IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 2, December 2025
Impact Factor: 7.67

Age Engagement Estimation in Human-Centered AI

Rajni Dubey[1] and H N Verma[2]
M.Tech.(CSE) Student, Dept. of CSE[1]
Associate Professor, Dept. of CSE[2]
ITM University, Gwalior, Madhya Pradesh, India
beti1cs21002@itmuniversity.ac.in and hnverma.mca@itmuniversity.ac.in
ORCID: 0000-0003-3268-0787

Abstract: *Human-Centered AI (HCAI) demands models that are not only accurate but also reliable, fair and intelligible to the people they serve. This paper tackles a joint problem in term age–engagement estimation: simultaneously inferring a user's apparent age and moment-to-moment engagement state from multi-modal signals (face, gaze, posture, interaction logs) so that interfaces can adapt responsibly. It motivate the task in safety-, education- and accessibility-critical settings, survey post-2020 advances in facial age estimation and automatic engagement analysis and propose a unified, privacy-aware learning objective with fairness regularization. Our method integrates ordinal age modeling, temporal engagement inference and human- centered constraints (documentation, transparency, controllability). On benchmark datasets and a controlled pilot, the approach produces competitive age MAE and robust engagement F1 while reducing disparity across age groups. It presents ablations and qualitative analyses that relate attention maps and decision rules to meaningful behavioral cues. It concludes with a roadmap for deploying age–engagement systems that meet HCAI standards in the wild*

Keywords: Age estimation; Engagement recognition; Human- Centered AI; Fairness; Transparency; Ordinal regression; Multimodal learning; Privacy; Responsible AI; Interpretability

DOI: 10.48175/IJARSCT-30317