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COMPUTER SCIENCE TERMINOLOGY: ANALYSIS OF SCIENTIFIC PUBLICATIONS IN THE SCOPUS DATABASE

This article examines the nature of the development of computer science terminology, focusing on its use in the fields of computer science, social sciences, and arts and humanities. The Scopus database was used as the main material for the study. Using the capabilities of this international database, an in-depth analysis was conducted. An analysis of 118 publications in the Scopus database from 1978 to 2024 showed a dynamic expansion of the terminology of this field. The publications included in the sample were carefully studied.

The article focuses on the first published research work and the most cited articles in this field. The countries that submitted the most research publications were also analyzed. The discussion section presents the main results of the study, including important trends in the creation of technical term lists, the difficulties of terminological ambiguity, and the impact of interdisciplinary collaboration on the lexicon. The conclusion section emphasizes the importance of continuing research and developing adapted educational resources, as this is necessary to keep up with the rapid development of computer science terminology.

Keywords: computer science terminology, interdisciplinary terminology, terminological ambiguity, vocabulary acquisition, standardization, globalization, educational resources, Scopus database.

Introduction

Currently, the study of computer science terminology is receiving considerable attention in academic research, reflecting the growing nature of the discipline and its intersection with various fields. In the field of cybersecurity, Parrish et al. have highlighted the need for a unified terminological framework to support the growth of the discipline.They note that the establishment of "computer science" as a formal academic discipline in the 1960s led to the emergence of other related fields. One of these is the field of cybersecurity. This highlights the importance of a structured approach to terminology in achieving progress in educational and organizational work in the field of cybersecurity [1, p. 37].

This need is highlighted in Singh's work, where he notes the infiltration of computer science terminology into medical sciences and suggests that such interdisciplinary language can lead to misunderstandings if not appropriately contextualized [2, p. 618]. Such insights underline the importance of precise terminology in facilitating effective communication across disciplines.

The development of specialized vocabulary lists has also been a focal point in recent studies. Uba, Irudayasamy, and Hankins (2023) developed the New Computer Science Academic Word List (NCSAWL) by conducting an extensive analysis of research articles in computer science. Their goal was to identify and standardize terms frequently used across different subfields within the discipline [3, p. 319]. Similarly, Roesler's work on the Computer Science Academic Vocabulary List (CSAVL) underscores the pedagogical implications of such lists, providing educators with tools to enhance vocabulary instruction in specific contexts [4, p. 32]. These glossaries serve as primary resources to help alleviate terminological confusion that is common among students and professionals. In addition, Diethelm and Goschler note that language difficulties encountered by students in computer science require greater awareness of the linguistic aspects of computer science education. They suggest that educators should prioritize the teaching of terminology to improve communication skills in the field [5, p. 22].

This view is supported by Kaldarova et al., who demonstrate innovative approaches to vocabulary acquisition and suggest the use of game-based learning as a method to increase students' understanding of computer science terminology [6, p. 2].

Research on computer science terminology reveals a complex field shaped by historical progression, interdisciplinary influences, and educational hurdles. Numerous scholars emphasize the importance of clear and consistent terminology to improve communication and comprehension within the discipline. As computer science advances, creating a strong terminological framework will be crucial for fostering both scholarly and practical progress.

The aim of the article is to review publications related to computer science terminology and to highlight the significance and relevance of research in this field.

Materials and Methods

The article analyzes publications from the Scopus database based on the keyword «computer science terminology». The article reviews publications from the Scopus database spanning the years 1978 to 2024, focusing specifically on the fields of «Computer Science», «Social Sciences», and «Arts and Humanities». The Scopus database offers filtering options for searches, and the analysis is described in accordance with these filtering criteria.

Results and discussion

As a result of the analysis, 118 documents were identified. Among these publications, the earliest article, published in 1978, based on the sampling results presented in the research methodology, was «The Lexical Attributes of Medical Name Files» by G. Frieder and P. J. Slocum. The article examines the structure and characteristics of medical terminology databases, specifically focusing on a set of obstetric-gynecological terms. The study analyzes the frequency of medical terms and their synonyms, exploring the potential for optimizing data storage and retrieval. Key findings highlight that medical terminology follows patterns similar to the English language but with significant variations. The research suggests that word-level coding, rather than character-level coding, can improve storage efficiency [7, p. 85].

Additionally, the most cited article in the Scopus database is «Four Dark Corners of Requirements Engineering» by Pamela Zave and Michael Jackson. The article explores four fundamental challenges in requirements engineering. These include the need to focus on the environment when describing system requirements, the importance of separating control information, the association between domain knowledge and requirement refinement, and eliminating biases from specifications. The authors argue for a clearer understanding of requirements, specifications, and domain knowledge, proposing solutions to make the process more precise and effective, especially for complex software systems. The article also discusses the importance of using precise and unambiguous terminology in the requirements process. The authors emphasize that all terms in the requirements must be related to the real environment for which the system is being developed. This is necessary so that the requirements are correctly interpreted and carry meaning tied to the real world. The article states that the definition of terms must be clear, precise, and documented to avoid ambiguities and misunderstandings during the development process [8, p. 3].

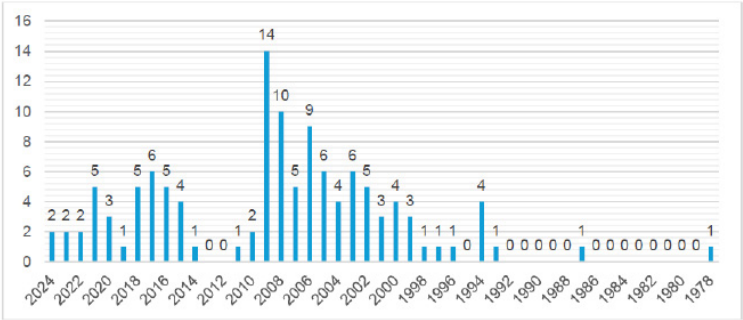

Figure 1 – Publication of research works by year.
(Source: own calculations based on data from the database of articles indexed by Scopus; Export Date: September 2 2024)

The highest number of publications based on the given keyword was made in 2009. A total of 14 documents were published in the Scopus database (Fig.1.). By 2009, computer science had increasingly intersected with other fields such as social sciences, biology (bioinformatics), and arts (digital humanities). This interdisciplinarity likely led to a broader array of publications discussing terminology to facilitate communication across disciplines [9, p. 3].

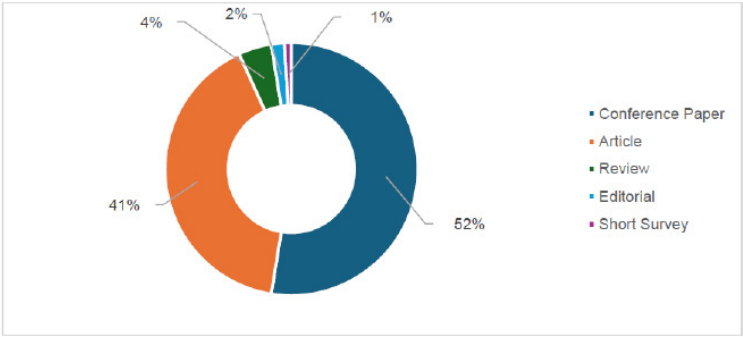

Figure 2 –Types of research work

Among the published documents, 62 are conference proceedings, representing 52.5 % of the total sample. Additionally, 48 documents are journal articles, comprising 40.7 % of the sample. The remaining publications include 5 review articles (4.2 %), 2 editorials (1.7 %), and 1 short survey (0.8 %) (Figure 2. Types of research work).

The nature of research topics in computer science also influences publication patterns. Many studies, particularly those involving interactive technologies or software development, are inherently suited for presentation at conferences rather than the more static format of journal articles [10, p. 62].

This contrasts with the perception that some journals may have longer review cycles, potentially delaying the dissemination of critical research findings. As a result, many researchers opt for conferences to ensure their work reaches the community in a timely manner [11, p.12].

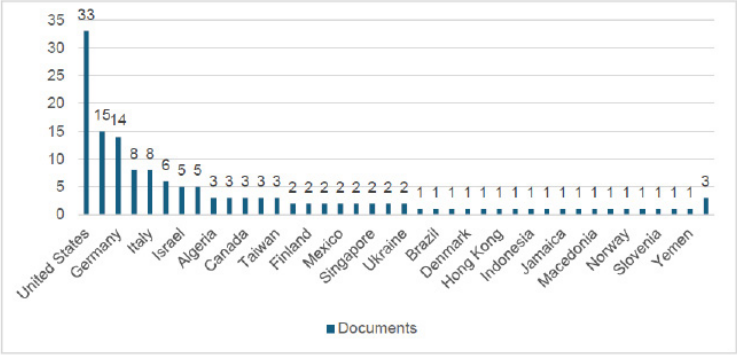

Figure 3 – Countries with the highest number of research publications

In terms of the geographical distribution of research in this area, the United States leads with 33 publications. The United Kingdom ranks second, contributing 15 research papers published in Scopus-indexed journals, followed by Germany in third place, with 14 research publications (Fig. 3).

The predominance of articles on computer science terminology published in the Scopus database from the United States can be attributed to several interrelated factors, including the country's robust research infrastructure, the dominance of English as the primary language of scientific communication, and the historical context of computer science education and research. Firstly, the United States has long been recognized as a leader in scientific research and innovation, particularly in the field of computer science. This is evidenced by bibliometric analyses that consistently show a high volume of publications originating from U.S. institutions. For instance, a study by Lunn et al. highlights the rapid growth of computer science education as a discipline, noting that the majority of research output is concentrated in the U. S. due to the presence of numerous prestigious institutions and funding opportunities that foster research initiatives [13, p. 290].

Overall, the practical importance of researching computer science terminology is underscored by its role in enhancing communication, fostering interdisciplinary collaboration, and improving educational practices across computer science, social sciences, and the arts and humanities. As these fields continue to converge, a shared lexicon will be essential for driving innovation and understanding in an increasingly complex research landscape.

Conclusions

In conclusion, this article highlights the importance of a comprehensive analysis of computer science terminology in an interdisciplinary context. The analysis of publications has shown that the terminology in this field is actively developing in accordance with the needs of various scientific fields, such as the social sciences and humanities. It was found that misunderstandings arising from terminology cause difficulties and that interdisciplinary cooperation has an impact on the development of vocabulary. The results indicate the need to standardize terminology and create special glossaries to improve understanding and education. Therefore, research results in computer science terminology should be able to meet the requirements of a rapidly changing scientific environment.

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КОМПЬЮТЕРЛІК ҒЫЛЫМДАР ТЕРМИНОЛОГИЯСЫ: SCOPUS ДЕРЕККОРЫНДАҒЫ ҒЫЛЫМИ ЖАРИЯЛАНЫМДАРДЫ ТАЛДАУ

Бұл мақалада компьютерлік ғылымдар терминологиясының даму сипаты зерттеліп, оның компьютерлік ғылымдар, әлеуметтік ғылымдар, сондай-ақ өнер мен гуманитарлық пәндер салаларындағы қолданылуына баса назар аударылады. Зерттеудің негізгі материалы ретінде Scopus дерекқоры пайдаланылды. Осы халықаралық дерекқордың мүмкіндіктерін пайдалана отырып, тереңдетілген талдау жүргізілді. 1978 жылдан 2024 жылға дейінгі аралықтағы Scopus дерекқорындағы 118 жарияланымға жасалған талдау аталмыш сала терминологиясының динамикалық кеңеюін көрсетті. Іріктемеге енгізілген жарияланымдар мұқият зерделенді. Мақалада алғашқы жарияланған зерттеуге және осы саладағы ең көп сілтеме жасалған мақалаға ерекше назар аударылды. Сондай-ақ зерттеу жарияланымдарын ең көп ұсынған елдер талданды. Талқылау бөлімінде зерттеудің негізгі нәтижелері ұсынылған, оның ішінде техникалық терминдер тізімдерін жасаудағы маңызды үрдістер, терминологиялық айқындылықтың болмауының қиындықтары және пәнаралық ынтымақтастықтың лексикаға әсері айқындалды. Қорытынды бөлімде зерттеулерді жалғастыру мен бейімделген білім беру ресурстарын әзірлеудің маңыздылығы атап өтілді, өйткені бұл компьютерлік ғылымдар терминологиясының қарқынды дамуына сай болу үшін қажет.

Кілтті сөздер: компьютер ғылымы терминологиясы, пәнаралық терминология, терминологиялық екіұштылық, сөздік қорды игеру, біріздендіру, жаһандану, білім беру ресурстары, Scopus дерекқоры.

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ТЕРМИНОЛОГИЯ КОМПЬЮТЕРНЫХ НАУК: АНАЛИЗ НАУЧНЫХ ПУБЛИКАЦИЙ В БАЗЕ ДАННЫХ SCOPUS

В данной статье исследуется природа развития терминологии компьютерных наук с акцентом на ее применение в областях компьютерных наук, социальных наук, а также искусства и гуманитарных дисциплин. В качестве основного материала исследования использовалась база данных Scopus. Благодаря использованию возможностей этой международной базы данных было проведено углубленное исследование. Анализ 118 публикаций в базе данных Scopus за период с 1978 по 2024 годы продемонстрировал динамическое расширение исследовательской терминологии. Публикации, включенные в выборку, были тщательно изучены, при этом особое внимание уделялось первому опубликованному исследованию и наиболее цитируемой статье в данной области. Также был проведен анализ стран, внесших наибольший вклад в публикацию исследований. В разделе обсуждения представлены ключевые выводы исследования, включая выявление значительных тенденций в создании списков технических терминов, проблемы терминологической неопределенности и влияние междисциплинарного сотрудничества на лексикон. В заключение подчеркивается важность продолжения исследований и разработки адаптивных образовательных ресурсов, которые являются необходимыми для соответствия быстрому развитию терминологии компьютерных наук.

Ключевые слова: терминология компьютерных наук, междисциплинарная терминология, терминологическая двусмысленность, освоение лексики, стандартизация, глобализация, образовательные ресурсы, база данных Scopus.

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