorial destaca a necessidade de uma abordagem ponderada e responsável, enfatizando o estabelecimento de diretrizes e melhores práticas por parte de pesquisadores e comunidades científicas. Esforços colaborativos entre desenvolvedores de IA, pesquisadores e comitês éticos podem garantir a integração perfeita das tecnologias de IA, ao mesmo tempo em que mantêm a integridade, qualidade e padrões éticos da divulgação científica. Este texto oferece um resumo abrangente considerações-chave ao se utilizar geradores de texto de inteligência artificial em relatórios científicos.

PALAVRAS-CHAVE

Inteligência artificial; Sociedade odontológica; Ética; Previsão; Sociedade científica.

CONTEXT AND PROSPECTS

Overcoming barriers and pushing beyond a beautiful smile, modern dentistry subtly consolidates itself, conquering millimeter by millimeter new advances on the threshold of knowledge. In this constant search for professional assertiveness and patient well-being, performance in diagnosis, treatment planning, improvement of materials, harmonization, and execution of techniques are the flagships of studies in various specialties [1-3]. Recent research explores promising techniques, and thus, primordial dentistry establishes its foundations in the "gold standard" and underpins the steps of progress in modern/contemporary dentistry, which now goes hand in hand and is already awakening with Artificial Intelligence (AI) [4]. What once seemed distant to us is now perceived as part of our routine: Speech recognition and natural language processing voice assistants provide personalized and sometimes humorous responses to our inquiries. They are capable of performing daily tasks and controlling other smart devices. Internet browsing behavior suggests products, websites, and images based on previous searches, feeding into this "intelligence". Traffic control systems optimize vehicle flow and safety, facial recognition aids in identification, and big data analysis targets patterns and trends, adding significant value to areas such as marketing, finance, arts (Figure 1), and scientific research. AI silently permeates our daily lives.

Figure 1 - AI-generated image using the input "open access science, digital art"

Speaking of scientific research and the promising capabilities of numerous AI tools, we now turn to the production or refinement of scientific writing. While AI appears to assist in the development of laboratory research, its use for improving and perhaps even guiding scientific language is a subject of interest [5]. Researchers and authors continue to play a crucial role since no groundbreaking idea can be developed without skillful and meticulous hands and thoughtful minds. Creating a paper using AI may seem akin to plagiarism, as it relies on existing knowledge [6]. Therefore, we acknowledge the merit of AI in language corrections and improvements, which could potentially minimize the "Tower of Babel" effect between countries. However, it is essential to emphasize that AI is powered by brilliant minds who have worked naturally, posing questions and searching for answers the "old way." The human mind is necessary for creative and ethical thinking, while AI currently acts as a helpful tool rather than a threat. It relies on properly trained and qualified individuals to function effectively.

ETHICAL CONSIDERATIONS IN THE DENTAL FIELD

To provide valuable insights, this editorial presents a summary of ethical considerations within the dental field that can also apply to health sciences. The following six topics are described in detail below:

1. Accuracy and Reliability: One primary concern is ensuring the accuracy and reliability of the AI-generated text. Dentistry involves critical decision-making processes that directly impact patients' oral health. Any inaccuracies or errors in the AI-generated text could lead to incorrect diagnoses, treatment plans, or advice, potentially causing harm to patients.
2. Accountability and Responsibility: As AI systems are developed and trained by human creators, the issue of accountability and responsibility comes into play. It is essential to establish clear guidelines and regulations to determine who is responsible for the actions and decisions made based on AI-generated text in dentistry. This includes determining liability in case of any negative consequences resulting from the AI's recommendations.

3. Informed Consent and Transparency: Dentists have an ethical obligation to provide patients with accurate and comprehensible information about their oral health and treatment options. With AI-generated text, it becomes crucial to ensure that patients are fully informed about the use of AI in their diagnosis or treatment. Dentists should communicate the limitations, potential biases, and uncertainties associated with AI-generated text to obtain informed consent from patients.
4. Data Privacy and Security: AI systems rely heavily on vast amounts of data to train and improve their performance. Dentistry involves handling sensitive patient information, such as medical records, X-rays, and personal details. It is imperative to protect patient privacy and ensure that AI-generated text is developed and used in compliance with data protection regulations. Safeguards should be in place to prevent unauthorized access, use, or misuse of patient data.
5. Equity and Bias: AI systems are susceptible to biases present in the data they are trained on, potentially resulting in unequal treatment or disparities in dental care. To avoid perpetuating existing biases, it is essential to address data biases during the development and training of AI systems. Efforts should be made to ensure that the AI-generated text is fair, unbiased, and equitable, providing equal and appropriate care to all patients, irrespective of their demographic characteristics.
6. Professional Autonomy and Human Judgment: AI-generated text should be viewed as a tool to augment human decision-making rather than replacing it entirely. Dentists must retain their professional autonomy and use AI-generated text as an aid in their clinical practice, considering it alongside their expertise and patient-specific factors. Human judgment, empathy, and intuition should continue to play a central role in dentistry, ensuring the holistic care of patients.

Addressing these ethical considerations requires a multidisciplinary approach involving dental professionals, AI developers, regulatory councils, and ethicists. It is essential to establish clear guidelines, standards, and regulations to govern the development, implementation, and use of AI-generated text in dentistry, with the primary aim of promoting patient well-being, safety, and ethical practice.

WHY SHOULD WE CHECK IT TWICE?

Checking something twice is often done to ensure accuracy, avoid errors, or maintain quality. In the AI scenario the terms "garbage in, garbage out" (GIGO) refer to the concept that the quality of output or results from a system is directly dependent on the quality of the input or data provided to it [7]. It suggests that if you feed a system with faulty, inaccurate, or low-quality data, the output or results produced by the system will also be flawed, inaccurate, or of low quality.

"GIGO" highlights the importance of ensuring high-quality input data and the careful validation and preprocessing of data before using it to make clinical decisions or use it in a scientific manuscript. It serves as a reminder that even the most advanced algorithms or technologies can only work with the information provided to them and are not capable of compensating for poor-quality or flawed data. Consequently, by ensuring that high-quality data is fed into a system, we increase the likelihood of obtaining meaningful and trustworthy results [7,8].

Without checking the AI-provided information, and trying to boost productivity without ethics, authors can cite non-existing references and made-up data from unreliable sources as noticed in a retracted preprint article that contained several fake references [9].

Understanding each AI tool and its applicability can make its incorporation into daily life easier and more useful. The language models generate responses based on patterns and information present in the training data it has been exposed to, including information about the dental field [10]. In its current status, it does not have real-time access to the internet and cannot retrieve or verify the latest information [11]. The model's responses are based on statistical patterns rather than a deep understanding of specific facts or real-time events and therefore may produce inaccurate information about people, places, facts, or even references from the article.

GUIDELINES AND SUGGESTIONS FOR SCIENTIFIC REPORTS

When using AI-generated text in scientific reports, it is important to follow certain guidelines to ensure responsible and ethical usage. Here are some key guidelines to consider:

1. Transparency and disclosure: Indicate when AI-generated text has been used in the report. Provide information about the specific AI models, algorithms, or tools employed, as well as the training data sources. Transparency helps readers understand the potential limitations, biases, and uncertainties associated with AI-generated text.
2. Verification and validation: Validate the accuracy, reliability, and relevance of AI-generated text before incorporating it into scientific reports. Cross-check the generated content against trusted sources, conduct additional research or experiments to confirm findings, and critically evaluate the outputs to ensure they align with scientific rigor. Open-access science can play an important role in this regard [11].
3. Contextualization and interpretation: Provide proper context and interpretation for AI-generated text. Clearly distinguish between human-authored content and AI-generated content. Explain the purpose and limitations of AI-generated text, and offer critical analysis and interpretation to complement the generated results.
4. Collaboration between AI and human researchers: Recognize that AI is a tool that can assist in scientific research but should not replace human expertise. Foster a multidisciplinary approach where researchers with domain knowledge work alongside AI systems, combining their respective strengths for more robust scientific reports. Using AI to help write a scientific article is not equivalent to co-authorship. AI lacks the ability to contribute original ideas, understand context, make ethical decisions, or participate in rigorous critical review. It can only be considered a helpful tool, but not a co-author. Mentioning AI as a tool is acceptable, but it cannot be granted co-author status [12].
5. Ethical considerations: Be mindful of the ethical considerations surrounding AI-generated text, as discussed earlier. Address issues such as bias, misinformation, intellectual property, privacy, and accountability. Take steps to mitigate biases, ensure accuracy, protect privacy, and properly attribute sources.
6. Peer review and validation: Submit AI-generated text within scientific reports to rigorous peer review. Independent experts can assess the scientific validity, ethical implications, and appropriateness of using AI-generated text. Peer review helps maintain the quality and integrity of scientific reports and provides additional scrutiny for AI-generated content.
7. Compliance with publishing guidelines: Follow the publishing guidelines of the target scientific journals or venues when including AI-generated text. Ensure compliance with citation standards, disclosure requirements, and any specific guidelines related to the use of AI or machine-generated content.
8. Ongoing monitoring and improvement: Continuously monitor and evaluate the performance and impact of AI-generated text. Identify and address potential biases, inaccuracies, or unintended consequences that may arise. Regularly update and refine AI models, algorithms, and training data to improve the quality and reliability of the generated text.

By adhering to these guidelines, researchers can incorporate AI-generated text responsibly into scientific reports while upholding scientific integrity, transparency, and ethical principles.

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The figure presented in this editorial was generated using DALL-E, an AI model developed by OpenAI that specializes in creating images from textual descriptions. DALL-E utilizes a combination of deep learning and generative modeling techniques to produce unique and novel visual representations based on the input provided.

Author's Contributions

KACF: Conceptualization, Writing, Original Draft Preparation, Review & Editing. SEPG: Original Draft Preparation, Writing, Review &

Editing. JPMT: Conceptualization, Original Draft Preparation, Supervision, Review & Editing.

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