

Bias in Emerging Biometric Systems: A Scoping Review

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OVERVIEW

In light of the rapid development and implementation of systems such as automatic face recognition (AFR) technology (Furnell & Clarke, 2014), speech recognition technology (Savchenko & Savchenko, 2021), and behavioural biometric identification such as how people use a computer mouse (Siddiqui et al., 2022), research must come to understand the flaws and biases in these systems.

This scoping review aimed to identify the types of bias in AI-biometric systems, steps being taken to mitigate these biases, how effective these steps are, and to identify any gaps in the literature.

Database searches were conducted on Web of Science and PsychInfo. In total, the searches identified 80 papers and a further 10 found through scanning the selected articles for relevant references. After title/abstract review 28 papers were read in full and 23 identified as fitting the criteria for this review. From the 23 selected papers four main themes emerged: racial bias, age bias, gender bias, and solutions.

Despite some searches including the terms “disability” and “sexuality” no papers were found to fit the inclusion criteria. The implications of systems having demographic biases include risk of discrimination that potentially breaks equality laws across the world (Wang & Deng, 2019). Research proposed solutions for mitigating bias yet there did not appear to be a cohesive or interdisciplinary approach, meaning that even solutions effective in one context might not generalise more widely, thus potentially limiting their usefulness.



More cross-discipline research is needed to assess and mitigate the biases within AI-biometric systems; ideally before these systems are applied throughout society.

The aim of this project is to learn about bias in emerging biometrics, who these biases primarily impact, where the bias in the systems is most prevalent, as well as any steps forward to mitigate such biases. The review identifies where there are gaps in the research literature in terms of biases that exist yet the risk these pose has not been sufficiently researched. The report provides an overview of the current state of bias in biometrics. As such, this review aims to address four main research questions:

- To identify the different types of bias in emerging biometrics systems
- To look at the effectiveness of actions to mitigate bias in emerging biometrics
- To suggest next steps in mitigating bias in emerging biometrics based on current research
- To identify gaps in current research looking at bias in emerging biometrics

ABOUT THIS PROJECT

This Executive Summary comes from part of the Digital Emerging Biometrics project. This project provides summaries of cutting-edge research and knowledge with the aim of offering user-friendly guidance to help the NCA to put evidence into practice as well as guide future planning and policy. To read the Full Report this Executive Summary was produced from, as well as other outputs from this project, visit our website: crestresearch.ac.uk/project/digital-emerging-biometrics/

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