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GENERATIVE ARTIFICIAL INTELLIGENCE IN HEALTH PROFESSIONS A BIBLIOMETRIC DESCRIPTIVE ANALYSIS

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Background

- Generative artificial intelligence (AI) refers to a type of AI that has the ability to create text, images and other media using models.
- These models learn patterns and structures, from training data to generate outputs.
- Some examples of AI systems include ChatGPT developed by OpenAI, Bard by Google and Claude from Anthropic.

Background

- In the healthcare sector, generative AI has applications from gathering information during interactions between healthcare professionals and patients for creating clinical records to enhancing diagnostic accuracy and clinical efficiency to support continuity of care.
- Over the last year, there has been growth in the use of generative AI in healthcare with potential impacts on education and research as well.
- However, due to the amount of literature in this field comprehending its scientific structure and development presents challenges. To overcome this impact, visualization techniques based on data can prove helpful, for understanding the specific domains.

Background

- Bibliometrics is the study of patterns and trends in research literature. It involves the use of statistical and mathematical methods to analyze and measure the impact of research papers and other scholarly works.

- Bibliometric studies are often used to evaluate the productivity and impact of research in a particular field or institution, and may be used to inform decisions about funding, hiring, and promotion

Methodology

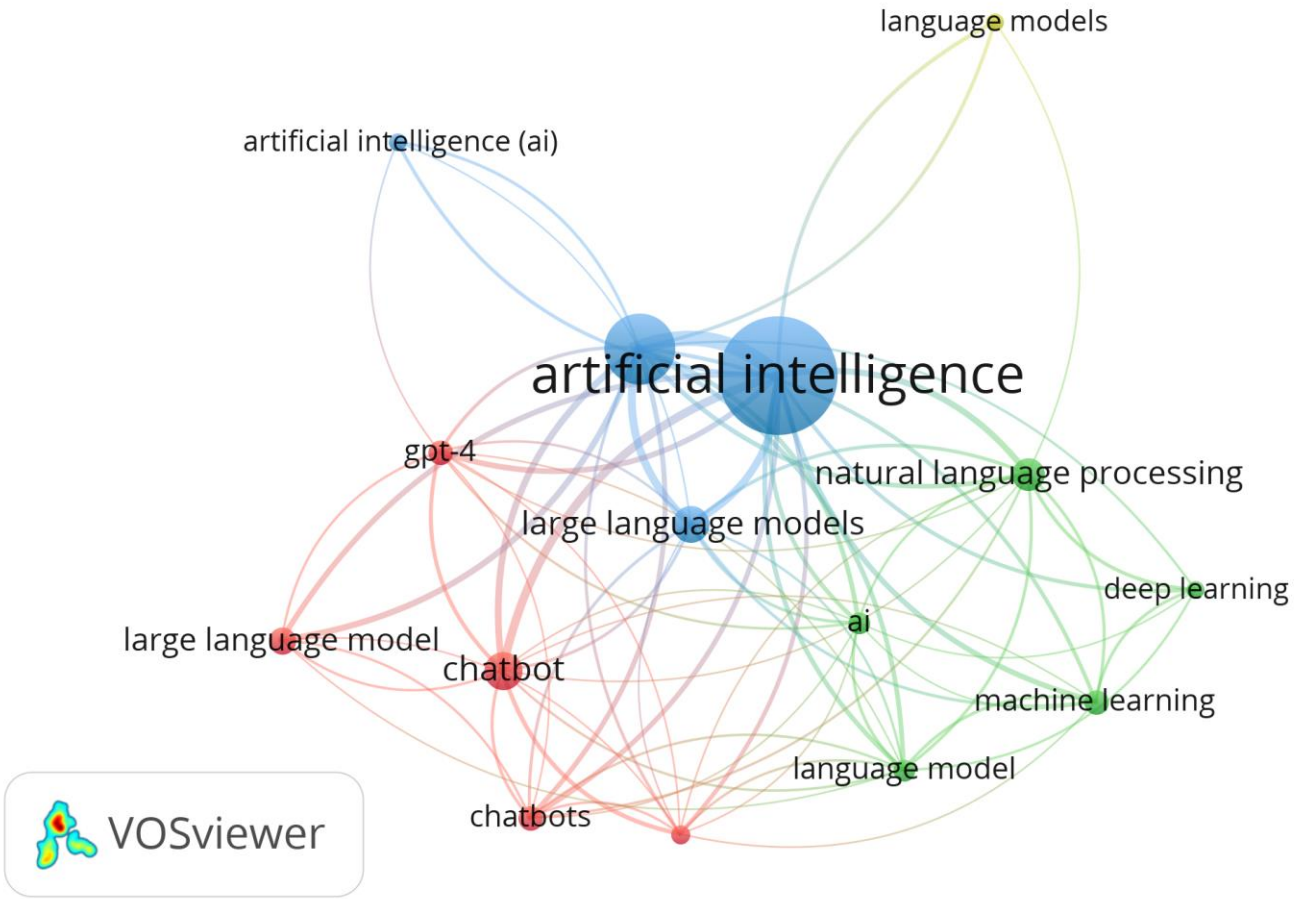
- This study is a bibliometric, descriptive, and retrospective analysis of publications related to the use of Generative Artificial Intelligence (AI) in Healthcare.

- The author identified publications from the PubMed database from November 2022 till November 2023 related to the use of Generative Artificial Intelligence in Health Professions, using this search string: **(("chatbot"[All Fields] OR "GPT"[All Fields] OR "ChatGPT"[All Fields] OR "Bard"[All Fields] OR "Bing"[All Fields]) AND ("Artificial Intelligence"[MeSH Terms] OR "Large Language Models"[All Fields] OR "LLM"[All Fields]) AND ("Health Personnel"[MeSH Terms] OR "Health Occupations"[MeSH Terms])) AND (2022/11/30:2023/11/30[pdat])**.

- From the titles and abstracts of these publications, was selected the main terms related to the field, extracted by VOSviewer software, to create a visualization of the most important trends referred to in the literature.

Results

The researchers identified a total of 248 relevant references, including clinical trials and randomized controlled trials. as well as meta-analvses and svstematic reviews.



Results

- The bibliometric visualization with "artificial intelligence" as its central node demonstrates AI's pivotal role in the literature, indicating its foundational influence and the high frequency of its occurrence, around which various research topics are interconnected.

- Clusters adjacent to the central AI node represent thematic groupings within AI research, with one notable cluster focusing on natural language processing, deep learning, and language models, highlighting a key research area in AI's application to understanding and generating human language.

- Another significant cluster includes terms related to conversational AI, such as "GPT-4," "large language models," and "chatbots," illustrating a concentrated research interest in conversational AI systems and the development of advanced language models.

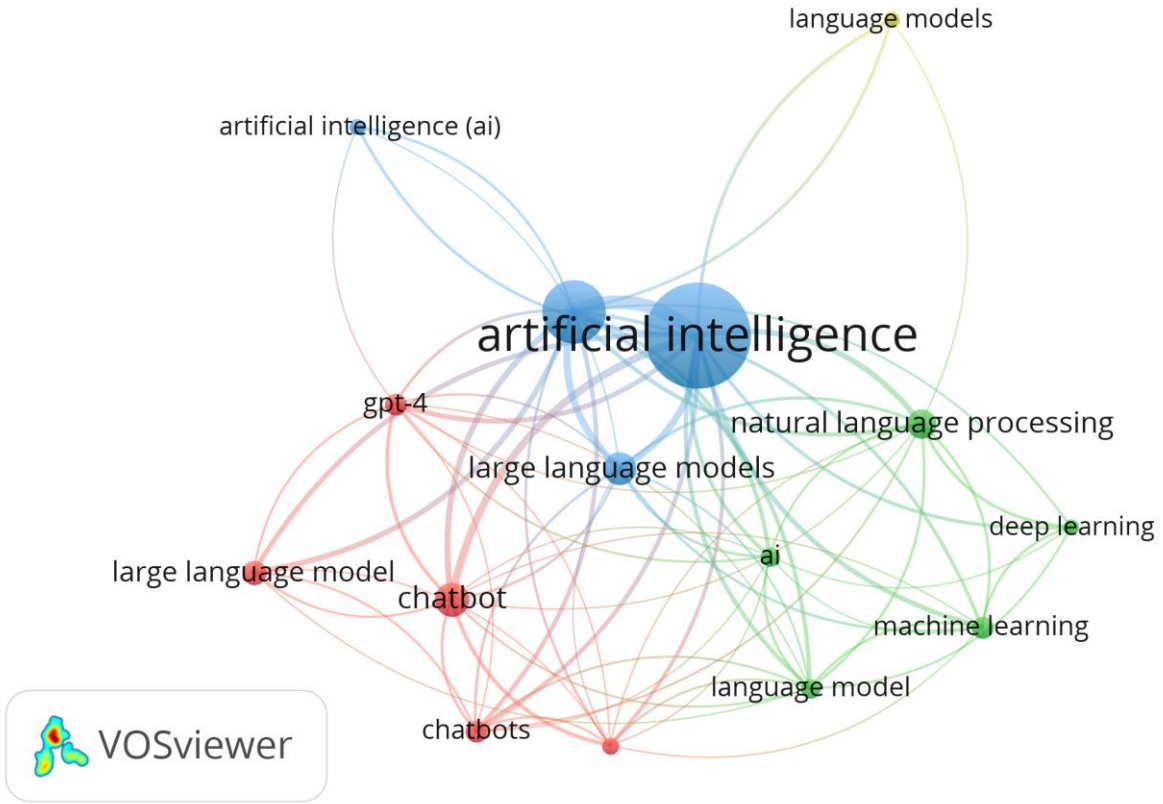


Figure 1. Co-occurrence of the terms associated with AI (VOSviewer)

Results

- The central positioning and size of the "artificial intelligence" node within the network emphasize its significant occurrence and integral role in medical research, underlining AI's pivotal presence in the field.
- The thickness of the lines connecting the nodes indicates the strength of the association between AI and various medical disciplines, with thicker lines suggesting a more pronounced focus on AI in academic discussions and research within those fields.
- A significant cluster in blue, highlighting terms like "radiology" and "medicine," reflects the growing incorporation of AI technologies in diagnostic processes and medical practices, indicating a technological shift in these areas.
- Adjacent clusters reveal influence in different branches of medicine, including clinical and dental practices (red-tinted nodes), gynaecology, internal medicine, and cardiology (green hues), as well as in surgical planning, patient monitoring, and procedural efficiency (yellow-toned cluster), showcasing AI's broad impact and potential to drive advancements across various medical specialties.

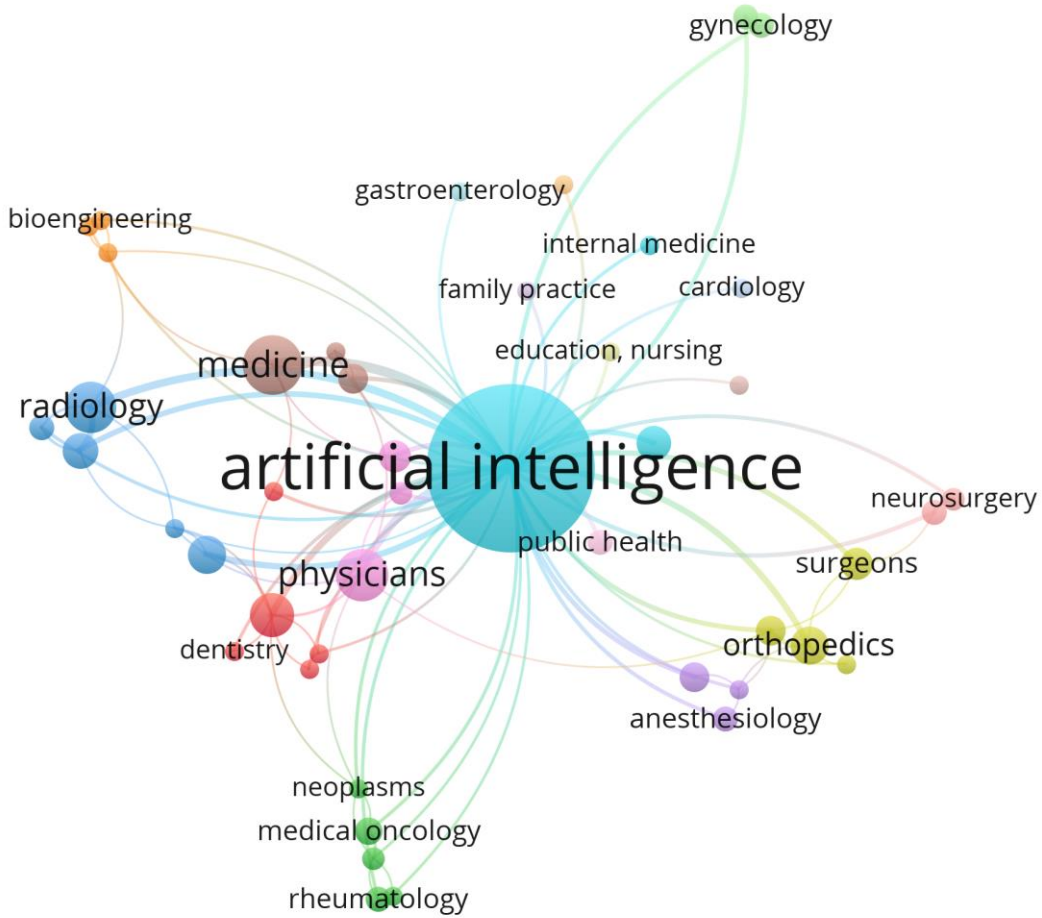


Figure 2. Co-occurrence of the terms associated with Generative AI and health professions (VOSviewer)

Results

- The bibliometric visualization highlights "artificial intelligence" as a central node interconnected with significant terms like "medical education," "chatbot," "telemedicine," and "digital health," showcasing AI's integration into various aspects of healthcare, suggesting a trend towards its incorporation in medical education, patient interaction, and remote healthcare services.

- The mention of "GPT-4" alongside terms such as "medical writing" and "curriculum" indicates an innovative application of advanced AI technologies in the medical field, particularly in the development of educational content and curriculum design for medical training and education.

- The thickness of the lines between nodes reflects the strength of co-occurrence, highlighting strong connections between AI and different facets of digital health and education, suggesting a robust association and dialogue within these areas.

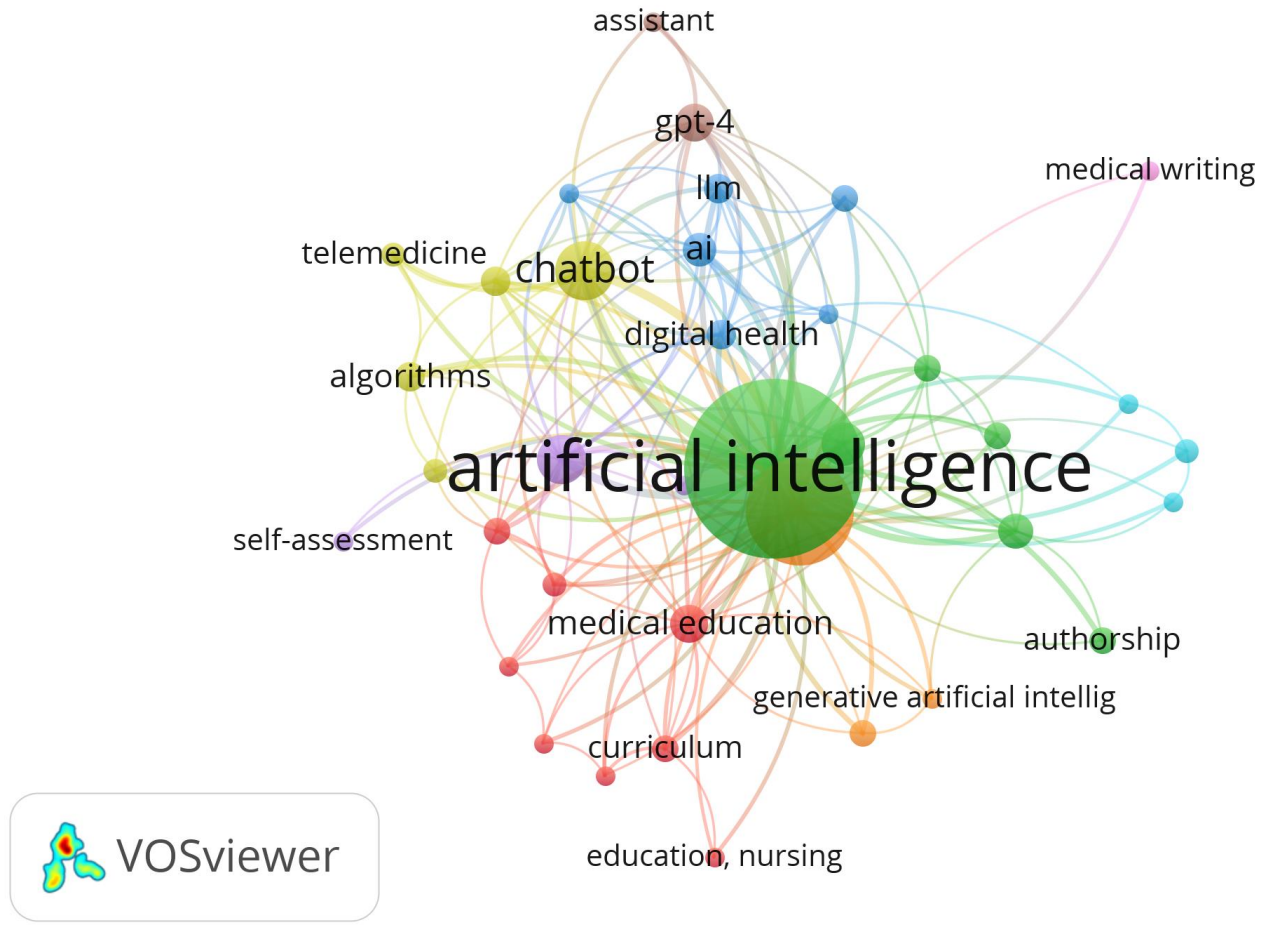


Figure 3. Co-occurrence of the terms associated with the types of generative AI usage in healthcare (VOSviewer)

Conclusions

The bibliometric analysis reveals a comprehensive view of Generative AI's impact on healthcare, emphasizing its foundational role in research, widespread integration across medical disciplines, and significant applications in healthcare settings. Key points include:

1. **Central Role of AI in Healthcare Research:** AI is highlighted as a pivotal element in healthcare research, with a focus on its capabilities in language processing and generation, as evidenced by the emphasis on "natural language processing," "deep learning," "language models," and the interest in conversational AI and advanced language model development such as "GPT-4."

2. **Integration into Medical Disciplines:** The analysis shows AI's growing influence on various medical fields, including radiology, dentistry, and surgery, suggesting a transformative impact on diagnostic processes, medical practices, and surgical planning through its integration into these areas.

3. **Applications in Healthcare:** AI's role extends to healthcare applications like medical education, telemedicine, and digital health, with a trend towards using AI for educational content creation and curriculum development, indicating its potential to revolutionize medical education and training.

4. **Ethical Considerations:** The growing interest in Generative AI in healthcare underscores the necessity for ethical considerations, including addressing bias, privacy, and transparency to ensure AI's responsible development and implementation, aiming to improve healthcare professionals' knowledge and skills while protecting patient outcomes.

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