Etik ved brug af AI i sundhedsvæsenet
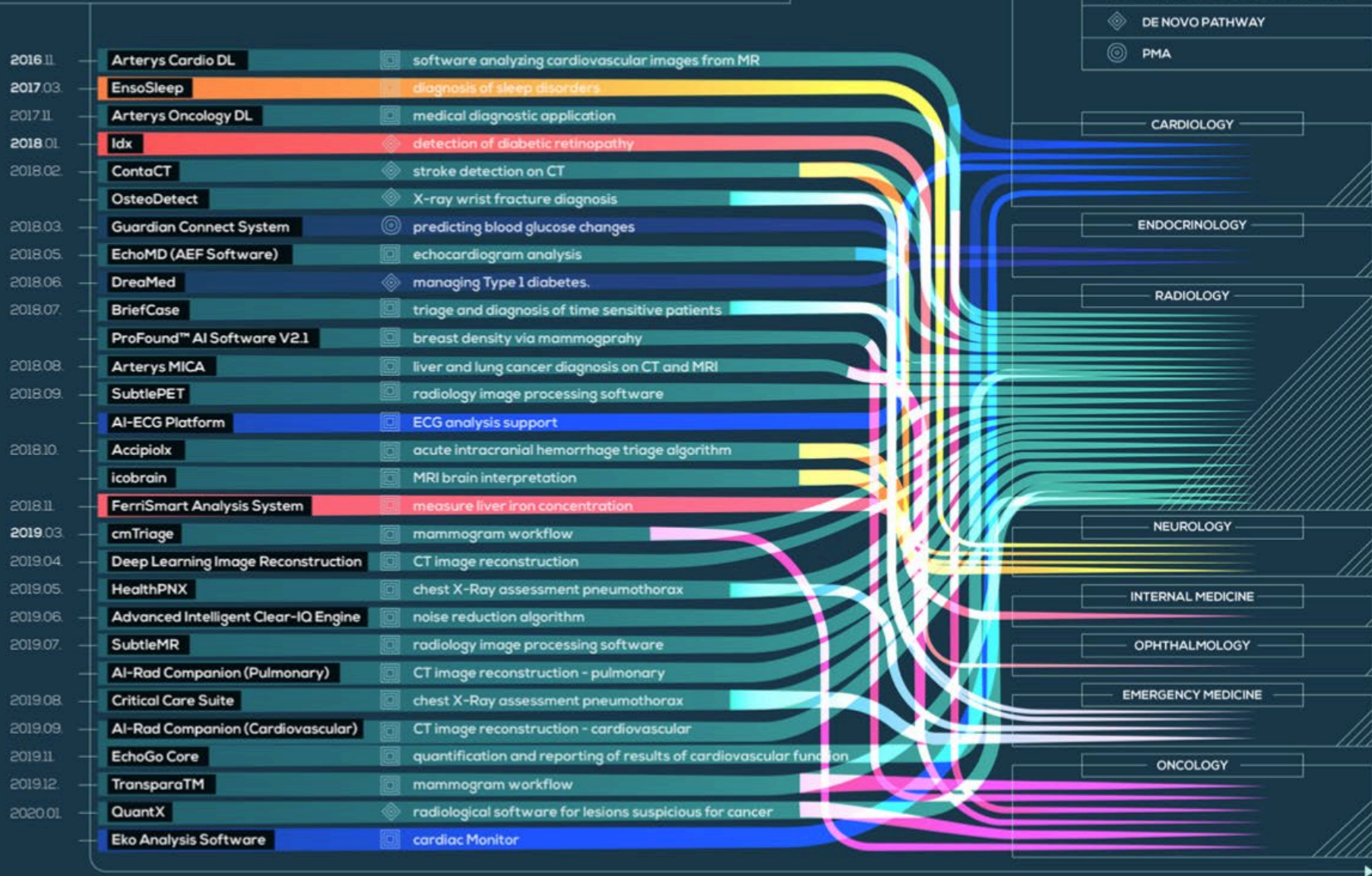
Sune Holm, lektor, IFRO, KU

FDA APPROVALS FOR ARTIFICIAL INTELLIGENCE-BASED DEVICES IN MEDICINE

TYPE OF FDA APPROVAL

- 510(K) PREMARKET NOTIFICATION
- DE NOVO PATHWAY
- PMA

Date	Device	Description
2016.11	Arterys Cardio DL	software analyzing cardiovascular images from MR
2017.03	EnsoSleep	diagnosis of sleep disorders
2017.11	Arterys Oncology DL	medical diagnostic application
2018.01	Idx	detection of diabetic retinopathy
2018.02	ContaCT	stroke detection on CT
	OsteoDetect	X-ray wrist fracture diagnosis
2018.03	Guardian Connect System	predicting blood glucose changes
2018.05	EchoMD (AEF Software)	echocardiogram analysis
2018.06	DreaMed	managing Type 1 diabetes.
2018.07	BriefCase	triage and diagnosis of time sensitive patients
	ProFound™ AI Software V2.1	breast density via mammogrpahy
2018.08	Arterys MICA	liver and lung cancer diagnosis on CT and MRI
2018.09	SubtlePET	radiology image processing software
	AI-ECG Platform	ECG analysis support
2018.10	Accipiolx	acute intracranial hemorrhage triage algorithm
	icobrain	MRI brain interpretation
2018.11	FerriSmart Analysis System	measure liver iron concentration
2019.03	cmTriage	mammogram workflow
2019.04	Deep Learning Image Reconstruction	CT image reconstruction
2019.05	HealthPNX	chest X-Ray assessment pneumothorax
2019.06	Advanced Intelligent Clear-IQ Engine	noise reduction algorithm
2019.07	SubtleMR	radiology image processing software
	AI-Rad Companion (Pulmonary)	CT image reconstruction - pulmonary
2019.08	Critical Care Suite	chest X-Ray assessment pneumothorax
2019.09	AI-Rad Companion (Cardiovascular)	CT image reconstruction - cardiovascular
2019.11	EchoGo Core	quantification and reporting of results of cardiovascular function
2019.12	TransparaTM	mammogram workflow
2020.01	QuantX	radiological software for lesions suspicious for cancer
	Eko Analysis Software	cardiac Monitor

Specialties: CARDIOLOGY · ENDOCRINOLOGY · RADIOLOGY · NEUROLOGY · INTERNAL MEDICINE · OPHTHALMOLOGY · EMERGENCY MEDICINE · ONCOLOGY

Minister bebuder ai-offensiv: Skal afbøde mangel på varme hænder

Et opsigtsvækkende projekt i Køge, som netop er blevet fremlagt for sundhedsministeren, kan være med til at løse den massive mangel på sundhedspersonale. Sådan lyder vurderingen fra Sophie Løhde (V).

Problemerne tårner sig op for de trængte sygehuse, og fremtiden ser sort ud, spår flere analyser. Men nu er et nyt superværktøj imidlertid kommet til. Og det kan være med til at løse manglen på sundhedspersonale, mener sundhedsministeren.
Foto: Mathias Svold

Algoritmisk beslutnings tagning

En beslutningstager overlader en beslutning til en algoritmes output

FDA permits marketing of artificial intelligence-based device to detect certain diabetes-related eye problems

For Immediate Release: April 11, 2018

Español

The U.S. Food and Drug Administration today permitted marketing of the first medical device to use artificial intelligence to detect greater than a mild level of the eye disease diabetic retinopathy in adults who have diabetes.

IDx-DR

- A doctor uploads the digital images of the patient's retinas to a cloud server on which IDx-DR software is installed.

- If the images are of sufficient quality, the software provides the doctor with one of two results:

(1) "more than mild diabetic retinopathy detected: refer to an eye care professional" or

(2) "negative for more than mild diabetic retinopathy; rescreen in 12 months."

https://www.fda.gov/news-events/press-announcements/fda-permits-marketing-artificial-intelligence-based-device-detect-certain-diabetes-related-eye

Dermatologist-level classification of skin cancer with deep neural networks

Andre Esteva, Brett Kuprel, Roberto A. Novoa, Justin Ko, Susan M. Swetter, Helen M. Blau & Sebastian Thrun

"We can train a model, and it can even give us the right answer. But we can't just tell the doctor "my neural network says this patient has cancer!"

The doctor just won't accept that!

They want to know why the neural network says what it says. They want an explanation. They need interpretable models."

Effect of Machine Learning on Dispatcher Recognition of Out-of-Hospit[al] Cardiac Arrest During Calls to Emergency Medical Services
A Randomized Clinical Trial

Stig Nikolaj Blomberg, MsC; Helle Collatz Christensen, MD, PhD; Freddy Lippert, MD; Annette Kjær Ersbøll, MsC, PhD; Christian Torp-Petersen, MD, [...] Michael R. Sayre, MD; Peter J. Kudenchuk, MD; Fredrik Folke, MD, PhD

- **Findings**
  - There was **no significant improvement** in recognition of out-of-hospital cardiac arrest during calls on which the model alerted dispatchers vs those on which it did not
  - The machine learning **model had higher sensitivity than dispatchers** alone.

Effect of Machine Learning on Dispatcher Recognition of Out-of-Hospital Cardiac Arrest During Calls to Emergency Medical Services
A Randomized Clinical Trial

Stig Nikolaj Blomberg, MsC; Helle Collatz C
Michael R. Sayre, MD; Peter J. Kudenchuk,

Algorithm Aversion: People Erroneously Avoid Algorithms After Seeing Them Err

Berkeley J. Dietvorst, Joseph P. Simmons, and Cade Massey
University of Pennsylvania

Research shows that evidence-based algorithms more accurately predict the future than do human forecasters. Yet when forecasters are deciding whether to use a human forecaster or a statistical algorithm, they often choose the human forecaster. This phenomenon, which we call *algorithm aversion*, is costly, and it is important to understand its causes. We show that people are especially averse to algorithmic forecasters after seeing them perform, even when they see them outperform a human forecaster. This is because people more quickly lose confidence in algorithmic than human forecasters after seeing them make the same mistake. In 5 studies, participants either saw an algorithm make forecasts, a human make forecasts, both, or neither. They then decided whether to tie their incentives to the future predictions of the algorithm or the human. Participants who saw the algorithm perform were less confident in it, and less likely to choose it over an inferior human forecaster. This was true even among those who saw the algorithm outperform the human.
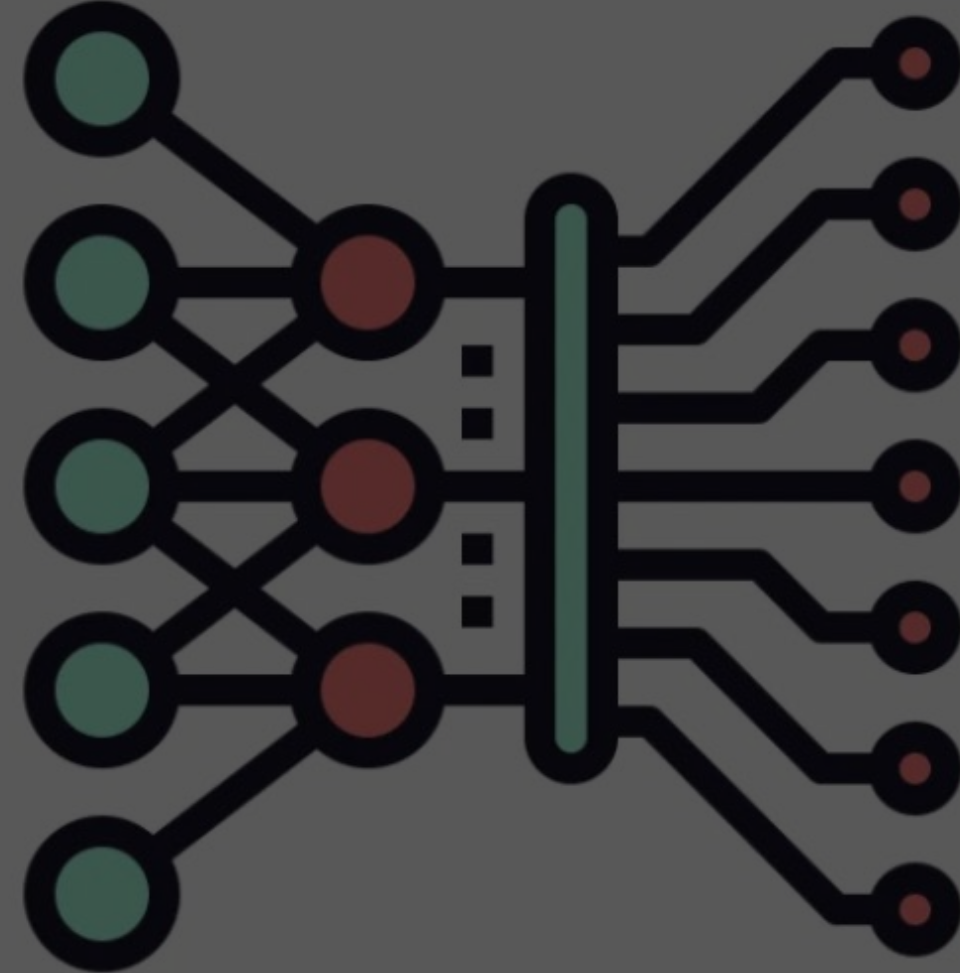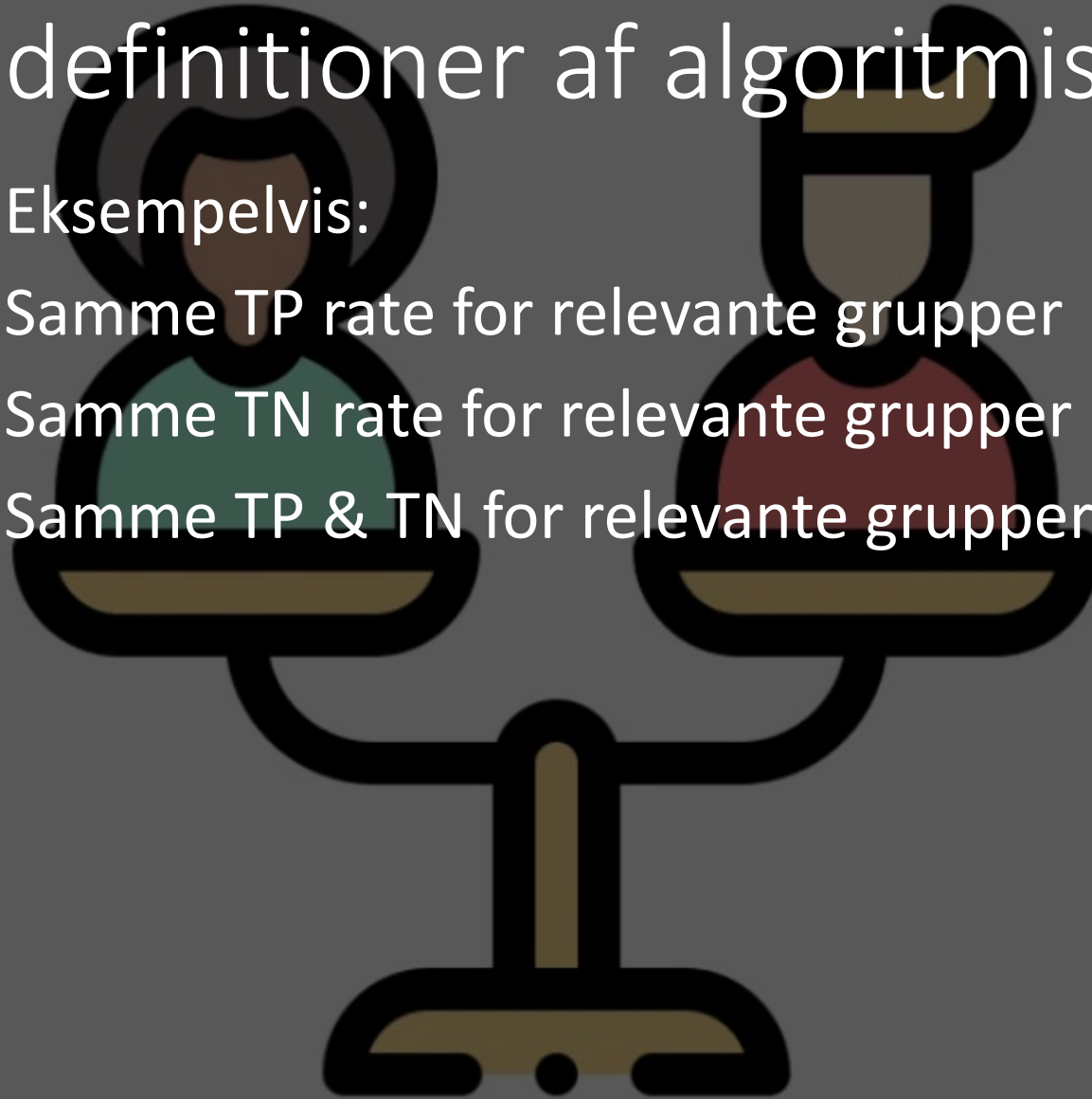
Forskellige mål for algoritme performance og definitioner af algoritmisk fairness

Eksempelvis:

Samme TP rate for relevante grupper
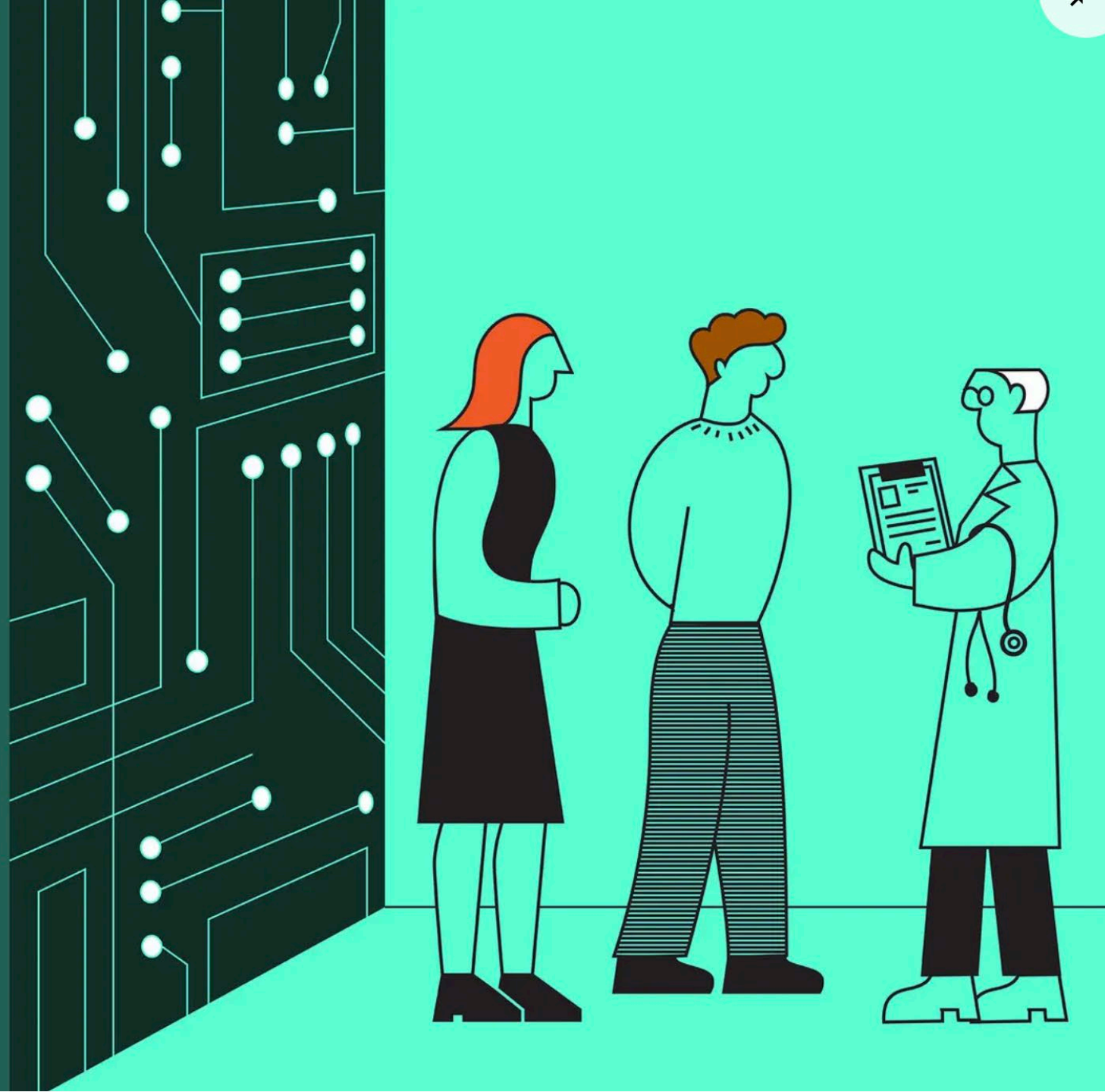
Samme TN rate for relevante grupper

Samme TP & TN for relevante grupper

Der kan være stor forskel i fejlrater for forskellige befolkningsgrupper

Det kan resultere i store forskelle i adgang til sundhedsydelser

"Hvem har det største behov?"

Characteristics of publicly available skin cancer image datasets: a systematic review

David Wen, BMBCh • Saad M Khan, MBChB • Antonio Ji Xu, BMBCh • Hussein Ibrahim, MBChB • Luke Smith, BSc •

Jose Caballero, MSc • et al. Show all authors • Show footnotes

- 2,436 out of 106,950 images within 21 databases had skin type recorded.
- Of these, only 10 images were from people recorded as having brown skin and one was from an individual recorded as having dark brown or black skin.
- No images were from individuals with an African, African-Caribbean or South Asian background.
- Coupled with the geographical origins of datasets, there was massive under-representation of skin lesion images from darker-skinned populations."

Dissecting racial bias in an algorithm used to manage the health of populations

Ziad Obermeyer [1] [2], Brian Powers [3], Christine Vogeli [4], Sendhil Mullainathan [5]

Affiliations + expand

- At a given risk score, Black patients are considerably sicker than White patients, as evidenced by signs of uncontrolled illnesses.
- The bias arises because the algorithm predict[s] health care costs rather than illness
- Choice of convenient, seemingly effective proxies for ground truth can be an important source of algorithmic bias.
- Remedying this disparity would increase the percentage of Black patients receiving additional help from 17.7 to 46.5%.

• Hvem har ansvaret for algoritmiske beslutninger?
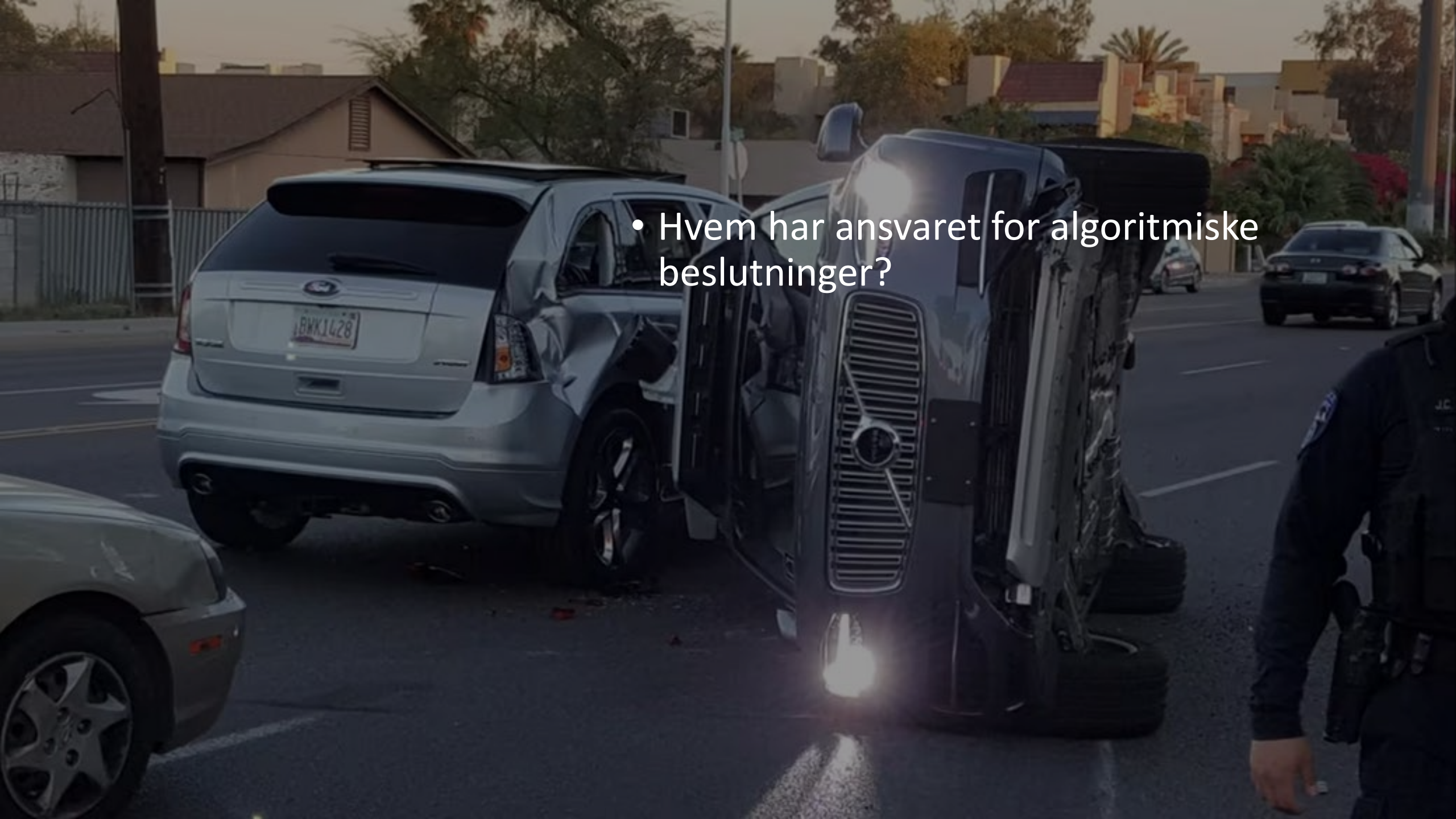
Hvordan skal AI anbefalinger indgå i læge-patient relationen?

Bør patienter have krav på en AI-vurdering?

Tak for opmærksomheden…