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Utilizing Bibliometrics to Understand the Role of Machine Learning in the Current Orthopedic Arthroplasty Literature

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Utilizing Bibliometrics to Understand the Role of Machine Learning in the Current Orthopedic Arthroplasty Literature

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Background: Machine learning technology has been demonstrated to be a very useful tool in current orthopedic research. Furthermore, machine learning has shown to be quite impactful in the field of arthroplasty solving many clinical and scientific problems, leading to greater utilization in retrospective studies. This current study aims to identify machine learning arthroplasty research and predict future hotspots. We hypothesize that the production of current scientific literature on machine learning will be produced by US-based national institutions and will have exponentially grown in the past 5 years.

Methods: Machine learning arthroplasty publications between 1996 and 2023 were identified using the Web of Science Core Collection of Clarivate Analytics. Then bibliometric indicators were obtained and imported for further analysis with VOSviewer and Bibliometrix to identify previous and ongoing trends within this field.

Results: The bibliometric sourcing identified a total of 235 documents that were associated with machine learning applications to arthroplasty. 34 countries published articles on the topic and the United States demonstrated to be the largest contributor. The year 2022 had the highest number of publications produced in a year, totaling 66 articles. A total of 405 institutions across the world had published articles, the most relevant institutions with the highest production were Harvard University and Harvard Medical School with 41 and 34 articles produced respectively. Kwon YM was the most productive author while Haeberle HS and Ramkumar PN are the most impactful based on h-index. Co-occurrence visualization and thematic map identified niche and major themes within the literature.

Conclusions: Machine learning in arthroplasty research continues to show an increasing trend since 2021 with contributions from authors and institutions globally. United States institutions and authors are the leading contributors to machine learning applications in arthroplasty research. This study identifies previous, current, and developing trends within this field for future hotspot development.

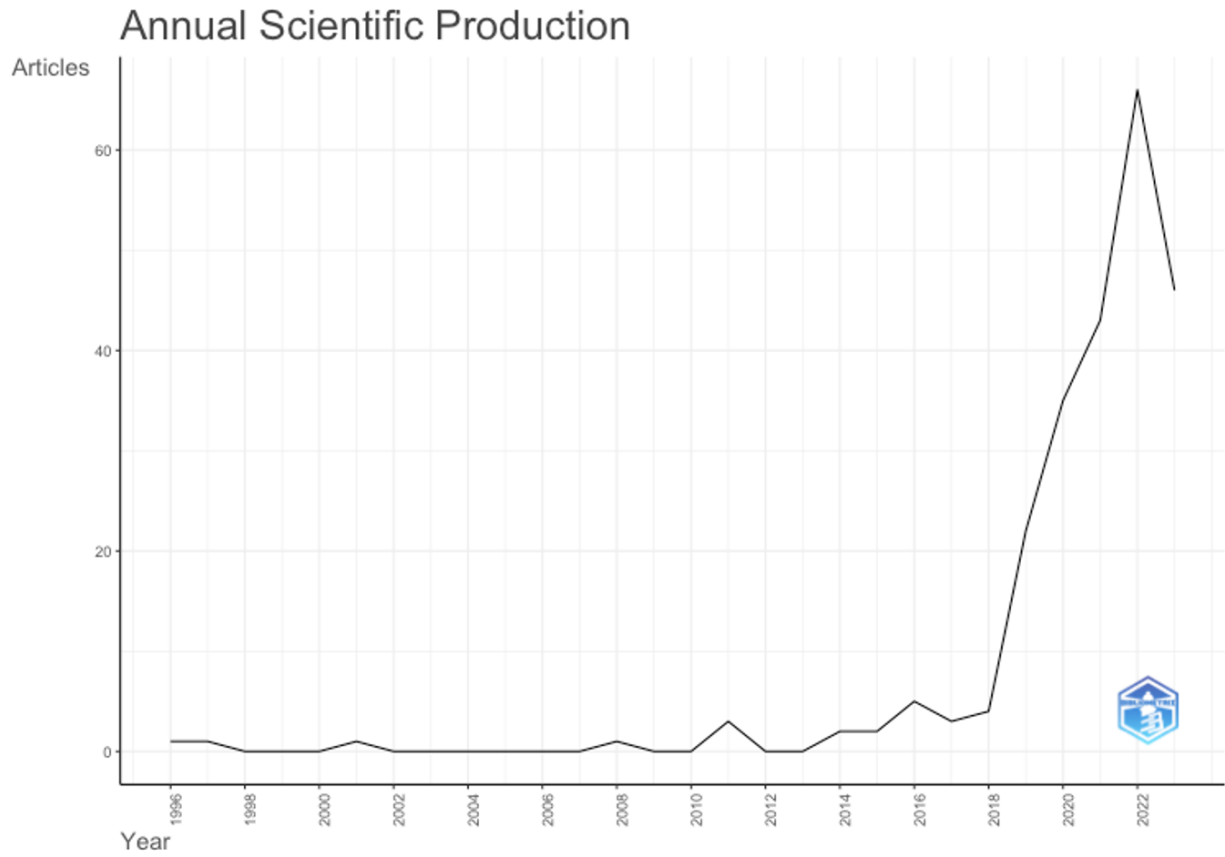


Figure 1: Global annual scientific production with the greatest increase in article production between 2021 and 2022.

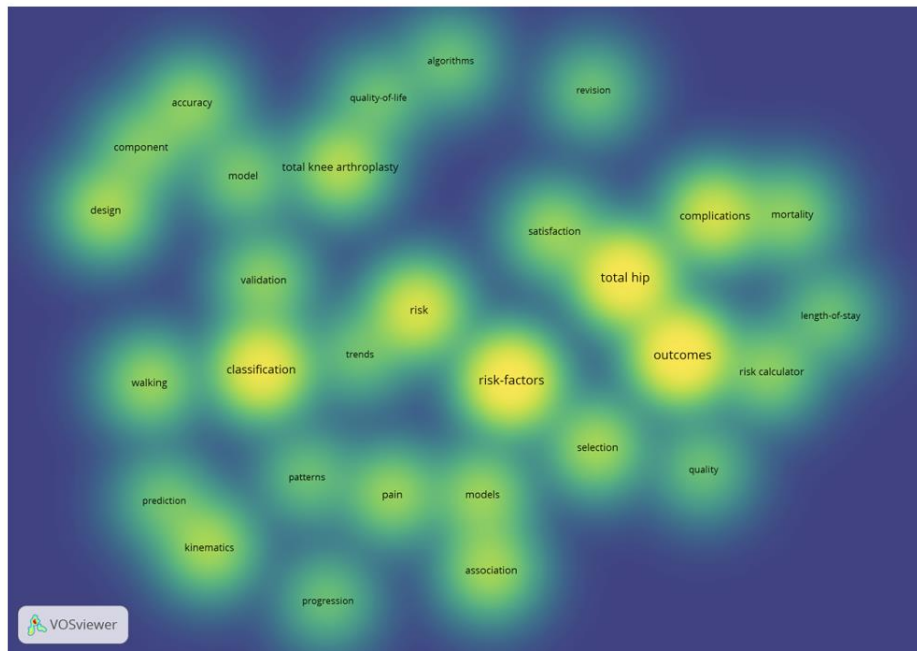
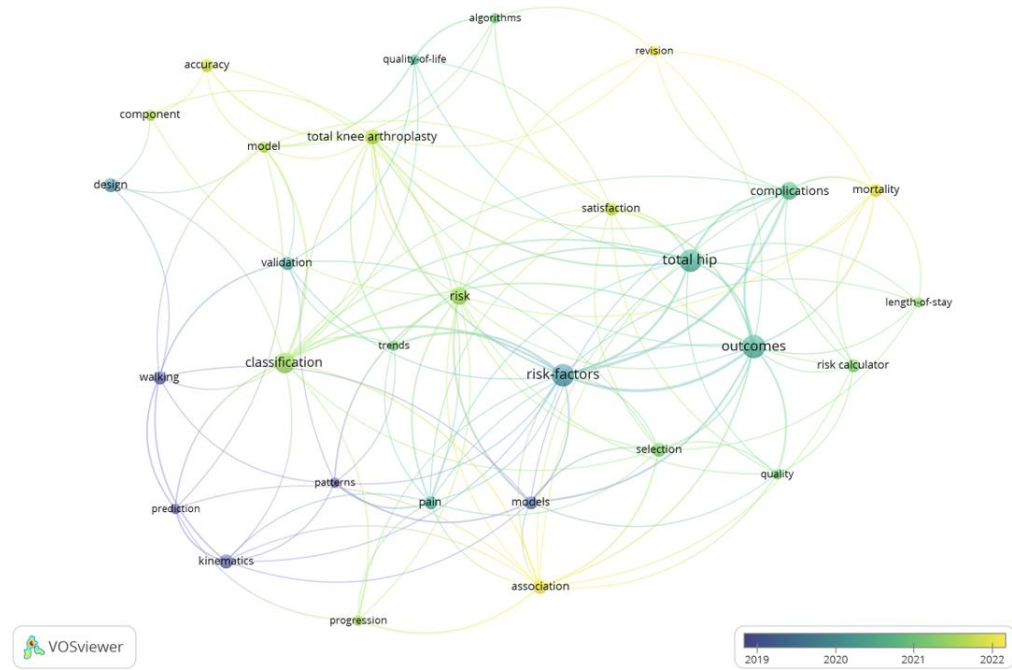


Figure 2: A) Co-occurrence overlay demonstrating thematic keyword development by time. B) Co-occurrence overlay showing cluster by density.