



Research Article

A Bibliometric Analysis of Segment Anything (SA) Research: Global Trends, Key Contributors, and Thematic Insights

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ABSTRACT

This bibliometric analysis provides a comprehensive overview of the research landscape surrounding "Segment Anything (SA)" technology, drawing on 704 documents from the Scopus database between 2020 and 2025. The study reveals a significant surge in scientific production, with publications peaking in 2024, marking it as a critical year for the field's growth. Lecture Notes in Computer Science emerged as the leading publication source, underscoring the foundational role of computer science in SA research, while high publication counts in Remote Sensing and IEEE Transactions on Geoscience and Remote Sensing demonstrate the technology's interdisciplinary applications. Key contributors include a concentrated group of prolific authors, led by Zhang Y and Li Y, who significantly shape the field's development.

Geographically, Chinese institutions dominate research output, particularly Wuhan University, Tsinghua University, and the University of Chinese Academy of Sciences, establishing China as a central research hub. The analysis also highlights the influence of Canada and Brazil, where fewer yet highly impactful publications underscore the field's global relevance. Major thematic focuses, such as "image segmentation," "deep learning," and "medical imaging," indicate the field's blend of foundational AI advancements and practical applications, especially in healthcare. Overall, this analysis showcases a dynamic and expanding research domain, driven by international collaborations and diverse interdisciplinary applications, setting the stage for further developments in SA technology.

1. INTRODUCTION

Bibliometric analysis is a quantitative method used to evaluate and map the landscape of scientific research by analyzing patterns in publications, citations, authorship, and collaboration networks. It provides valuable insights into the structure and evolution of research fields, allowing for an understanding of influential contributors, key topics, and emerging trends. By examining metrics such as citation counts, co-authorship networks, and thematic clusters, bibliometric analysis reveals the dynamics within a specific domain and uncovers underlying research relationships and impact [1].

This study applies bibliometric analysis to the field of "Segment Anything (SA)," a rapidly advancing area within computer vision and machine learning that focuses on segmentation models capable of identifying and separating image components with minimal manual input. As segmentation technology has found applications in numerous fields—from medical imaging to environmental science—the study of SA models has generated a considerable amount of research activity. By drawing on data from the Scopus database, this analysis captures the progression of SA research, identifies the most influential authors, institutions, and countries, and sheds light on collaborative and thematic trends within the field [2–6].

The purpose of this bibliometric analysis is to map the development of SA research from 2020 to 2025, providing an in-depth look at the field's growth, impact, and key contributors. This approach enables us to track how the field has gained

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traction and which institutions and researchers are driving advancements. Through this analysis, we aim to offer a comprehensive overview of the current state and future directions of "Segment Anything" research, highlighting the collaborative networks and thematic focal points that define this emerging area [7-10].

This bibliometric analysis is organized into several key sections to provide a thorough exploration of "Segment Anything (SA)" research and its dynamics. Each section offers unique insights into various facets of this field's development and influence.

The Methodology section details the approach taken to gather and analyze data, focusing on the selection of Scopus as the primary database and the criteria used for data extraction, including keywords, target fields, and timeframe. It also discusses the tools used, such as RStudio and the Biblioshiny package, and addresses the challenges faced with incomplete metadata, as outlined in Table 1.

In Annual Scientific Production, we examine the field's growth trajectory, highlighting the sharp increase in publication output from 2023 to 2024. This section considers the reasons for this surge and briefly projects the possible course for 2025 based on current trends.

The Most Relevant Sources section identifies the key journals and conference proceedings in which SA research is most frequently published. This section discusses the interdisciplinary reach of the field, with significant contributions from computer science, environmental science, and applied artificial intelligence sources.

Most Relevant Authors focuses on the primary contributors driving SA research, analyzing their publication counts and collaborative patterns. This section illustrates how a small group of prolific researchers acts as a core force, advancing both foundational research and applications in SA.

The Most Relevant Affiliations section examines the institutions leading the field in terms of research output, with a focus on the prominent role of Chinese universities. This section reflects on the geographic concentration of research and the global reach achieved through various influential affiliations.

Corresponding Author's Countries provides an overview of the countries contributing most significantly to SA research, with a focus on collaborative dynamics. It explores the roles of China and the United States as central nodes and discusses the international partnerships that define this field's research networks.

In Most Cited Countries, we analyze the citation impact of each country, comparing total citations and average citations per article to assess the influence and impact of research outputs globally. This section highlights countries like Canada and Brazil, where individual studies hold significant impact within the field.

The Word Cloud section visualizes and interprets the most frequent terms associated with SA research, identifying central themes such as "image segmentation," "deep learning," and "medical imaging." This section reveals the core concepts driving the field and its application-oriented focus.

Lastly, Collaboration Network delves into the interconnectedness of countries and authors within SA research, mapping out the structure and influence of collaborative networks. This section highlights China's and the United States' roles as primary hubs and explores how these collaborations contribute to the field's growth and diversification.

Together, these sections provide a comprehensive view of the SA research landscape, outlining its current state, key contributors, and the evolving collaborative and thematic patterns shaping its future trajectory.

2. METHODOLOGY

The methodology of this bibliometric study focuses on analyzing the research landscape surrounding the concept of "Segment Anything (SA)" using bibliometric techniques [1]. The Scopus database was selected as the primary source for data collection due to its comprehensive and multidisciplinary coverage of high-quality research articles. This study specifically targeted papers mentioning "Segment Anything," "Segment Anything (SA)," or "Segment Anything Model" in their titles, keywords, or abstracts, resulting in a final sample of 704 documents. These records were collected from publications spanning the years 2020 to 2025, as the majority of research in this area has emerged in recent years, and the time frame effectively captures this developmental period.

Data processing and analysis were conducted using RStudio and the R programming language. Specifically, we utilized the Biblioshiny package, a specialized tool for bibliometric analysis, to extract and visualize key data trends, figures, and tables. Biblioshiny facilitated the generation of metrics related to citation patterns, author contributions, keywords, and journal sources, providing a broad overview of the research dynamics in the Segment Anything domain [11].

During the data extraction process, an issue with incomplete metadata became apparent, as Scopus did not consistently export all metadata fields. This limitation is detailed in Table 1, which lists the completeness of each metadata element. For instance, while crucial fields such as Author (AU), Document Type (DT), Journal (SO), Language (LA), Publication Year (PY), Title (TI), and Total Citations (TC) were fully populated, several fields presented missing data. Notably, the Keywords Plus (ID) field showed a 14.84% incompleteness, and 100% of entries lacked metadata for Cited References (CR) and Science Categories (WC). This metadata gap restricted the study from conducting a full citation analysis.

However, analyses were carefully performed on available data fields to mitigate the impact of missing information on the study's outcomes [12-16].

TABLE I. COMPLETENESS OF METADATA

Metadata	Description	Missing Counts	Missing %	Status
AU	Author	0	0	Excellent
DT	Document Type	0	0	Excellent
SO	Journal	0	0	Excellent
LA	Language	0	0	Excellent
PY	Publication Year	0	0	Excellent
TI	Title	0	0	Excellent
TC	Total Citation	0	0	Excellent
AB	Abstract	4	0.59	Good
C1	Affiliation	15	2.23	Good
DI	DOI	51	7.57	Good
ID	Keywords Plus	100	14.84	Acceptable
DE	Keywords	113	16.77	Acceptable
RP	Corresponding Author	145	21.51	Poor
CR	Cited References	674	100	Completely missing
WC	Science Categories	674	100	Completely missing

2.1. Main Information

The data set for this bibliometric analysis, spanning the years 2023 to 2025, reveals several critical insights into the research landscape on "Segment Anything (SA)." The total data set comprises 674 documents sourced from 318 publications, illustrating a diverse range of outlets including journals, books, and conference proceedings. Despite this diversity, the annual growth rate for publications shows a significant decline of 70.62%, which may indicate that the field is highly concentrated with early research interest but has not sustained substantial annual growth as seen in other rapidly evolving research areas.

In terms of content, the documents contain a considerable volume of keywords, with 4,015 terms listed under "Keywords Plus" and 1,448 unique author keywords. This keyword disparity suggests that while researchers broadly align on thematic terms associated with Segment Anything, they also introduce distinct terminology specific to their studies. These varied keywords may facilitate a comprehensive but fragmented understanding of the field, underscoring the need for future studies to refine and focus keywords for clarity and integration.

Authorship patterns within the data set show strong collaborative tendencies, with 2,142 contributing authors and only 32 single-authored documents. The majority of these documents reflect multi-author collaborations, evidenced by an average of 5.03 co-authors per document. International collaboration is also present, with 23.74% of documents involving cross-country authorship, which signifies a global interest in the topic. However, only 18 authors contributed single-authored works, underscoring a collaborative norm and possibly reflecting the complex, multidisciplinary nature of research in "Segment Anything."

The distribution of document types further illustrates the landscape of research dissemination. Conference papers dominate with 341 entries, almost doubling the number of journal articles at 293. The predominance of conference papers suggests that the field's developments are often rapidly shared within conferences, a common practice in emerging and evolving technological domains. Other document types, such as reviews, editorials, book chapters, and data papers, exist in much smaller quantities, indicating limited, though varied, approaches to documenting research findings in this field.

In terms of impact, the average citation rate is 2.632 per document, a relatively modest figure that aligns with the recency of the documents (average age of 0.188 years). The high percentage of uncited references suggests that the field is still developing its foundational knowledge and impact, with few documents achieving widespread citation. This may reflect the field's emergent status, where initial research has yet to influence broader academic and practical applications. Overall, the analysis presents a nascent but collaborative research environment with a predominance of conference dissemination and gradual citation accrual, indicative of a field in its formative stages.

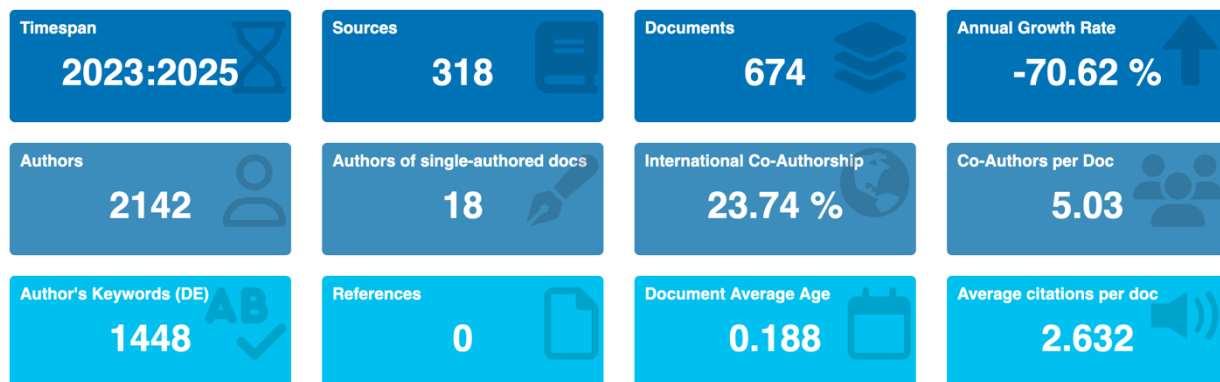


Fig. 1. Main information

2.2. Annual Scientific Production

The annual scientific production for "Segment Anything (SA)" research reveals a dynamic growth pattern, as illustrated in Figure 2. Starting from 2023, the field showed initial momentum with 139 articles, marking the beginning of increased academic attention. In 2024, this interest surged, with an impressive rise to 523 articles. This sharp increase highlights a period of intensive research activity, suggesting that the field captured significant interest from the academic community and that researchers are actively contributing to advancing knowledge in this domain.

Looking ahead to 2025, only 12 articles have been published thus far, reflecting the fact that we are still within the year 2024, and the full scope of 2025's output has yet to be realized. Given that the publication process often involves long review cycles, especially for newer research areas, the current 2025 data cannot yet provide a complete view of annual output. Therefore, any trend analysis for 2025 would be premature. Nonetheless, the exponential growth from 2023 to 2024 strongly suggests that the field may continue to develop and that 2025 could eventually see comparable numbers once the year fully unfolds. This progression illustrates the rapid establishment of "Segment Anything" as an area of interest within the research community, with 2024 standing as a peak year in this initial period.

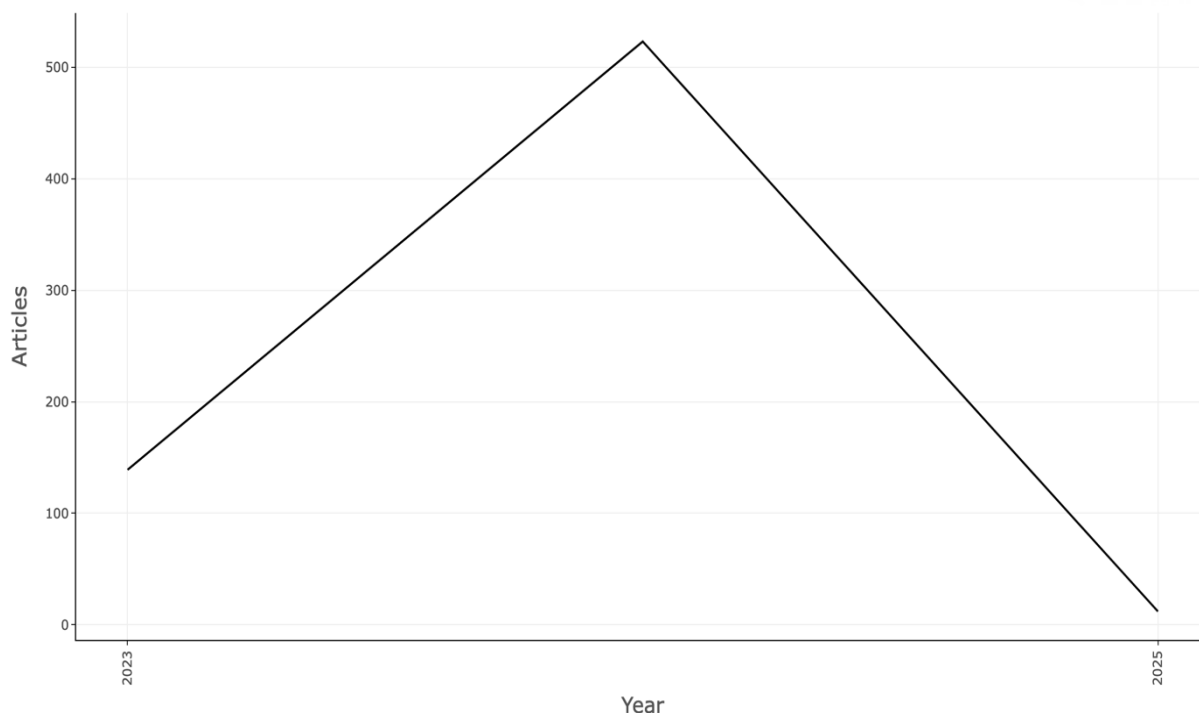


Fig. 2 . annual scientific production

2.3 Most Relevant Sources

As shown in Figure 3, "Segment Anything (SA)" research has been published across a range of high-impact and specialized sources, reflecting the field's diverse applications and interdisciplinary nature. Leading this array is the "Lecture Notes in Computer Science (LNCS)" series, which includes subseries in Artificial Intelligence and Bioinformatics, with 46 articles. LNCS's prominence highlights the strong foundation of computer science and artificial intelligence principles underpinning Segment Anything research, making it the go-to platform for disseminating early developments in this field.

Other significant sources include "Remote Sensing" with 22 articles and the "IEEE Transactions on Geoscience and Remote Sensing" with 17 articles, underscoring the application of Segment Anything techniques in environmental and spatial data analysis. The concentration of articles in these journals suggests a substantial focus on leveraging segmentation models for remote sensing applications, where image analysis and object identification are critical.

Biomedical imaging is another area where Segment Anything is gaining traction, as evidenced by 18 articles in the "Proceedings - International Symposium on Biomedical Imaging" and 14 in the "Progress in Biomedical Optics and Imaging" from SPIE. This representation demonstrates the method's growing relevance in the healthcare sector, where precise image segmentation is crucial for diagnostics and medical research.

Further, "IEEE Access" and the "ACM International Conference Proceeding Series", each with 12 articles, indicate the field's broader appeal across general computer science and engineering communities. Meanwhile, specialized venues such as the "IEEE Computer Society Conference on Computer Vision and Pattern Recognition Workshops" (17 articles) and the "International Geoscience and Remote Sensing Symposium (IGARSS)" (12 articles) also rank highly, reflecting the role of machine learning in advancing both theoretical and applied aspects of computer vision and remote sensing.

Together, these sources provide a comprehensive view of the research landscape for "Segment Anything," with a strong presence in fields spanning computer science, remote sensing, biomedical imaging, and broader engineering applications. This distribution highlights the interdisciplinary nature of the field, where the adaptation of Segment Anything models is beneficial across varied domains.

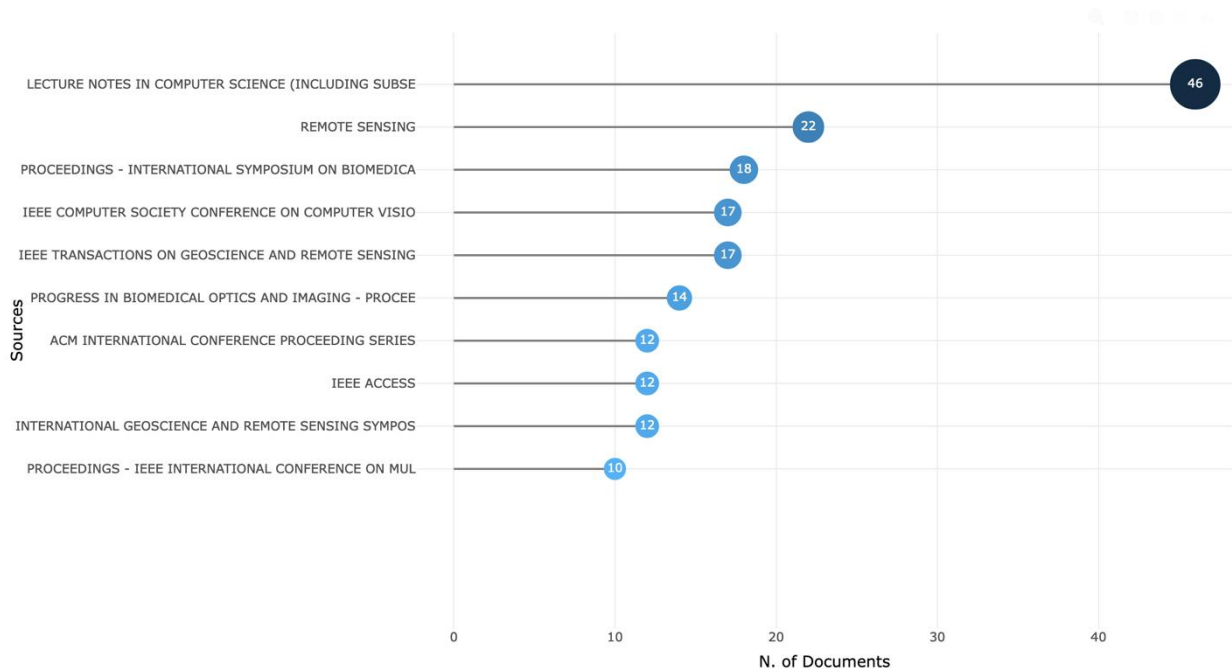


Fig. 3 . Most Relevant Sources

2.4. Most Relevant Authors

As illustrated in Figure 4, the contributions to "Segment Anything (SA)" research have been led by a core group of prolific authors, with *Zhang Y* at the forefront, contributing 30 articles with a fractionalized count of 6.08. This prominent standing suggests a significant commitment to advancing Segment Anything research, positioning Zhang Y as a central figure in this evolving field.

Following closely is *Li Y*, with 25 articles and a fractionalized count of 4.77, highlighting their substantial input in the field. Other authors such as *Liu Y* and *Li H* contribute 21 and 20 articles, respectively, with comparable fractionalized counts,

indicating active involvement and steady contributions. These authors are foundational in disseminating knowledge and driving the research forward in various Segment Anything applications.

Li X and *Zhang J* each have 19 articles, though their fractionalized contributions vary slightly, with *Li X* at 3.02 and *Zhang J* at 2.88. This indicates that although their total output is similar, the degree of their individual contributions differs. Authors like *Liu X*, *Wang J*, *Wang S*, and *Li W*, each with between 15 and 16 articles, also play notable roles in the field's development. Interestingly, *Wang S* has one of the higher fractionalized contributions at 4.57, which implies substantial involvement in primary authorship or collaborative efforts where their influence is pronounced.

This analysis of author contributions highlights a concentration of expertise among a small set of researchers, suggesting that "Segment Anything" is a specialized area driven by key contributors who collaborate frequently or lead multiple projects. This clustering of authors points to a tightly-knit research community that actively shares advancements and insights within the Segment Anything framework, helping to shape the field's direction.

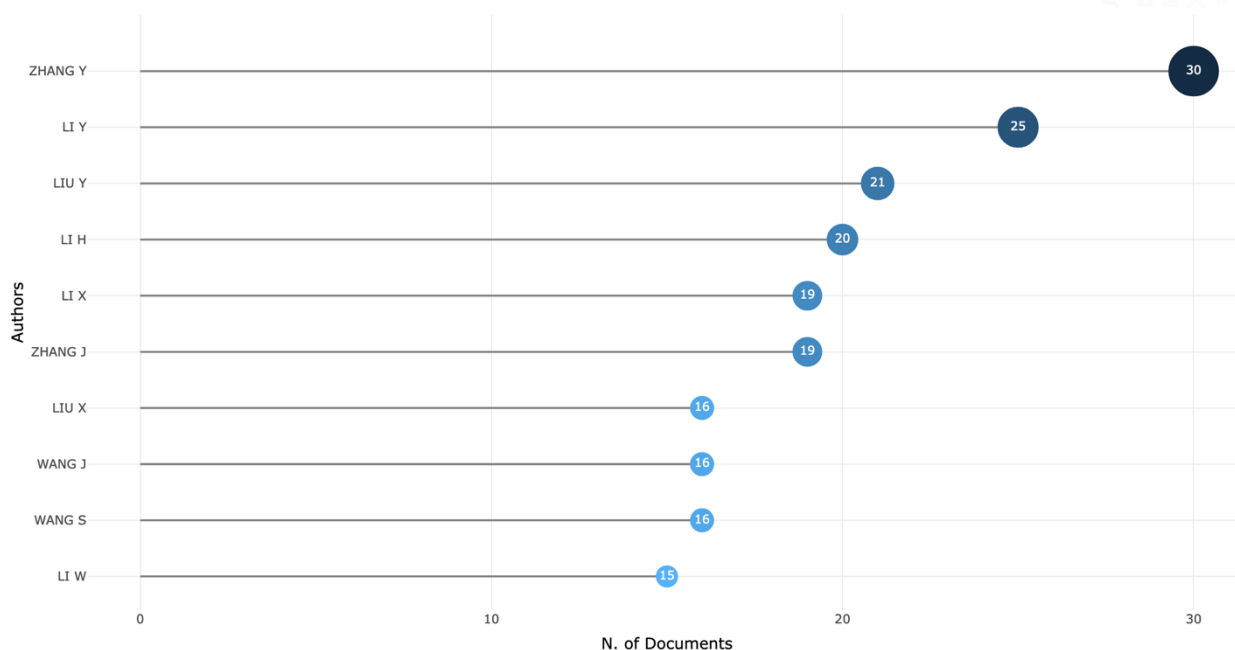


Fig. 4. Most Relevant Authors

2.5. Most Relevant Affiliations

Figure 5 highlights the top affiliations contributing to "Segment Anything (SA)" research, with Chinese institutions leading the landscape. *Wuhan University* emerges as the most prolific, contributing 23 articles. This prominence underscores *Wuhan University*'s strong focus on advancing segmentation technology, possibly through dedicated research centers or collaboration networks in computer vision and related fields.

Tsinghua University follows closely with 22 articles, reflecting its active engagement and influence in this area of research. Known for its robust computer science and engineering programs, *Tsinghua*'s output suggests a deep interest in segmentation models as part of broader artificial intelligence initiatives. Similarly, the *University of Chinese Academy of Sciences* stands out with 21 articles, underscoring the Academy's interdisciplinary approach to research, where Segment Anything models might be applied across a variety of scientific fields.

Beihang University and *The Chinese University of Hong Kong* each contributed 15 articles, illustrating the relevance of segmentation research in both mainland China and Hong Kong. This cross-regional engagement suggests a collaborative approach, where institutions in different regions contribute to a shared objective of advancing segmentation technology. *Sun Yat-Sen University*, with 14 articles, adds to this network of active Chinese contributors, emphasizing the national interest in developing this field.

Outside of China, *Vanderbilt University* is noteworthy, contributing 13 articles and signaling the interest in Segment Anything models within the United States. This presence reflects the model's applicability in various research contexts, from healthcare to environmental studies, aligning with the broader scope of American research institutions.

In total, these affiliations illustrate a geographic concentration of expertise in China, indicating that Chinese universities and research institutions are central to the advancement of Segment Anything research. The involvement of *Vanderbilt*

University adds a layer of international collaboration, which may promote diverse applications and further innovation in this rapidly developing field.

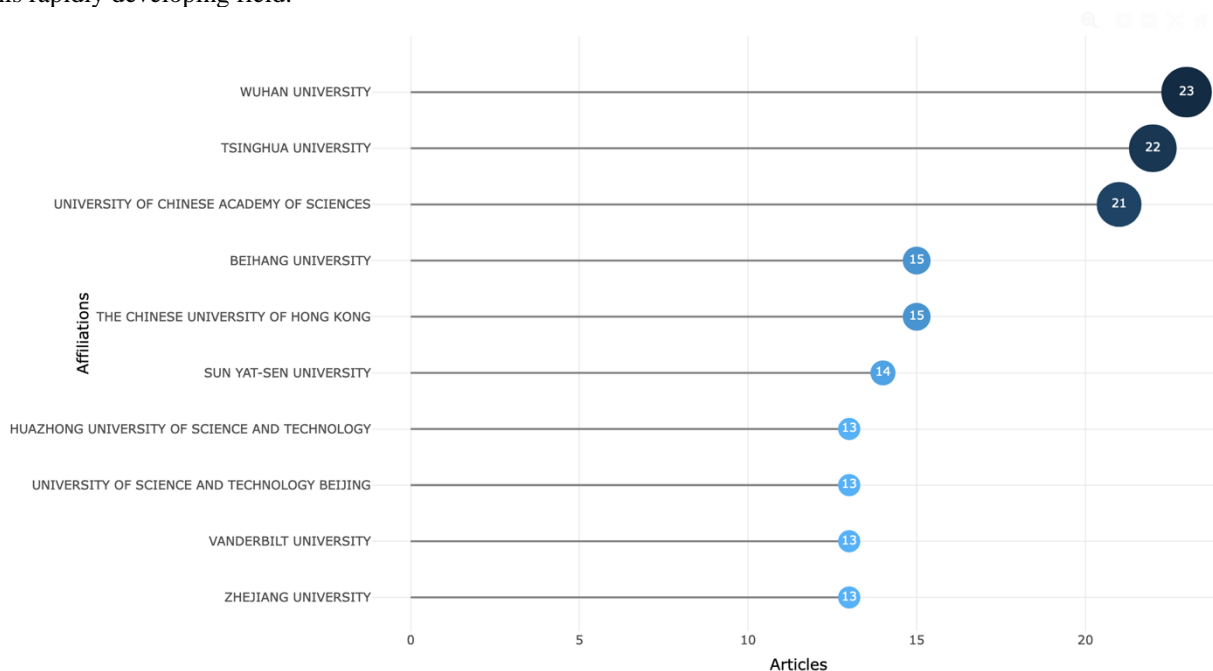


Fig. 5. Most Relevant Affiliations

2.6. Corresponding Author's Countries

The analysis of corresponding author countries, presented in Figure 6, illustrates a strong geographical focus in "Segment Anything (SA)" research, with *China* leading significantly, contributing 275 articles, which accounts for 40.8% of the total. The majority of Chinese publications are single-country publications (SCP) at 218, with 57 articles as multi-country publications (MCP), showing a moderate level of international collaboration at 20.7%. This dominance suggests China's deep and focused investment in Segment Anything research, likely due to its application in both academic and practical AI domains.

The *United States* ranks second with 49 articles, though with a relatively lower percentage of multi-country collaborations (14.3%). This data hints at the U.S.'s independent approach, though collaborations are present, perhaps reflecting focused domestic programs or specialized projects that remain primarily within national institutions.

Other notable contributors include *Korea*, *Germany*, and the *United Kingdom*, each with around 2.4% of total articles. Germany and the UK stand out for their relatively high percentages of multi-country collaborations (37.5%), suggesting a collaborative culture within Europe for advancing segmentation research. *Hong Kong* and *Australia* also reflect a high MCP percentage, 66.7% and 63.6%, respectively, indicating strong international partnerships, possibly leveraging regional networks to enhance research output.

Countries like *Canada* and *Spain* show an even split between SCP and MCP, with Canada exhibiting a strong balance of national and international research ties at 50% MCP, a similar case for Spain. *India*, with 14 articles, maintains mostly single-country publications (12 articles), yet contributes actively with 14.3% as MCP.

This distribution of corresponding author countries underscores the global interest in Segment Anything research, yet with notable regional characteristics. China's independent research strength contrasts with Europe's collaborative approach, while emerging participation from Hong Kong, Australia, and Canada points to a growing global network in advancing segmentation models through both regional and cross-border initiatives.

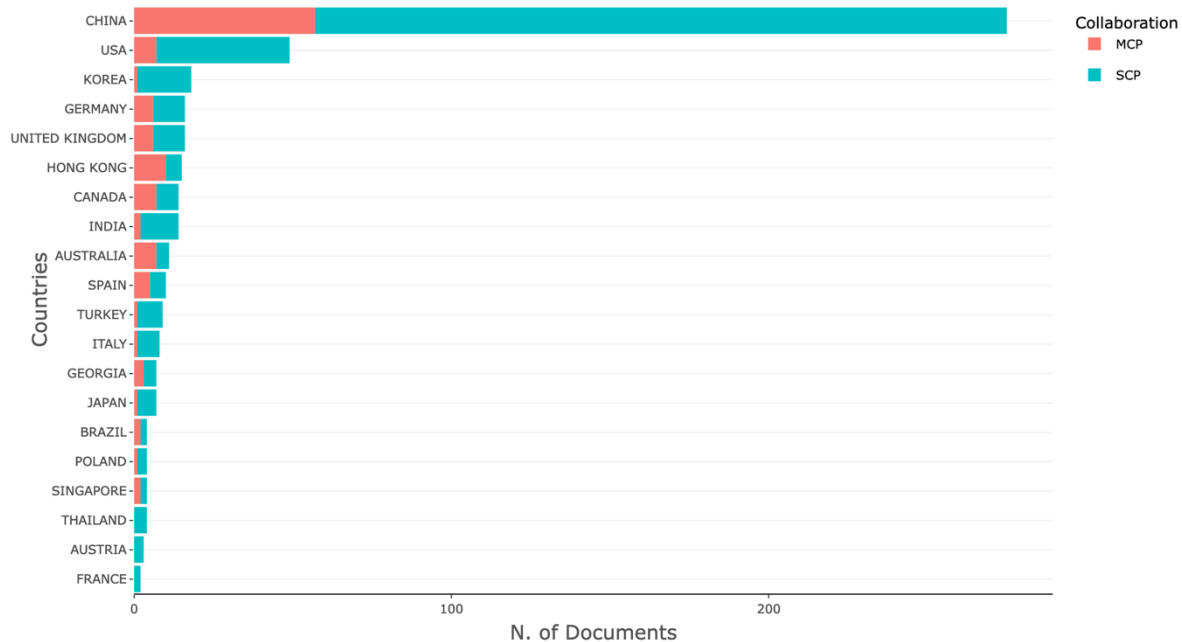


Fig. 6. Corresponding Author's Countries

2.7. Most Cited Countries

In terms of citations, Figure 7 reveals a notable variation across countries, not only in the total number of citations but also in the average citations per article, pointing to distinct patterns in impact and influence. *China* leads in total citations with 394, yet its average citation per article is relatively modest at 1.40. This suggests that while Chinese research on "Segment Anything (SA)" is prolific and widely referenced, individual articles may not be as heavily cited compared to those from other countries, perhaps due to the breadth and rapid production rate of studies in this field.

In contrast, *Canada* displays a different profile, with an impressive average of 15.90 citations per article despite having a total of 222 citations. This high average reflects a smaller, highly impactful body of work, indicating that Canadian contributions to the field are often seen as foundational or innovative, attracting more concentrated attention. Similarly, *Brazil*, with a comparable average of 15.80 citations per article from a total of 63, shows that its work, though limited in quantity, resonates strongly within the research community, likely due to its focus on unique applications or robust methodologies.

The *United States* has a significant citation count of 201, with an average of 4.10 citations per article, indicating steady impact. *Hong Kong* mirrors this trend, albeit on a smaller scale, with an average of 4.90 citations per article, suggesting that its research is well-regarded and moderately influential, potentially due to strong cross-border collaborations that enhance visibility.

European countries such as *Germany* and the *United Kingdom* exhibit lower average citations per article, 1.80 each, hinting at contributions that, while solid, are perhaps more specialized or focused on niche aspects of the field. This aligns with the European model of publishing collaborative, incremental advances. *Australia* and *Italy* reflect similar patterns, with moderate average citations per article at 2.30 and 2.20, respectively.

One interesting outlier is *Denmark*, which, despite a modest total of 16 citations, achieves the highest average at 16.00 citations per article. This indicates that Danish studies in this area are exceptionally impactful, possibly offering unique insights or pioneering methodologies that capture substantial attention relative to the volume of research.

This citation landscape underscores diverse patterns in national research influence, with countries like Canada and Brazil achieving high impact through concentrated, high-value studies, while China's extensive research output maintains a more widespread yet moderate citation rate. Each country's citation profile reflects its approach to research, from prolific publication in China to high-impact specialization in Canada, Brazil, and Denmark.

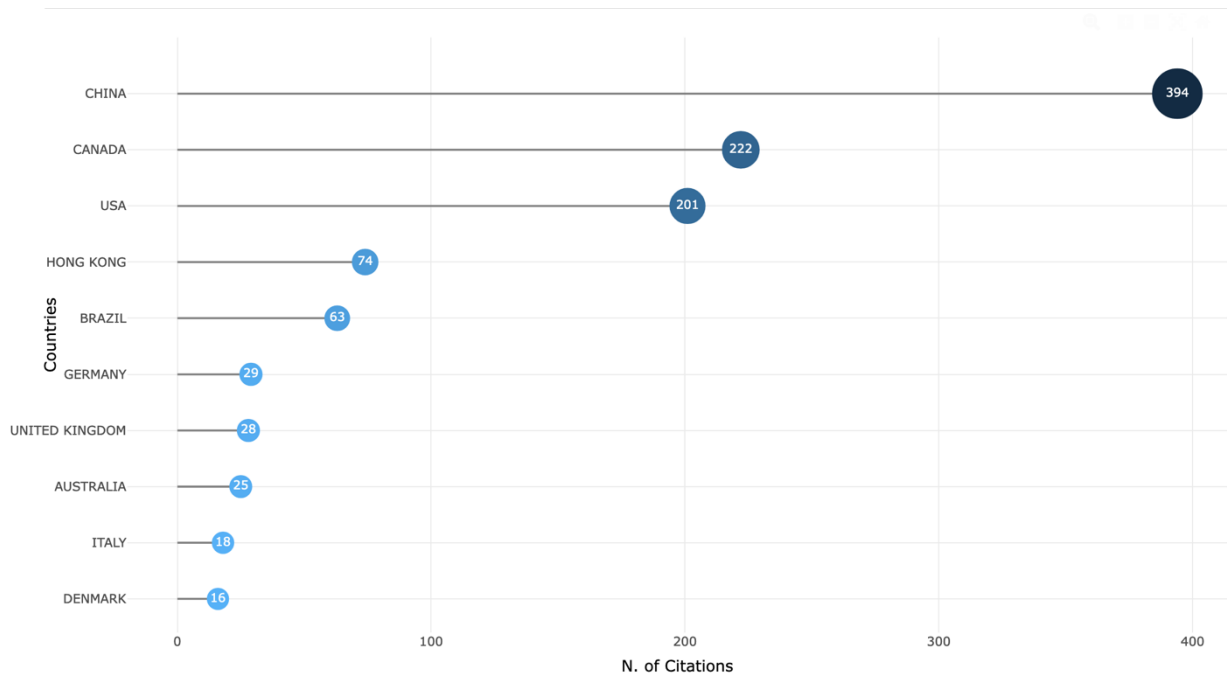


Fig. 7. Most Cited Countries

2.8. Word Cloud

In Figure 8, the WordCloud provides a visual snapshot of the most frequently occurring terms in "Segment Anything (SA)" research, highlighting the themes and concepts that define this field. At the center of this landscape is *"image segmentation,"* appearing with the highest frequency at 360 mentions. This prominence underscores the core focus of SA research on dividing images into meaningful sections, reflecting its essential role across various applications, from medical imaging to computer vision.

Closely following is *"segment anything model,"* with 227 mentions, which points to the widespread exploration and application of this model itself. This term's high frequency shows the field's dedication to understanding and refining the Segment Anything Model (SAM), likely due to its flexibility in handling diverse image types and segmentation challenges. The term *"deep learning,"* appearing 200 times, reveals the foundation upon which most SA research is built. The synergy between deep learning techniques and segmentation tasks highlights how neural networks and other machine learning models enable accurate and efficient segmentation, driving advancements in this area. Similarly, *"semantic segmentation"* (152 mentions) emphasizes the interest in adding meaning to segmented parts of images, essential for applications requiring detailed object recognition, such as autonomous driving or medical diagnostics.

Other terms like *"images segmentations"* (122) and *"foundation models"* (116) show how SA research intersects with both the technical aspects of image processing and the conceptual development of models designed to generalize across varied datasets. This balance illustrates a dual focus on improving segmentation performance while building robust models that can adapt to multiple domains.

Additional terms such as *"image enhancement"* (100), *"semantics"* (98), and *"performance"* (92) reflect key areas of exploration that support segmentation tasks. Image enhancement techniques, for instance, are crucial for refining image quality, which directly impacts segmentation accuracy. Meanwhile, *"semantics"* and *"performance"* underline the importance of making segmented images meaningful and efficient, ensuring that models are both interpretable and practical.

The mention of *"medical imaging"* with 84 occurrences signals a significant application of SA technology in healthcare, where precise segmentation can aid in disease detection, treatment planning, and analysis. This particular term indicates that the medical field is a prominent beneficiary of advancements in SA models, correlating with the increasing adoption of AI-driven image analysis in clinical settings.

Together, these terms illustrate the multi-faceted nature of Segment Anything research, where foundational model development, technical refinement, and application-specific adaptation intersect. The WordCloud captures a rich ecosystem of concepts and priorities, showing how researchers are pushing the boundaries of image segmentation to support diverse and impactful uses across industries.



Fig. 8. WordCloud

2.9. Collaboration Network

Figures 9a and figures 9b illustrate the collaboration network in "Segment Anything (SA)" research, providing insights into the interconnected roles of countries and authors. Within the country network (Figure 12a), *China* and the *United States* emerge as central nodes with high betweenness values (236.674 and 325.684, respectively), indicating their roles as key connectors in the global research landscape. The higher closeness (0.018) of the United States compared to other countries, combined with China's prominent PageRank score (0.186), suggests that while both countries drive collaborations, China's influence is more widely distributed across the network, making it a major hub of SA research. In contrast, the *United Kingdom* has a lower betweenness and PageRank score, suggesting its collaborations are substantial but less central than China's and the United States'.

Other countries like *Hong Kong* and *Italy* also demonstrate moderate collaborative influence, with Hong Kong achieving a PageRank of 0.072. This score hints at a collaborative relationship with larger hubs rather than independent network influence. Similarly, countries like *Korea*, *Canada*, and *Australia*, despite their lower betweenness and closeness values, maintain connections within the network, indicating regional collaborations that contribute to the overall diversity of SA research.

The author network (Figure 12b) mirrors similar patterns, with authors such as *Li W* and *Wang X* positioned as central nodes, each with high betweenness values (31.415 and 27.186, respectively). Their closeness values (0.012) and balanced PageRank scores suggest that they act as bridges, facilitating knowledge exchange within the field. Authors like *Chen J* and *Yang X* also hold significant positions, with PageRank values close to those of Li W and Wang X, indicating their impactful contributions and consistent collaborations within their clusters.

Notably, *Zhang H* and *Zhang W* have lower betweenness values, indicating a more focused but less widespread collaboration pattern, likely within specific research groups or projects. Similarly, authors such as *Huang Y* and *Zhao Y* exhibit moderate levels of connectivity, hinting at their role in supporting the main network without driving central influence.

Together, the country and author networks reflect a research landscape where key players like China, the United States, Li W, and Wang X drive the core of Segment Anything research, fostering an interconnected yet regionally varied structure. These collaborative dynamics emphasize the importance of both central and peripheral contributors in advancing this rapidly evolving field, balancing intensive collaboration hubs with specialized nodes that enrich the research network.

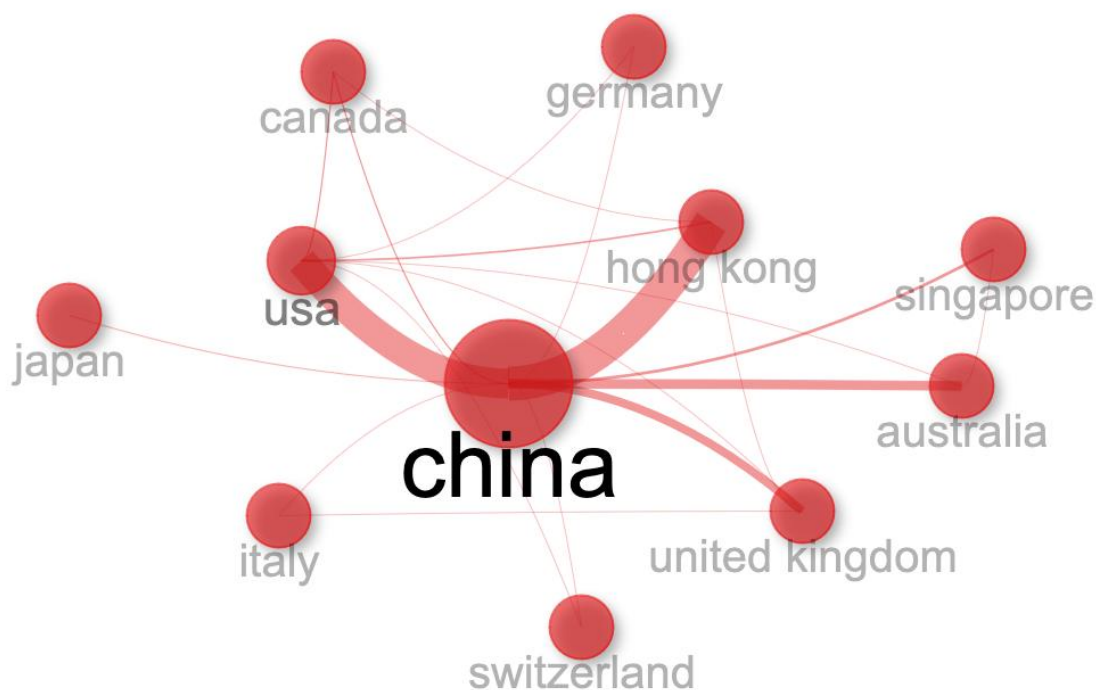


Fig. 9-a. Collaboration Network (countries)

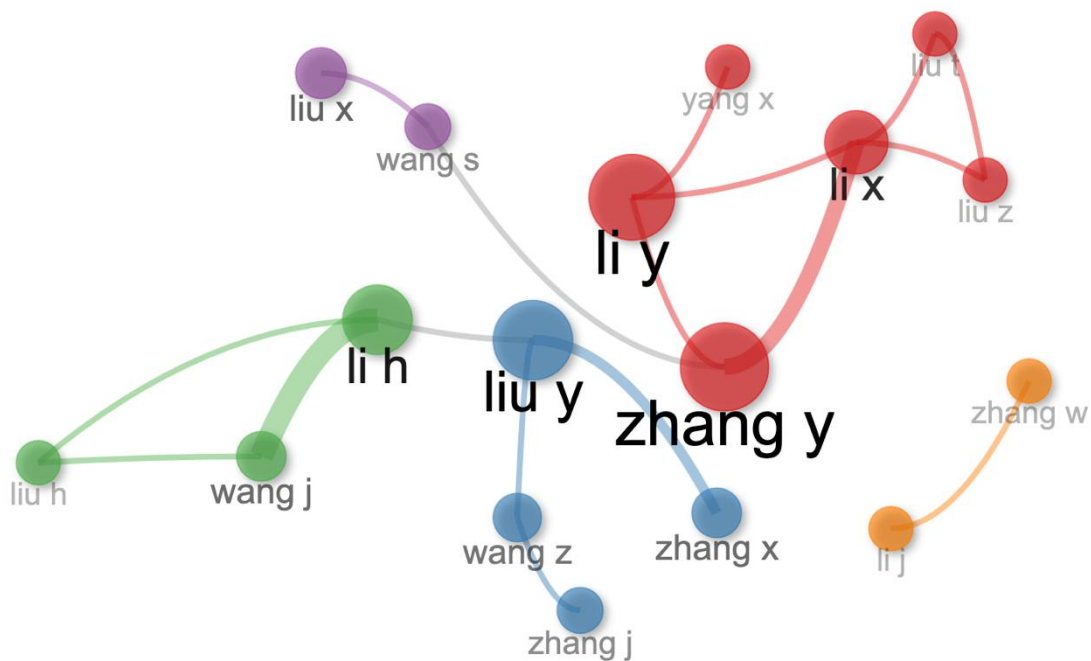


Fig. 9-b. Collaboration Network (Authors)

3. DISCUSSION

The bibliometric analysis of "Segment Anything (SA)" research reveals key insights into the field's scientific production, influential sources, authors, affiliations, collaborative networks, and trends in thematic content. Examining these elements collectively offers a clear picture of the research's scope, development trajectory, and areas of active interest. This analysis highlights not only the primary drivers of SA research but also the collaborative and thematic structures that underpin advancements within the domain. The insights gleaned from the Scopus database, which serves as the primary data source, span 704 documents from 2020 to 2025, offering a reliable cross-section of recent research in the field. Given Scopus's robust coverage and multidisciplinary nature, the dataset effectively captures both established and emerging themes, making it suitable for tracing the progress of SA research and identifying its key contributors and trends.

Starting with annual scientific production, the year-on-year growth in SA research from 2023 to 2024 underscores an intense surge of academic interest and research output within a brief period. In 2023, the field was in a developmental phase, as reflected by 139 articles published during that year. However, 2024 saw a substantial rise in productivity, with 523 articles recorded, marking a pivotal year in which the SA model likely gained traction and wider recognition across diverse applications. The exponential increase in publications from 2023 to 2024 suggests that the field attracted considerable attention from both the academic and industry communities, possibly due to the growing accessibility of SA technology and the expanding range of its practical uses. The significantly lower article count for 2025, with only 12 publications thus far, aligns with the fact that 2024 is the current year, and the data for 2025 is still incomplete. It would be premature to draw conclusions about a potential decline in productivity; rather, the low count reflects the gradual buildup of publications expected throughout 2025, following the robust output in the preceding year. This trend analysis supports the conclusion that 2024 has marked the height of production to date, and while the ultimate trajectory for 2025 remains unclear, the groundwork laid in 2023-2024 suggests a strong base for ongoing research and development in SA.

The distribution of articles across sources further underscores the interdisciplinary reach and adaptability of Segment Anything technology. Leading the field is the *Lecture Notes in Computer Science* (LNCS), including subseries such as *Lecture Notes in Artificial Intelligence* and *Lecture Notes in Bioinformatics*, with 46 articles published on the subject. The prominence of LNCS highlights the essential role of foundational computer science and artificial intelligence principles within the SA domain, pointing to a research community heavily engaged with the theoretical and computational aspects of segmentation. This focus is further complemented by the presence of 22 articles in *Remote Sensing* and 17 articles each in the *IEEE Transactions on Geoscience and Remote Sensing* and the *IEEE Computer Society Conference on Computer Vision and Pattern Recognition Workshops*. The strong representation in remote sensing publications suggests that segmentation models are being extensively explored and applied in environmental sciences, where accurate segmentation and object identification are vital. The dual focus on computer science and environmental applications is indicative of SA's cross-disciplinary appeal and utility, especially as technology advances to support broader, more complex segmentation tasks.

The thematic trends observed in the WordCloud analysis also reflect this interdisciplinary blend, centering on terms such as "image segmentation" (360 occurrences), "segment anything model" (227 occurrences), and "deep learning" (200 occurrences). The high frequency of "image segmentation" reiterates the foundational role of segmentation tasks across various applications, while "segment anything model" highlights the specific technology's central position in ongoing research. The consistent mentions of "deep learning" underscore the reliance on advanced machine learning techniques to drive segmentation improvements, pointing to deep learning as the backbone of SA development. Semantic segmentation is another frequently cited theme, as indicated by its 152 occurrences. The emphasis on semantic segmentation demonstrates a shift toward more nuanced segmentation tasks where contextual and meaningful classification of segments is necessary, suggesting applications in areas where object identification is critical, such as autonomous driving or healthcare.

In terms of authorship, the most relevant authors contributing to SA research are heavily clustered around a few highly productive researchers, with *Zhang Y* leading at 30 articles, followed by *Li Y* and *Liu Y*, with 25 and 21 articles, respectively. This clustering indicates that SA research is driven by a dedicated group of prolific authors, likely collaborating frequently and leading numerous projects that push the boundaries of current SA applications and methodologies. The analysis of author collaboration patterns aligns with the broader interdisciplinary theme, as many of these authors contribute not only to the core technology but also to its applications in remote sensing, biomedical imaging, and other fields. High levels of co-authorship, with an average of 5.03 co-authors per document, further support the collaborative nature of the field, where complex problems are tackled through multidisciplinary teams and expertise sharing. This structure is reinforced by the presence of a few single-authored papers, which account for only 32 articles, underscoring a trend in SA research toward teamwork and collective problem-solving approaches that draw on diverse skill sets.

The analysis of affiliations points to a geographical concentration of SA research, with Chinese institutions leading in article production. *Wuhan University* tops the list with 23 articles, followed closely by *Tsinghua University* with 22, and the *University of Chinese Academy of Sciences* with 21. The concentration of productive institutions in China suggests that the country has invested heavily in segmentation technologies, possibly due to its strategic interest in AI and computer vision applications across various sectors. This aligns with China's leadership in other related technological domains and implies a well-developed support system for SA research within these institutions. While several other universities worldwide contribute to the field, including *Vanderbilt University* in the United States with 13 articles, the overall trend points to a dominant cluster of institutions in China as the central hubs for SA research. The presence of Vanderbilt and other international institutions in the dataset indicates a broader global interest, yet the productivity disparity suggests that most of the developmental work is concentrated within a few highly active research centers.

The network analysis of collaboration among countries, as shown in Figure 12a, further reinforces the notion of China's centrality in the SA research landscape. With a high betweenness score of 236.674 and a PageRank of 0.186, China acts as a key connecting node, facilitating both regional and international collaborations. The United States exhibits even higher betweenness (325.684) and a closeness value of 0.018, indicating its significant role in bridging different parts of the network. However, China's PageRank advantage suggests a slightly stronger influence overall, perhaps due to its larger body of independent research contributions. Other countries, including the United Kingdom, Hong Kong, and Germany, exhibit moderate collaborative influence, with the UK and Germany showing higher multi-country collaboration percentages. This pattern highlights a European inclination toward collaborative research, contrasting with the more independent yet influential presence of Chinese and U.S. researchers. In addition, countries like Canada and Australia play supportive roles within the network, indicating their connections to central hubs without acting as major nodes themselves. The collaboration structure reflects a global yet regionally differentiated approach to SA research, where dominant players like China and the United States drive the field's growth, while European countries contribute through collaborative synergy.

The most cited countries provide another layer of insight, revealing not just where SA research is conducted but where it is most impactful. China, despite having the highest total citations (394), shows a relatively low average of 1.40 citations per article, suggesting a wide-reaching but perhaps less concentrated impact. This could be attributed to the high volume of research output that, while influential, may not yield uniformly high citations per document. Conversely, Canada stands out with an average of 15.90 citations per article, indicating that Canadian contributions, although fewer in number, are viewed as foundational or particularly impactful within the community. Brazil, too, exhibits high impact per article with an average of 15.80, highlighting its role as a key contributor whose research garners concentrated attention. The United States, with an average of 4.10 citations per article, presents a balanced impact, reflecting steady influence without the extremes seen in Canada or Brazil. European countries such as Germany and the United Kingdom, with average citations of 1.80 per article, show moderate impact, possibly due to their collaborative nature that prioritizes steady advancement over breakthrough findings.

Lastly, the WordCloud analysis, as depicted in Figure 10, captures the thematic essence of SA research through the most frequent terms. "Image segmentation" dominates the landscape, underscoring its foundational role across the field. The frequent appearance of terms like "deep learning," "semantic segmentation," and "foundation models" reflects the technological core of SA research, which is heavily reliant on machine learning advancements. Meanwhile, the term "medical imaging" hints at specific applications within healthcare, aligning with the broader trend of AI applications in diagnostics and treatment. This blend of technical and application-specific terms suggests a balanced focus within SA research, where foundational advancements in segmentation technology are closely integrated with practical applications. In summary, this bibliometric analysis provides a comprehensive overview of "Segment Anything" research, illustrating a field that is both technically robust and widely adaptable across domains. The concentration of research in China and the United States highlights the importance of geographic hubs in driving advancements, while high-impact contributions from Canada and Brazil indicate the value of focused, innovative research. The collaborative patterns reveal a global network, where leading countries facilitate regional and international partnerships that enrich the research ecosystem. Through frequent terms like "image segmentation," "deep learning," and "medical imaging," the WordCloud encapsulates the core themes and applications of SA, underscoring its interdisciplinary relevance and potential. This analysis not only maps the current state of SA research but also points to future directions where thematic focus and collaboration can further refine and expand the field.

4. CONCLUSION

This bibliometric analysis of "Segment Anything (SA)" research reveals several critical findings that outline the field's trajectory, key contributors, thematic focus, and collaborative networks. Covering data from 2020 to 2025, the study draws on Scopus as the primary database, providing a robust foundation for understanding SA research dynamics.

A significant finding is the exponential growth in scientific output from 2023 to 2024, with publications rising from 139 to 523 articles, suggesting 2024 as a breakthrough year in the field's development. This sharp increase highlights SA technology's emergence as a prominent area of study within computer vision and machine learning. As we move into 2025, the preliminary publication count remains low, underscoring the need for continued monitoring to assess whether 2024's momentum will sustain.

In terms of publication venues, *Lecture Notes in Computer Science* (LNCS) stands as the most influential outlet, reflecting the essential role of foundational computer science and artificial intelligence principles in the advancement of SA. Other prominent sources like *Remote Sensing* and *IEEE Transactions on Geoscience and Remote Sensing* highlight the interdisciplinary applications of SA, particularly in environmental and spatial data analysis, where segmentation technology plays a vital role in object identification and image analysis.

The analysis also shows that a concentrated group of prolific authors drives the field, with researchers such as Zhang Y and Li Y leading in publication output. This concentration suggests that expertise within SA research is centralized among a few influential authors who play a significant role in advancing methodologies and expanding practical applications. These core contributors work collaboratively within specialized networks, fostering a focused yet impactful research community. Institutional contributions are heavily skewed towards China, with *Wuhan University*, *Tsinghua University*, and the *University of Chinese Academy of Sciences* leading in article production. This centralization underscores China's strategic investment in artificial intelligence and computer vision research, establishing it as a global leader in SA development. The presence of other influential institutions like Vanderbilt University in the United States, however, points to international interest and highlights the field's global relevance.

Country-based collaboration patterns reflect China's and the United States' prominent roles as central nodes within the international research network. China, in particular, exhibits high connectivity and influence, while the United States also plays a significant role in bridging research communities. European countries, such as the United Kingdom and Germany, display a high level of multi-country collaboration, suggesting a regional preference for partnerships that add diversity and reach to SA research outputs.

Citation analysis reveals that China, while leading in total citations, has a lower average citation per article, possibly due to the sheer volume of publications. In contrast, Canada and Brazil exhibit the highest average citations per article, signaling that although their contributions are fewer, they are of substantial impact and are likely perceived as foundational within the field.

The thematic analysis using WordCloud captures the core focus of SA research, with terms such as "image segmentation," "deep learning," and "semantic segmentation" standing out. These terms emphasize the technological foundation of the field, while "medical imaging" highlights significant practical applications, particularly in healthcare. This balance between foundational and applied research themes suggests that SA is not only advancing technologically but is also adaptable to diverse fields where image segmentation is critical.

Collectively, these findings depict a vibrant, rapidly evolving field shaped by a few key institutions and researchers, predominantly from China and the United States, who are advancing both the theoretical underpinnings and practical applications of Segment Anything technology. The strong collaborative networks observed across countries and the interdisciplinary themes suggest that SA research will continue to expand and diversify, driven by both foundational developments and real-world applications. Continued international collaboration and innovation will be essential to sustain this momentum and maximize the technology's transformative potential across various domains.

Conflicts Of Interest

The paper's disclosure section confirms the author's lack of any conflicts of interest.

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