Perils and Promise of AI/ML in Healthcare

Professsor Margrét V. Bjarnadóttir

UNIVERSITY OF MARYLAND
FEARLESSLY FORWARD

JOHNS HOPKINS
CAREY BUSINESS SCHOOL
Center for Digital Health and Artificial Intelligence

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Predicting Colorectal Cancer Mortality: Models to Facilitate Patient-Physician Conversations and Inform Operational Decision Making

Margret Bjarnadottir*
R.H. Smith School of Business, University of Maryland, College Park, Maryland 20742, USA, margret@rhsmith.umd.edu

David Anderson
Zicklin School of Business, Baruch College, City University of New York, New York City, New York 10010, USA, David.Anderson@Baruch.Cuny.edu

Leila Zia
Wikimedia Foundation, San Francisco, California 94108, USA, Leila.Zia@gmail.com

Kim Rhoads
Stanford University School of Medicine, Stanford, California 94305, USA, kim.rhoads@stanford.edu

Having accurate, unbiased prognosis information can help patients and providers make better decisions about what course of treatment to take. Using a comprehensive dataset of all colorectal cancer patients in California, we generate predictive models that estimate short-term and medium-term survival probabilities for patients based on their clinical and demographic information. Our study addresses some of the contradictions in the literature about survival rates and significantly improves predictive power over the performance of any model in previously published studies.

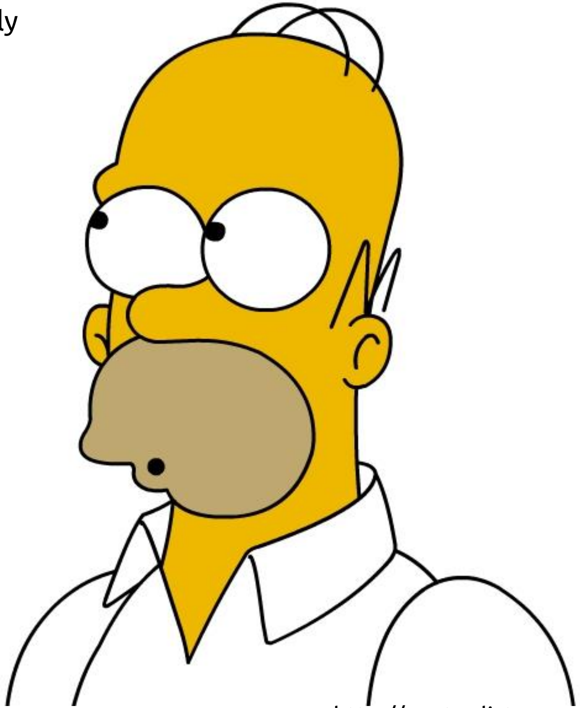
Key words: data mining; medical decision-making; survival analysis; personalized medicine
History: Received: March 2016; Accepted: April 2018 by Sergei Savin, after 2 revisions.

1. Introduction

Patients newly diagnosed with a medical condition

The Knowledge Seeker

Caucasian patients are significantly
different from black patients
(Dayal et. al, 1987)



http://spotonlists.com

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Race not significant unless considered with SES
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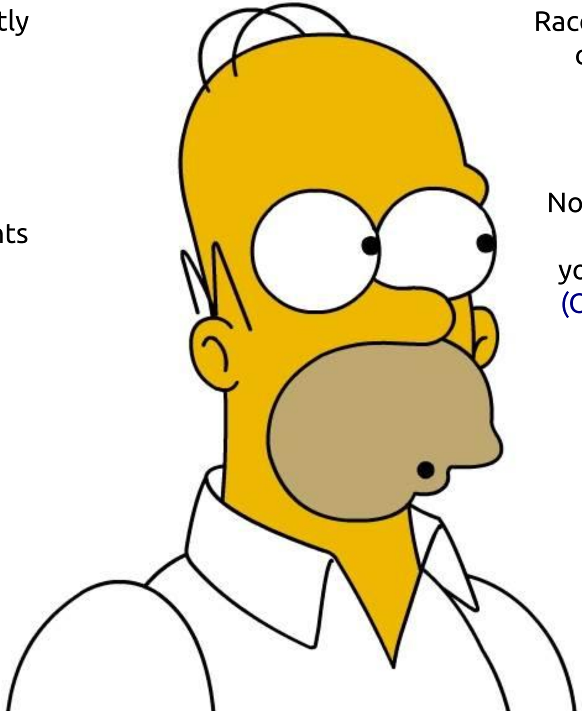

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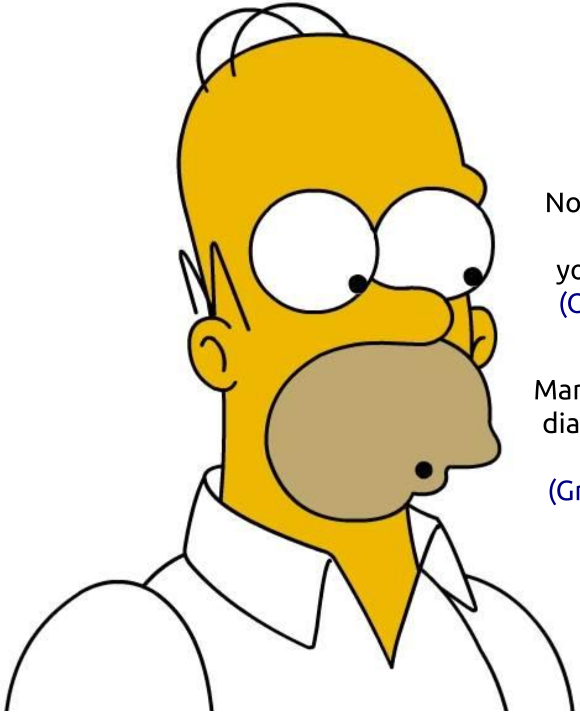

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No significant difference
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young and old patients
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Marriage not significant if
diagnosis and treatment
considered
(Greenberg et. al, 1987)

The Knowledge Seeker

www.addictinginfo.org

Seeking comprehensive understanding of cancer outcomes

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1. Introduction

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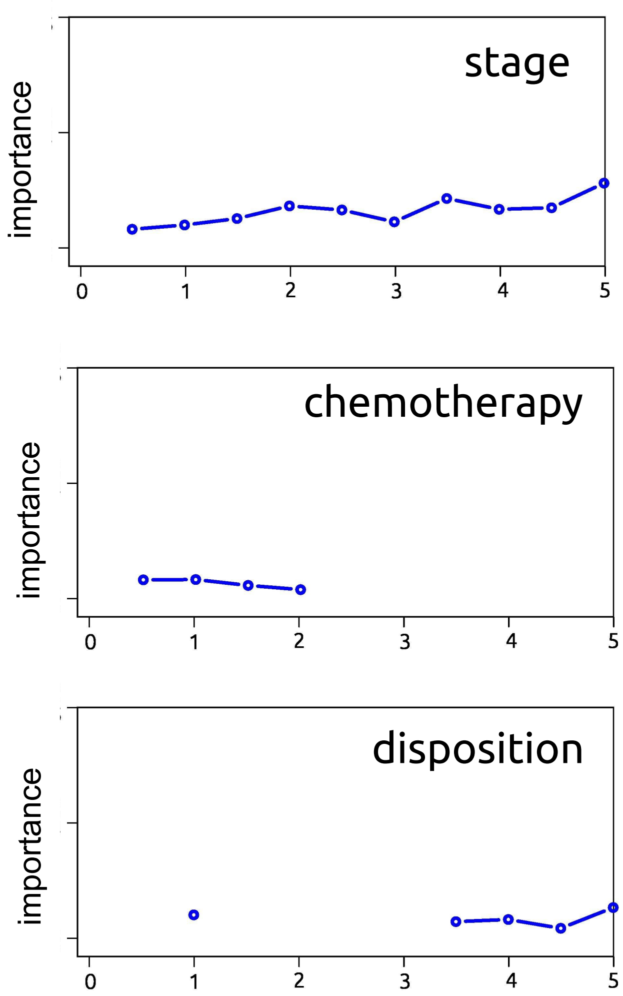
Main findings

Some variables are important across time horizons

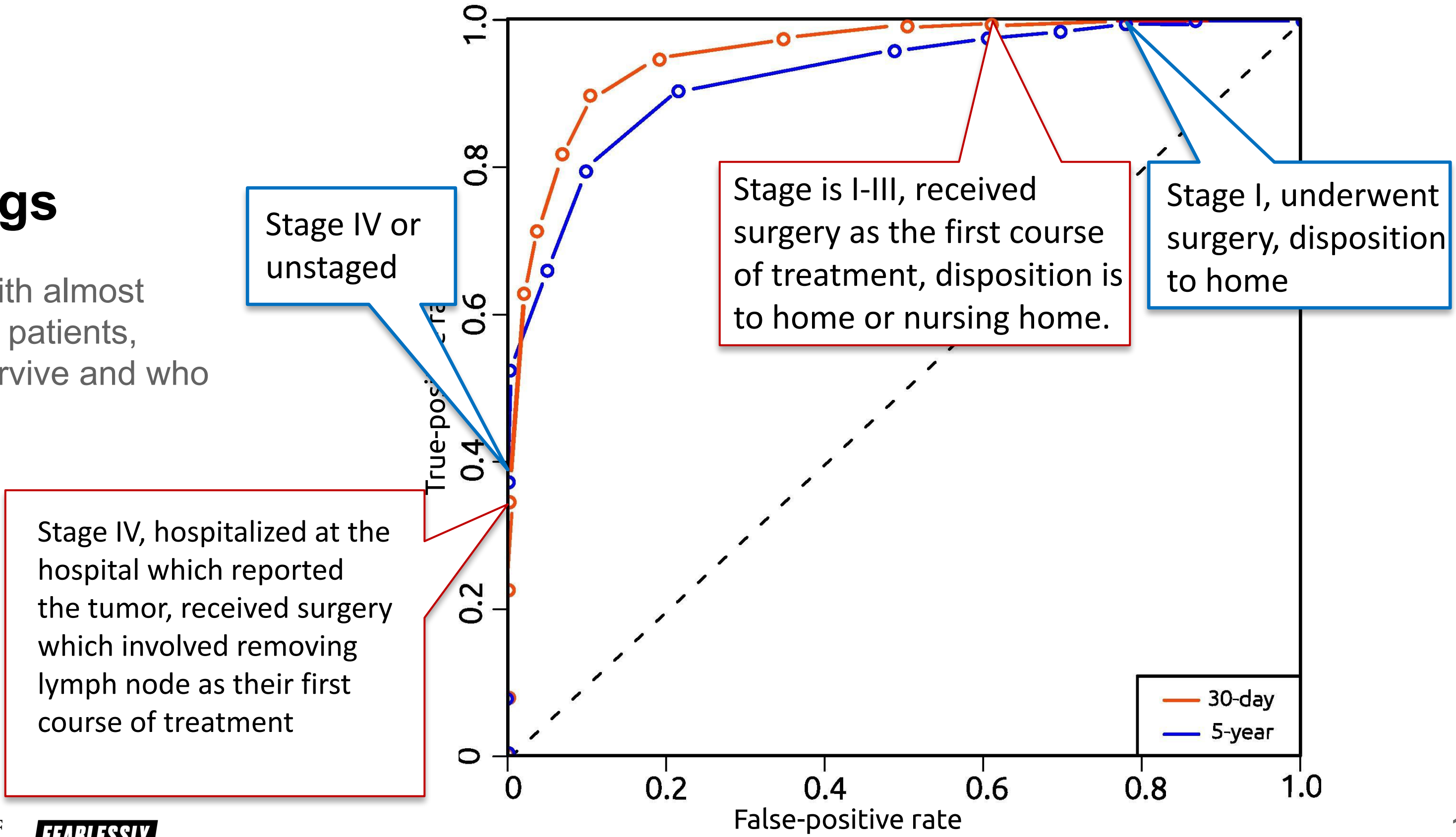
Others are only important over short time horizons

Others still may only appear important for long term survival



Main findings

The models can with almost certainty, for some patients, predict who will survive and who will not



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Original Article/Research

Addressing algorithmic bias and the perpetuation of health inequities: An AI bias aware framework

R. Agarwal [b], M. Bjarnadottir [a,*], L. Rhue [a], M. Dugas [c], K. Crowley [d], J. Clark [a], G. Gao [b]

[a] Center for Health Information and Decision Systems, Robert H. Smith School of Business, University of Maryland, College Park, MD 20742, United States
[b] Carey Business School, Johns Hopkins University, Baltimore, Maryland
[c] World Bank, Washington, District of Columbia
[d] Accenture, Arlington, Virginia

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ABSTRACT

The emergence and increasing use of artificial intelligence and machine learning (AI/ML) in healthcare practice and delivery is being greeted with both optimism and caution. We focus on the nexus of AI/ML and racial disparities in healthcare: an issue that must be addressed if the promise of AI to improve patient care and health outcomes is to be realized in an equitable manner for all populations. We unpack the challenge of algorithmic bias that may perpetuate health disparities. Synthesizing research from multiple disciplines, we describe a four-step analytical process used to build and deploy AI/ML algorithms and solutions, highlighting both the sources of bias as well as methods for bias mitigation. Finally, we offer recommendations for moving the pursuit of fairness further.

Introduction

With data revealing that a disturbingly disproportionate burden of the adverse outcomes of the COVID-19 pandemic is being borne by communities of color, racial disparities, long present in the US healthcare system, have recently come into sharper focus [1]. Today, health equity is appropriately front and center in public policy discourse: the National Academy of Medicine's Vital Directions for Health and

and stored in electronic repositories. Simultaneously, technical advances in computing and statistics have fueled the growth of automated algorithms constructed using artificial intelligence/machine learning approaches (AI/ML) that leverage these data repositories for discovering new knowledge and associations [5], supporting clinical judgement decision making [6,7], and automating administrative tasks [8].

The digitization of healthcare and developments in AI/ML have simultaneously been greeted with enthusiasm as well as caution in the

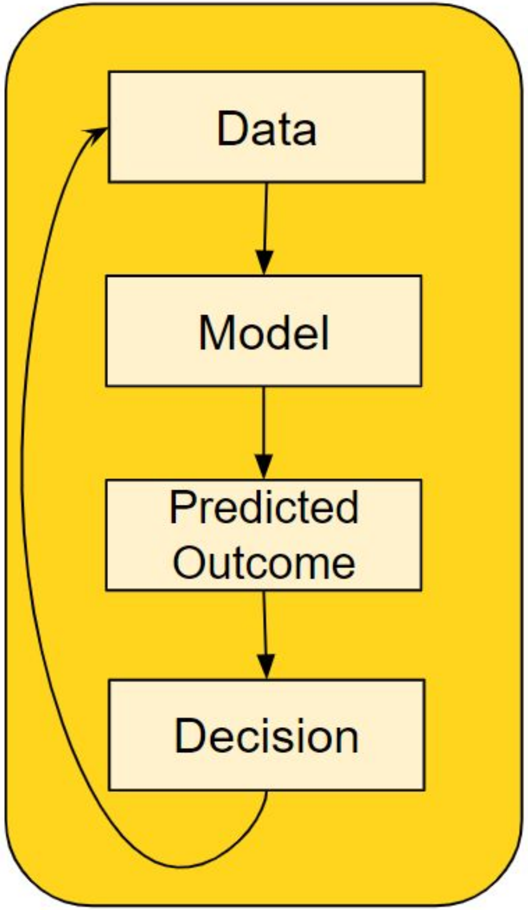
NEWS · 24 OCTOBER 2019 · UPDATE 26 OCTOBER 2019

Millions of black people affected by racial bias in health-care algorithms

Study reveals rampant racism in decision-making software used by US hospitals — and highlights ways to correct it.

An objective process on its surface

Bias can enter at any stage from problem defintion to bias amplification through



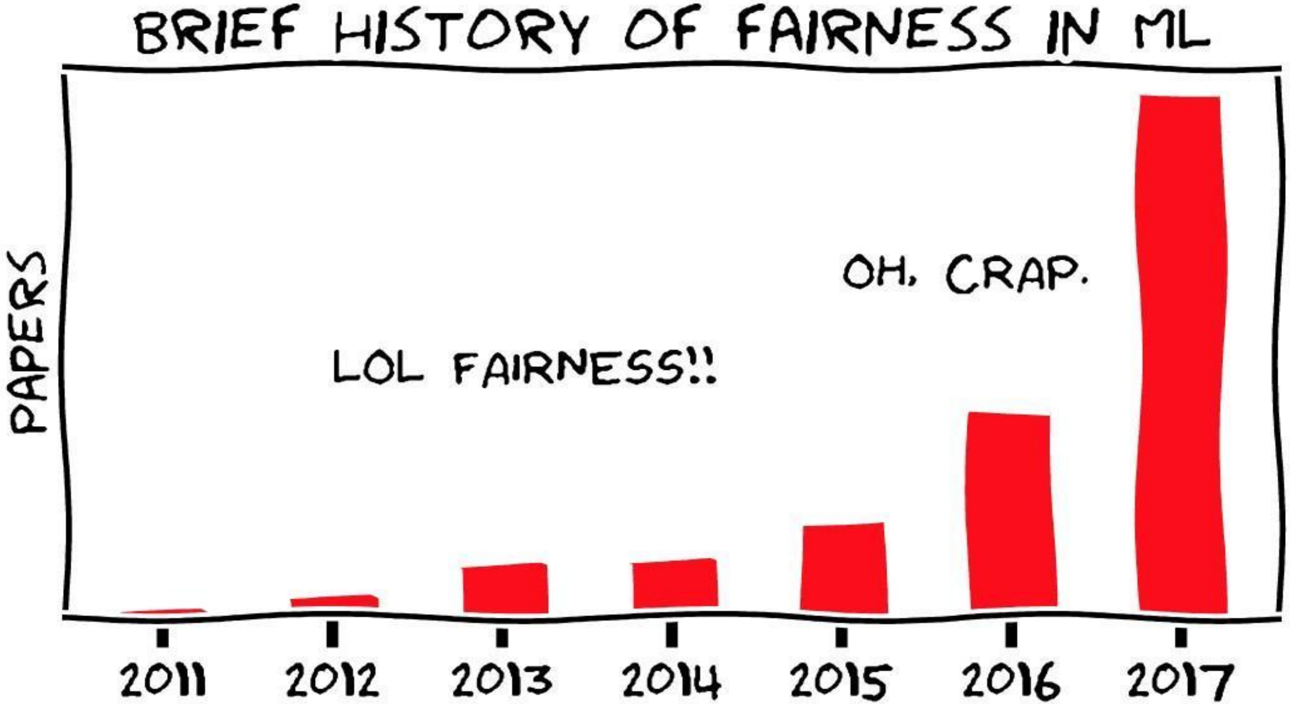


Image from: https://towardsdatascience.com/a-tutorial-on-fairness-in-machine-learning-3ff8ba1040cb

A framework to study health inequities; a case study of breast cancer survival

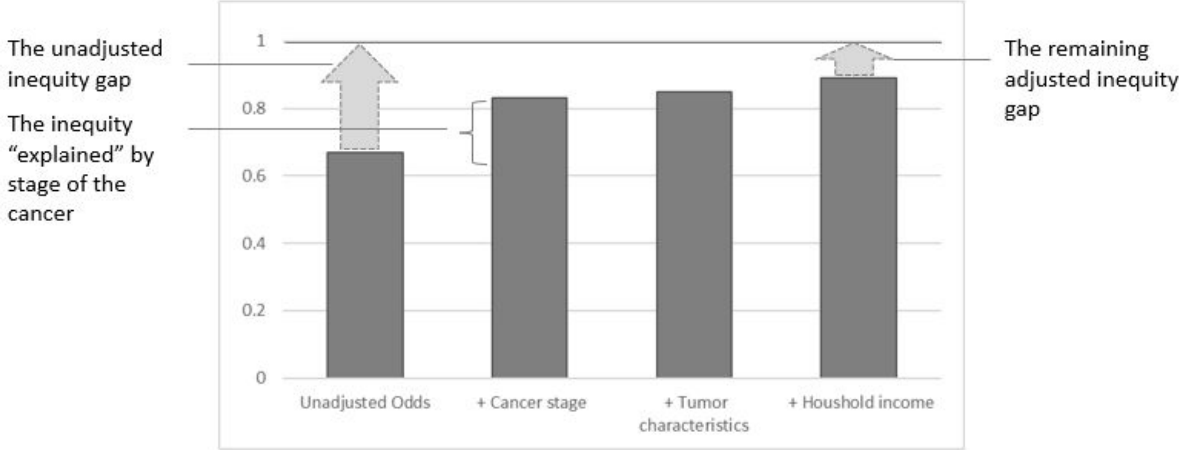
Margret V. Bjarnadottir, Ritu Agarwal, Shana Ntiri, Wedad Elmaghraby, Nawar Shara

Introduction and background

Health inequities across demographic and socio-economic groups are well documented and widely reflected in a variety of healthcare services and outcomes, including screening rates, disease severity at diagnosis, disease incidence, disease prevalence, mortality, survivorship (the morbidity from treatment) and financial burden. It is therefore not surprising that there is a growing need and desire to first understand and subsequently address the presence of such disparities (Best et al, 2022). The phenomenon of health inequity is complex and multi-faceted, and can arise as a result of a confluence of impacting factors (cite: our paper). However, there are limited standardized methodological approaches to understand the contribution and interdependencies of the many factors (e.g. access to care, health literacy) that drive health disparities. Thus, there is a pressing need for techniques that can be used to understand the root causes of disparities.

Using AI to frame the health inequities conversation

The causes of health inequity are complex and intertwined



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Johns Hopkins Carey Business School

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Thank you

mbjarnd@umd.edu

University of Maryland

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