# Algorithmic Fairness over the Years - A Scoping Review of Research in Computer Science and Law

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This paper presents partial results of a scoping review, conducted on the field of algorithmic fairness. We analyzed 1570 papers, to identify research gaps and developments within the field, particularly regarding their demographic and geographical focus.

Keywords: Algorithmic Fairness, Scoping Review, Research Trends

## 1 Introduction

Algorithmic fairness research has expanded rapidly over the past 15 years, evolving from a niche topic into a well-established field with dedicated conferences such as ACM FAccT and AAAI AIES. To examine how the field has developed and identify key research trends and gaps, we conducted a scoping review of 1,570 papers. Our analysis explores how the literature has evolved across four dimensions: domain-, technological, demographic, and geographical focus. By differentiating between contributions from legal scholars and technological scholars alone, we identify different research trends and gaps from both disciplines.

With over 1500 papers, our study represents the largest scoping review of algorithmic fairness to date, building on prior work that either examined AI ethics more broadly or had smaller sample sizes [2, 8, 14]. By concentrating specifically on algorithmic fairness, we provide a more comprehensive understanding of the field's progress, its underexplored areas, and future directions for research. While a full preprint of our findings is available on arXiv [5], this abstract focuses on key insights related to the demographic and geographic focus of the literature.

## 2 Methodology

We performed our scoping review using four scientific databases: the proceedings of all FAccT and AIES conferences, which focus primarily on algorithmic fairness; Web of Science, a comprehensive database for scientific papers; and Hein Online, which primarily includes legal sources that were underrepresented in the other databases.

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To search these databases, we designed a search query to scan papers' titles and abstracts for variations of terms like "algorithmic fairness" and "fair Machine Learning". After execution, we obtained a total of 6027 papers that we manually screened for relevance to this study. This narrowed down the results to a total of 1570 papers that needed to be tagged to answer our research questions. To obtain tags on papers' publication year, authors, as well as authors' affiliation and self-reported area of expertise, we made use of the pybliometrics API [12], which used the paper's DOI to obtain this information from Scopus. After, we manually tagged papers' *demographic-*, *geographical* focus, based on their titles and abstracts. We recognize that reading full papers would yield more precise results, but with over 1,500 papers in our database, time constraints made this impractical. Instead, we used an iterative process to identify recurring themes across these dimensions, merging similar categories as needed. As will become apparent in our next section, we found that many papers do not focus on specific demographic groups or geographical areas. Importantly, papers were only tagged to have a geographic- or demographic focus, if they explicitly centered their research on these groups or areas, rather than merely referencing them in passing.

To further analyse the geographical context in which algorithmic fairness was discussed, we also examined the affiliation countries of the authors. For this we used each papers' first authors' affiliation country as a proxy.

After having tagged the papers for all relevant information, we conducted broad quantitative analyses to get a high-level overview of research trends- and developments related to both demographic and geographic focus. Additionally, we conducted small-scale qualitative analyses and analysed papers from less popular research areas to understand the nuances of underexplored topics and identify gaps in the existing literature.

## 3 Results

### 3.1 Diversity of Demographic Groups

As can be observed in Figure 1 over the years, more authors have made specific demographic groups the focus of their research papers. To illustrate, in 2023 10% of all papers looked through a demographic-specific lens, an 8% increase since 2017. As seen in Figure 2, however, authors from a legal background are still much more likely to write these demographic-specific contributions, while Computer Scientists tend to stay generic in the forms of algorithmic discrimination they discuss. Across disciplines, researchers are most likely to write about biases against "gender" and "race", though harms faced by intersectional groups are also gaining attention.

One paper highlighting the importance of demographic-specific research is by Buyl et al. [3]. Their work highlights the diverse and complex algorithmic harms faced by people with disabilities, which can be even more intricate than those affecting gender or racial groups. This stems, among others, from the broad range of disabilities -physical, medical, sensory, cognitive, and psychological- each interacting with algorithms differently. For example, in the context of hiring algorithms, a visually impaired job applicant may struggle with automated recruitment assessments online, while someone with medical conditions might face algorithmic penalties for career gaps on their CV. Automated video analysis tools may not accommodate people with speech impairments [3]. Addressing these harms requires technology developers to envision them in the first place, which is unlikely to happen if computer scientists keep their tendency to discuss "algorithmic discrimination" in general terms.

From a legal standpoint, Binns & Kirkham argue that demographic-specific research is crucial for evaluating whether current laws adequately protect the corresponding groups [1]. Like Buyl et al., they discuss algorithmic discrimination against people with disabilities, emphasizing that ensuring fair treatment may require algorithms to

**Common papers in "Other" category**: Economic (6), Nationality (5), Political Opinion (2), Sexuality (2), Religion (1)



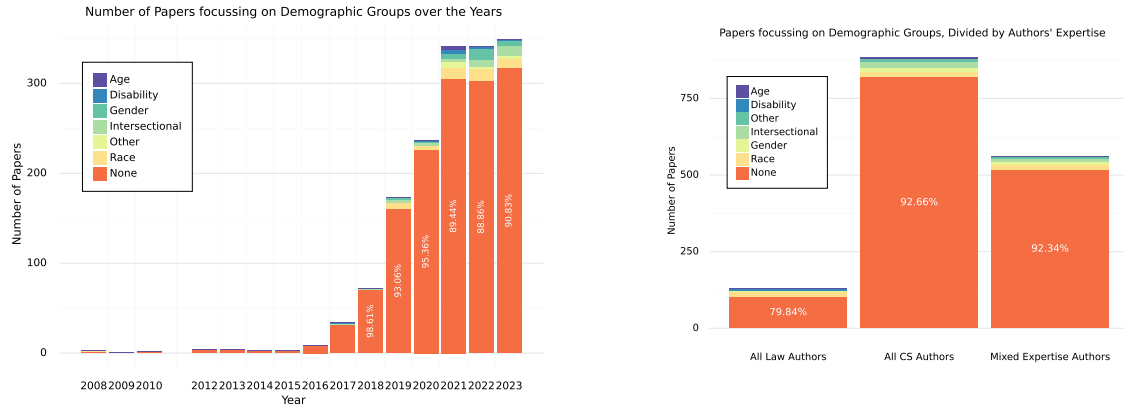Fig. 1. The demographic focus of papers over the years



Fig. 2. The demographic focus of papers split by first author's expertise

process disability-related information. For example, hiring algorithms could be designed to avoid penalizing career gaps if an applicant discloses a relevant medical history. However, individuals may be particularly hesitant to share their disability status due to concerns over misuse or discrimination. Thus, demographic-specific legal research is essential, to understand if current privacy and equality laws allow sensitive data collection for the right purposes, while simultaneously safeguarding individuals against the misuse of this information.

The studies by Buyl et al. and Binns & Kirkham illustrate that effectively identifying and mitigating algorithmic harms faced by specific demographic groups, requires making these groups the focal point of research. As our analysis reveals, this remains rare, with most studies still addressing algorithmic fairness broadly, or predominantly focusing on "gender" or "race" discrimination. Expanding demographic-specific research will be essential to not overlook the harms faced by more diverse communities.

### 3.2   Geographical Focus

The heatmap below shows that the majority of contributions come from authors affiliated in the Global North, specifically in North America and Europe. Similarly, when papers specify a geographical region, this tends to be from Global North countries, with the United States being the most frequently cited country (62 articles)[1]. The imbalance highlights a persistent Northern-centric perspective in AI research, though our analysis revealed that recent years have seen a gradual increase in contributions from the Global South.

This similar underrepresentation is evident in the geographic focus of the research, with relatively few studies centered on Global South countries. Various factors contribute to this disparity, including limited research funding,

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[1]We used UNCTAD's classification in which Global North is understood as countries in Europe and Nothern America; and including Israel, Japan, Australia and New Zealand. The Global South consists of countries in Africa, Asia, South America and the Caribbean. https://unctadstat.unctad.org/EN/Classifications.html
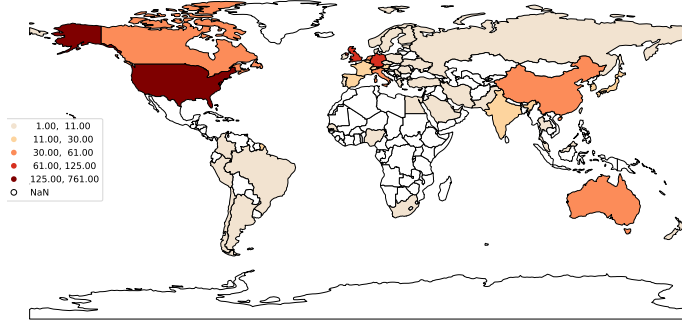
(a) Heatmap of first authors' affiliation country

| Country/Regional Focus | # Papers |
|---|---|
| United States | 82 |
| Europe | 60 |
| United Kingdom | 12 |
| China | 9 |
| India | 7 |
| Australia | 6 |
| Canada | 4 |
| Brazil, Netherlands, Germany, Italy, Africa | 3 |
| Spain, Singapore, France, Austria, Russia, Chile, Global South | 2 |
| New Zealand, Switzerland, Uruguay, Mexico, South America, Bangladesh, South Korea, Maldives, Vietnam, Philippines, Japan, Asia, Israel, United Arab Emirates, Nigeria | 1 |

(b) Number of times countries/geographical regions were made the focus of a papers' content

access barriers to academic databases, and methodological biases in how geographic mentions are recorded in which a specification of a Global South country or region was necessary to capture results from these regions. [7] Despite these challenges, there has been growing attention to algorithmic fairness in the Global South, exemplified by studies on predictive policing in India [6], educational AI systems in Uruguay [11], and fairness discussions in China and Brazil [10, 15].

One particularly illustrative study by Eshan et al. (2022) analyzes a UK A-level grading algorithm used during the Covid-19 pandemic, highlighting how UK-centric assumptions led to unfair outcomes for Bangladeshi students. The algorithm was, among others, based on UK assumptions that good performance on mock exams predicts good performance on the actual exams. However, this neglected the learning culture in Bangladesh, where mock exams are not common. This example highlights the necessity of incorporating diverse perspectives in AI development to mitigate biases and enhance fairness across different regions.

The need to consider Global South perspectives such as the African philosophical ideas like 'Ubuntu' also becomes vital in mitigating fairness through regulation, especially legislation like the EU's AI Act that have implications outside Europe as emphasised by Sambala et al [13] and Nwafor [9] respectively. Nwafor further argues for diverse representation in AI's design, development, deployment, and governance to ensure fairness.

## 4 Conclusion

This study presents a scoping review of current literature on algorithmic fairness in the computer science and law fields, showing the evolution in terms of the demographic and geographical focus of the research. Our results show the need for more specialised, interdisciplinary and globally inclusive work to address complex challenges in the algorithmic fairness field.

## Acknowledgements

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