University of Glasgow | School of Computing Science

THE AWARDS 2020 | UNIVERSITY OF THE YEAR

‘Fairness’ in Machine learning for Healthcare Applications

Dr. Fani Deligianni,

fani.deligianni@glasgow.ac.uk

Lecturer (Assistant Professor)

Lead of the Computing Technologies for Healthcare Theme

https://www.gla.ac.uk/schools/computing/staff/fanideligianni

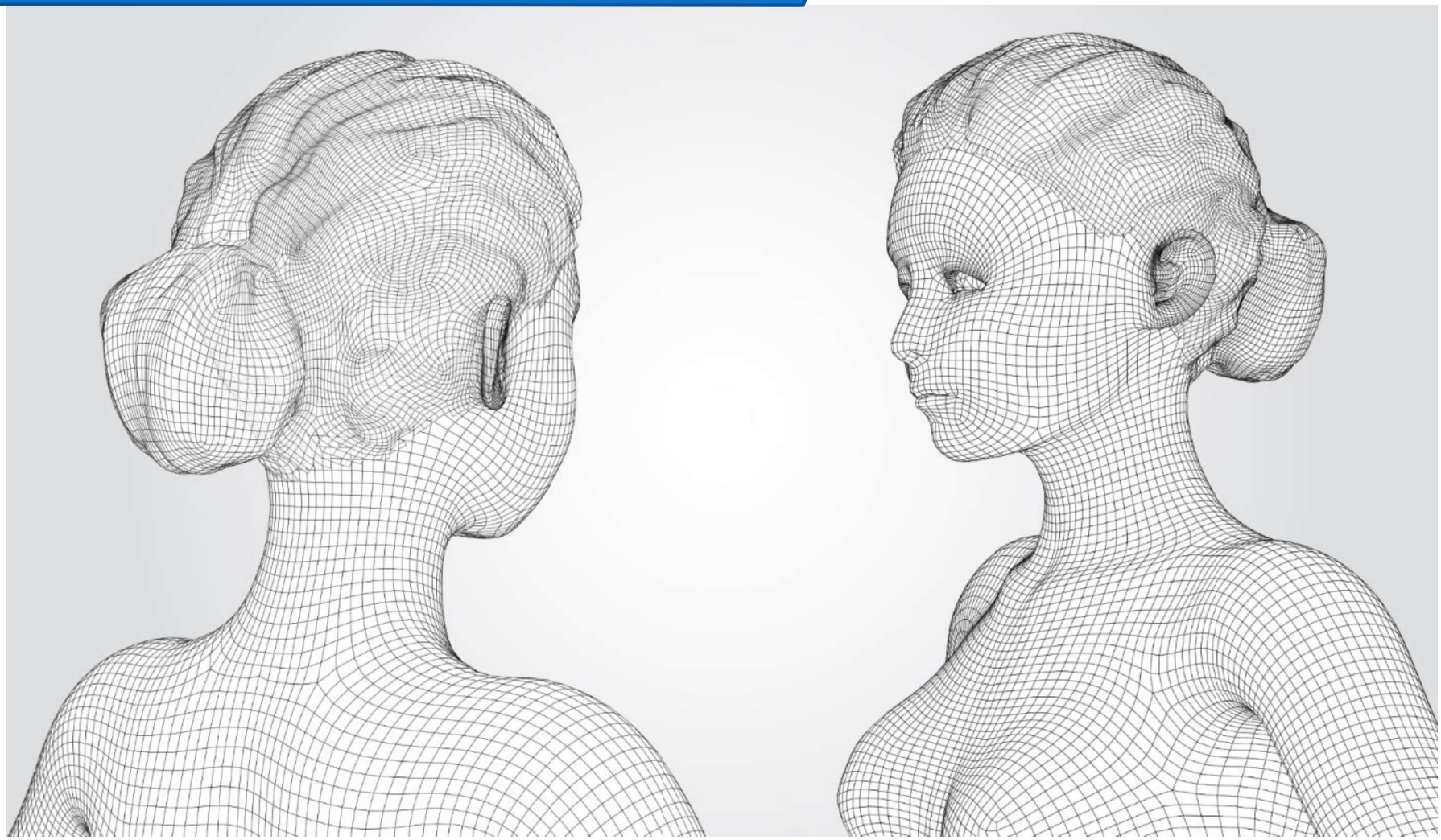
Bias in Data Mining

- Limited samples of subgroups
- Limited features of subgroups
- Bias over bias

Historic Examples in Algorithmic Bias

Gender and Racial Discrimination has been captured by an algorithm and reproduced

Bias in AI Algorithms



Discrimination in Online Ads

Karftsa.gr
karftsa.gr


Αξίζει ο CEO 9.000 φορές παραπάνω από ...
tanea.gr


How To Become A CEO - The Wealth Circle
worldscholarshipforum.com


Αποχωρεί από CEO της Amazon ο ΤΖεφ ...
kathimerini.gr

CEO and what is his role in a company ...
actualidadecommerce.com


President and Chief Executive Officer ...
businesswire.com


CEO vs. President: What's the ...
smartasset.com

Have CEO's mastered the psychology of ...
ceoworld.biz


You are the CEO of Your Life - Personal ...
personalexcellence.co


7 Personality Traits Every CEO Should H...
forbes.com


High-Growth CEO
chiefexecutive.net


Ο CEO της BMW στο τιμόνι του ACEA ...
in.gr


How to use 'CEO magic' when trying ...
europeanceo.com


Your CEO and senior executives are ...
cuttingedgepr.com


Chief Executive Officer (CEO): 7 Key ...
hivelife.com


CEO vs. CIO vs. COO vs. Other Executives
digital-adoption.com


CEO για τη Microsoft ...
news.microsoft.com


CEO: Michael Rasmussen | AlfaPeople-Global
alfapeople.com


What is a CEO? (with pictures)
infoloom.com


Από marketer για πρώτη φορά founder και CEO
epixeiro.gr

Ποιός είναι πια καλοπληρωμένος CEO σε ...
skai.gr

The CEO | Netflix
netflix.com


Τα χρήματα που κέρδισαν οι CEO των ...
autoblog.gr


Equilar CEO Tracker: Q3 2019 Update
equilar.com

Related searches
ceo logo
female ceo
business ceo


Burkhard Eling takes up role of CEO at ...
dachser.com


Νέος CEO για την Opel | CarTest ...
cartest.gr

Chief Executive Officer Images, Stock ...
shutterstock.com

What is CEO?
computerhope.com

CEO Job Description: Salary, Skills, & M...
thebalancecareers.com


Message from CEO | YOUNGSAN BUS...
youngsan.com

KPMG, Έρευνα για τις ανησυχίες των CEOs ...
accountancygreece.gr


Νέος CEO στη Ferrari - 4troxoi.gr
4troxoi.gr


CEO next 2021
capital.gr


CEO Job Description
betterteam.com

Ποσα παίρνουν οι CEO...
biznews.gr


CEO: What do they do? - LAWS.com
corporate.laws.com


as CEO to Help Your Business Grow ...
inc.com


How to Become a CEO: Definition Steps ...
online.maryville.edu


The Next CEO: Board a...
routledge.com - in stock


E-Marketing Clusters
e-marketingclusters.gr

Τι κάνει ο CEO σε μια εταιρεία ...
flowmagazine.gr

What Makes A Great CEO | A Leadership ...
leonid-group.com

CEO Clubs Greece Forum: Οι CEOs ...
insider.gr

CEO Clubs Greece: Συνεργασία ΔΕΗ ...
naftemporiki.gr

CEO Clubs Greece: Ισχυρό μήνυμα ...
sofokleousin.gr

Stephan Winkelmann: the new President ...
lamborghini.com

Understanding CEO Leadership Styles ...
online.norwich.edu

Linkedin CEO Jeff Weiner steps down ...
fortune.com

Related searches
ceo icon
ceo cartoon
ceo clipart

Proxies to sensitive attributes

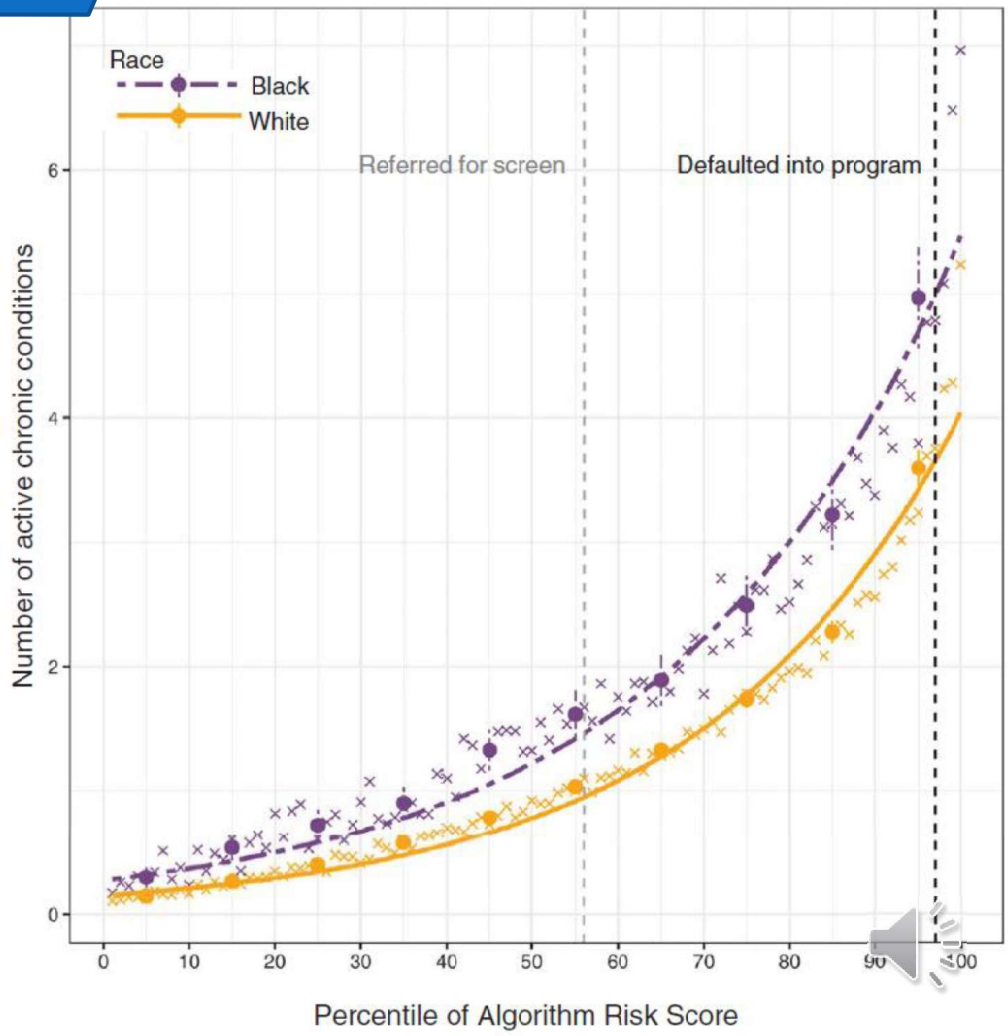
- Anti-discrimination law prohibits unfair treatment based on sensitive attributes, such as gender or race
- Implicit features may correlate with sensitive attributes
- Inherently algorithms inherit the prejudices of prior decision makers

Racial Bias in Healthcare

Obermeyer et al. ‘Dissecting racial bias in an algorithm used to manage the health of populations’, Science, 2019.

Racial Bias in Healthcare

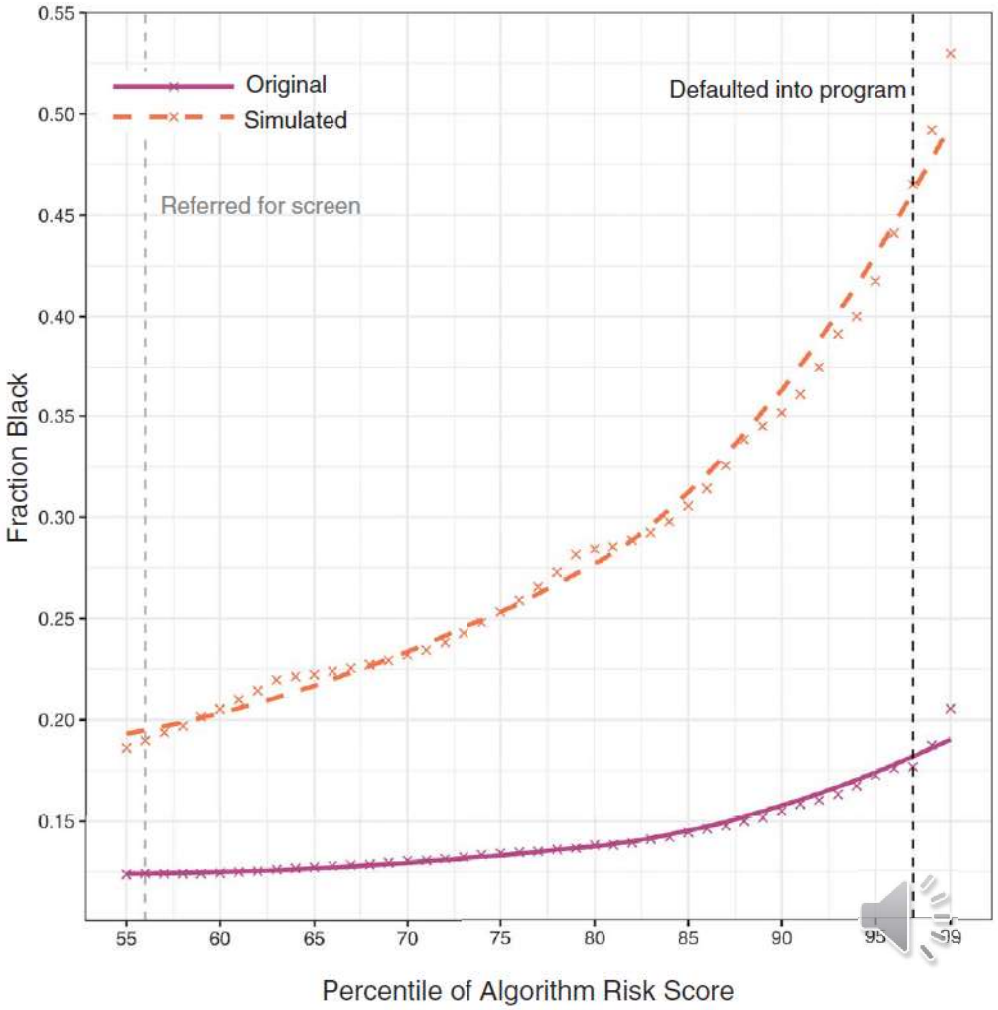
- Quantify bias by plotting algorithmic risk scores against multi-morbidity
- At 97th percentile of risk score blacks have 26.3% more chronic illness than whites
- Significant evidence of disparities that favor white people



Obermeyer et al. 'Dissecting racial bias in an algorithm used to manage the health of populations', Science, 2019.

Racial Bias in Healthcare

- Simulate an algorithm with no prediction gaps between blacks and whites
- At 97th percentile among the fraction of black patients would rise from 17.7 to 46.5%
  - Evaluate the performance of the model
- External Validation
  - Generalisability to ‘plausibly related populations’



Obermeyer et al. ‘Dissecting racial bias in an algorithm used to manage the health of populations’, Science, 2019.

Mechanisms of Bias

- The algorithm takes into consideration several features:
  - Demographics, insurance type, diagnosis, procedure codes, medications and detailed costs
  - Exclude race
- Prediction label is cost (The program is used to target high costs)
- The model is unbiased in terms of the cost prediction but biased in terms of the severity of the disease/multi-morbidity

Summary

- Historic data include discrimination bias in ways that are difficult to detect and eliminate
- Removing sensitive fields is important but is not adequate since the algorithm can identify proxies and learn based on them
- Quantifying calibration bias is used to detect bias that can disadvantage protective groups

References

- Barocas et al. ‘Big Data’s Disparate Impact’, 2016.
- Obermeyer et al. ‘Dissecting racial bias in an algorithm used to manage the health of populations’, Sciences, 2019.