Inteligencia Artificial y salud

separando hechos de ficción

Ignacio H. Medrano

24 noviembre 2022

English | Chinese (Simplified)

evidence
ˈevədəns

证据
Zhèngjù

Translations of evidence

noun

证据
evidence, proof, testimony

表明
evidence, demonstration, manifestation, declaration, proclamation, witness

明显
evidence, distinctness, patency, nakedness

Show more

Machine learning

Set
of
solved problems

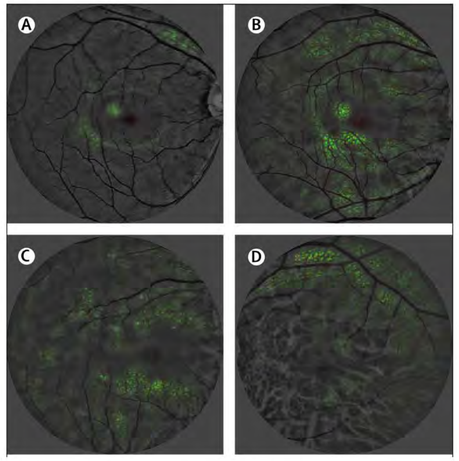
Inference
of
rules

Anticipation
of
unseen problems


amazon
Prim
NETFLIX

What the Machine Sees in the Retina

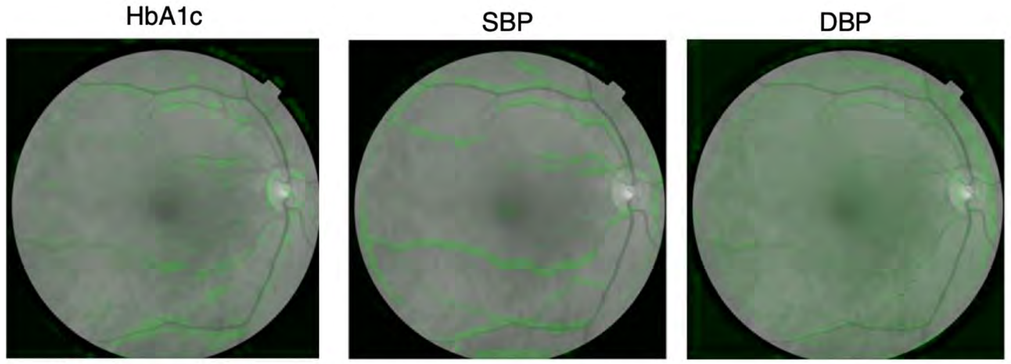
Kidney Disease



A deep learning algorithm to detect chronic kidney disease from retinal photographs in community-based populations

Lancet Digital Health May 2020

Diabetes and Blood Pressure Control



Prediction of cardiovascular risk factors from retinal fundus photographs via deep learning

nature biomedical engineering March 2018

Alzheimer's Disease

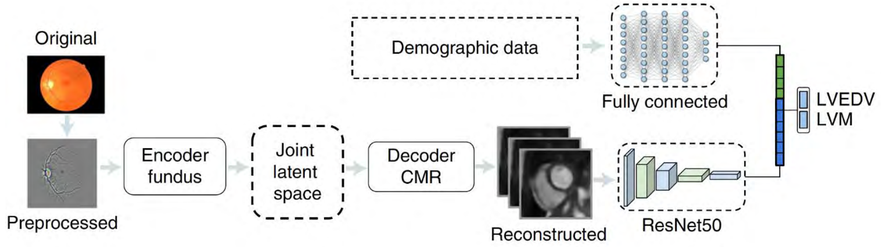
A system based on AI will scan the retina for signs of Alzheimer's

AlzEye
Detecting signs of dementia in the retina

Moorfields Eye Hospital NHS Foundation Trust

Lancet Digit Health :Sept 2022

Predicting heart attack

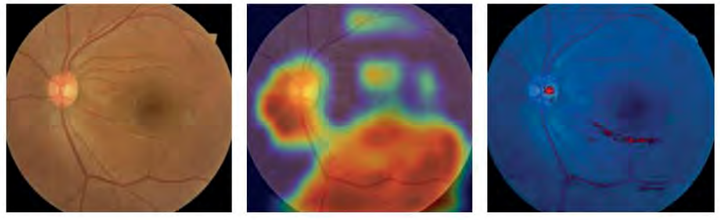


nature machine intelligence

Predicting myocardial infarction through retinal scans and minimal personal information

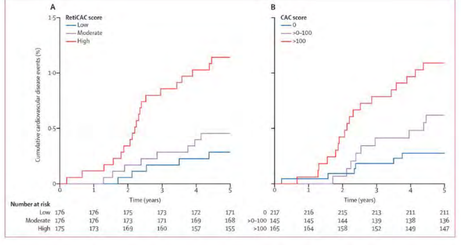
Jan 2022

Liver and Gall Bladder Disease



Lancet Digit Health Feb 2021

Heart Calcium Score



Lancet Digit Health Apr 2021

PLOS ONE

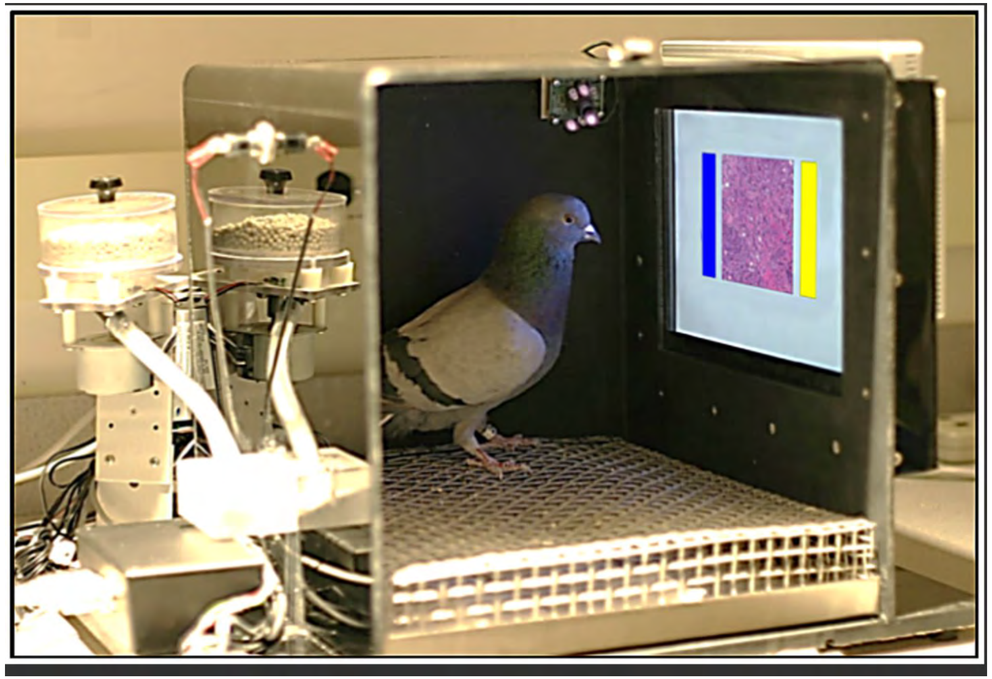
OPEN ACCESS PEER-REVIEWED

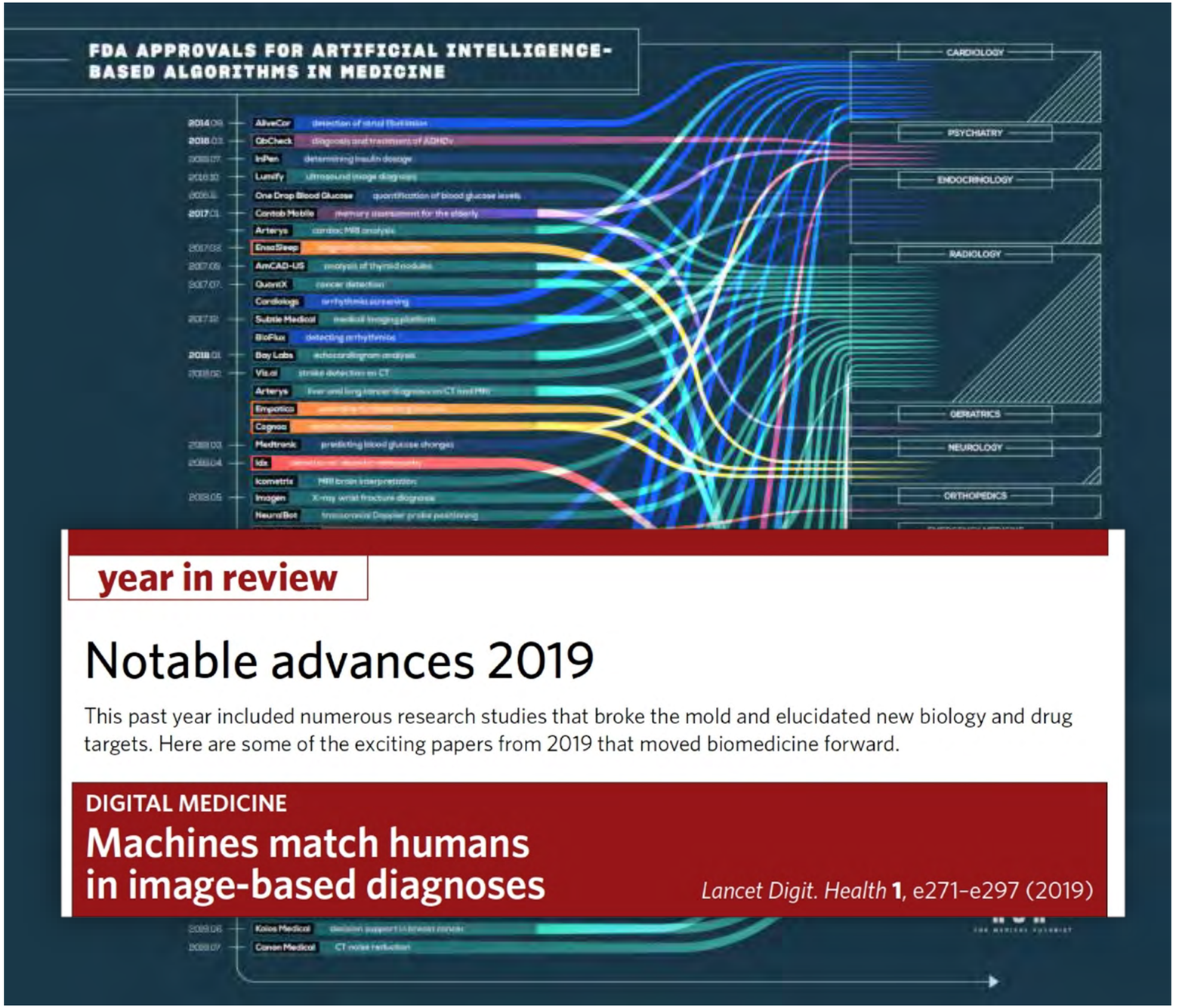
RESEARCH ARTICLE

Pigeons (*Columba livia*) as Trainable Observers of Pathology and Radiology Breast Cancer Images

Richard M. Levenson, Elizabeth A. Krupinski, Victor M. Navarro, Edward A. Wasserman

Published: November 18, 2015 • https://doi.org/10.1371/journal.pone.0141357





year in review

Notable advances 2019

This past year included numerous research studies that broke the mold and elucidated new biology and drug targets. Here are some of the exciting papers from 2019 that moved biomedicine forward.

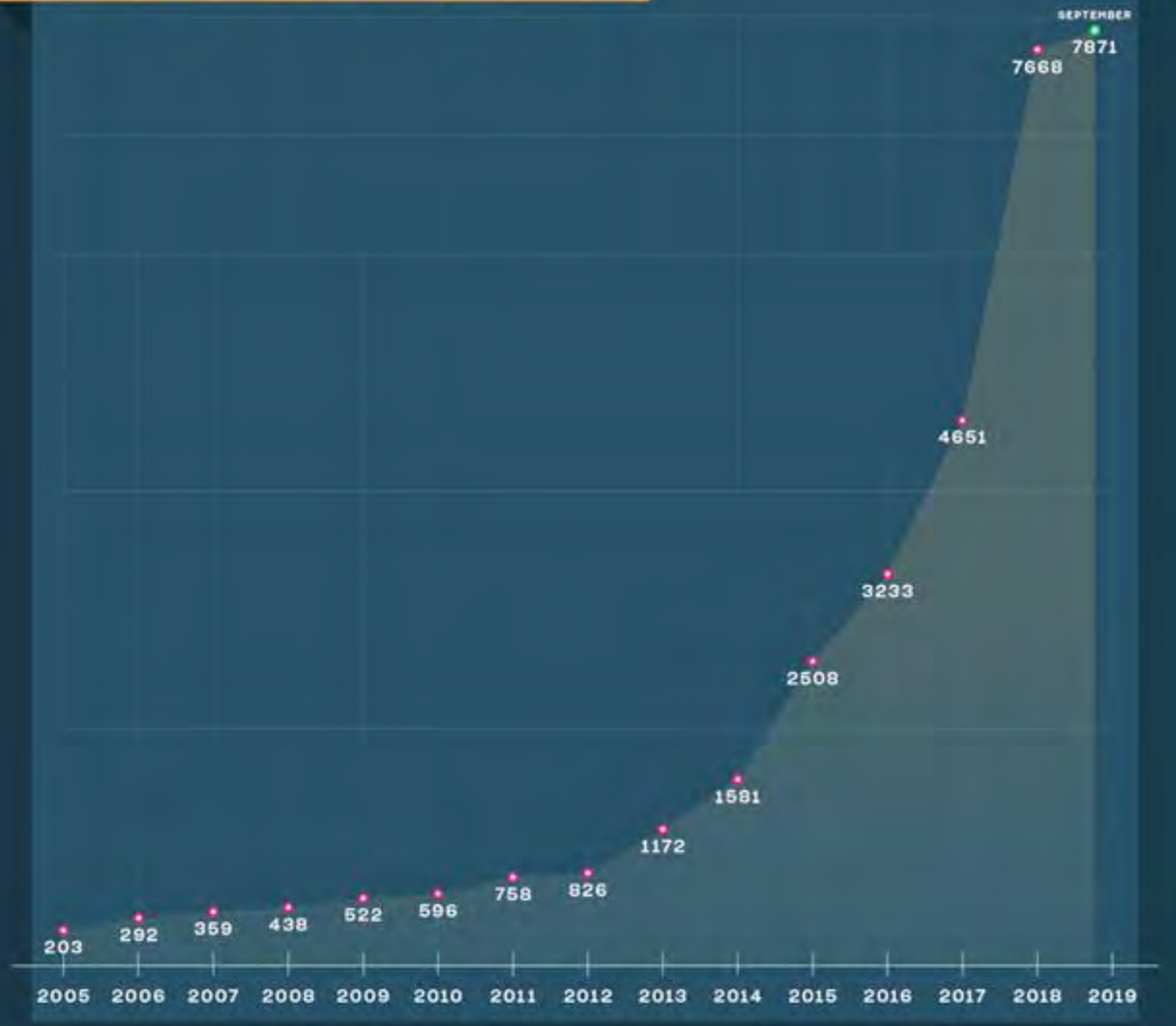
DIGITAL MEDICINE

Machines match humans in image-based diagnoses

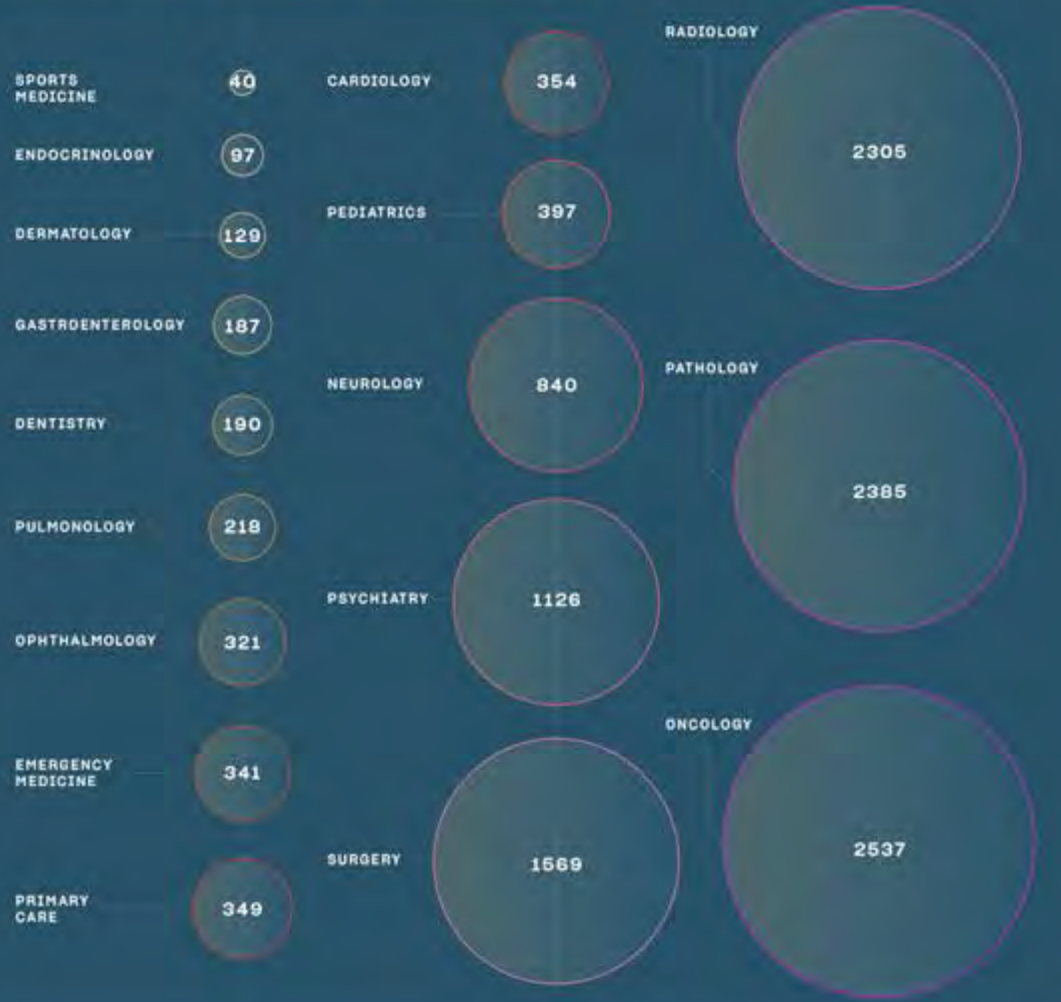
Lancet Digit. Health **1**, e271–e297 (2019)

MACHINE AND DEEP LEARNING STUDIES ON PUBMED.COM

TOTAL NUMBER OF STUDIES



STUDIES PER SPECIALTY



NIH National Library of Medicine
National Center for Biotechnology Information

PubMed.gov

machine learning occupational health

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330 results Page 1 of 33

RESULTS BY YEAR

Reset

1999 2021

TEXT AVAILABILITY

Abstract

1 Cite Share

Ethical Considerations of Using **Machine Learning** for Decision Support in **Occupational Health**: An Example Involving Periodic Workers' **Health** Assessments.

Six Dijkstra MWMC, Siebrand E, Dorrestijn S, Salomons EL, Reneman MF, Oosterveld FGJ, Soer R, Gr DP, Bieleman HJ.

J Occup Rehabil. 2020 Sep;30(3):343-353. doi: 10.1007/s10926-020-09895-x.

PMID: 32500471 Free PMC article. Review.

Purpose Computer algorithms and **Machine Learning** (ML) will be integrated into clinical decision support within **occupational health** care. ...The aim of this study was to explore ethical considerati and potential consequences of using ML based decisio ...

7 Cite Share

Machine Learning for Work Disability Prevention: Introduction to the Special Series.

Gross DP, Steenstra IA, Harrell FE Jr, Bellinger C, Zaïane O.

J Occup Rehabil. 2020 Sep;30(3):303-307. doi: 10.1007/s10926-020-09910-1.

PMID: 32623556

Rapid development in computer technology has led to sophisticated methods of analyzing large datasets with the aim of improving human decision making. Artificial Intelligence and **Machine Learning** (ML) approaches hold tremendous potential for solving complex real-wor ...

8 Cite Share

Intelligent Robotics Incorporating **Machine Learning** Algorithms for Improving Functional Capacity Evaluation and **Occupational** Rehabilitation.

Fong J, Ocampo R, Gross DP, Tavakoli M.

J Occup Rehabil. 2020 Sep;30(3):362-370. doi: 10.1007/s10926-020-09888-w.

PMID: 32253595 Review.

This paper reviews efforts to develop robotic FCE solutions that incorporate **machine learning** algorithms. Methods We reviewed the literature regarding rehabilitation robotics, with an emphasis on novel techniques incorporating robotics and **machine learning** ...

9 Cite Share

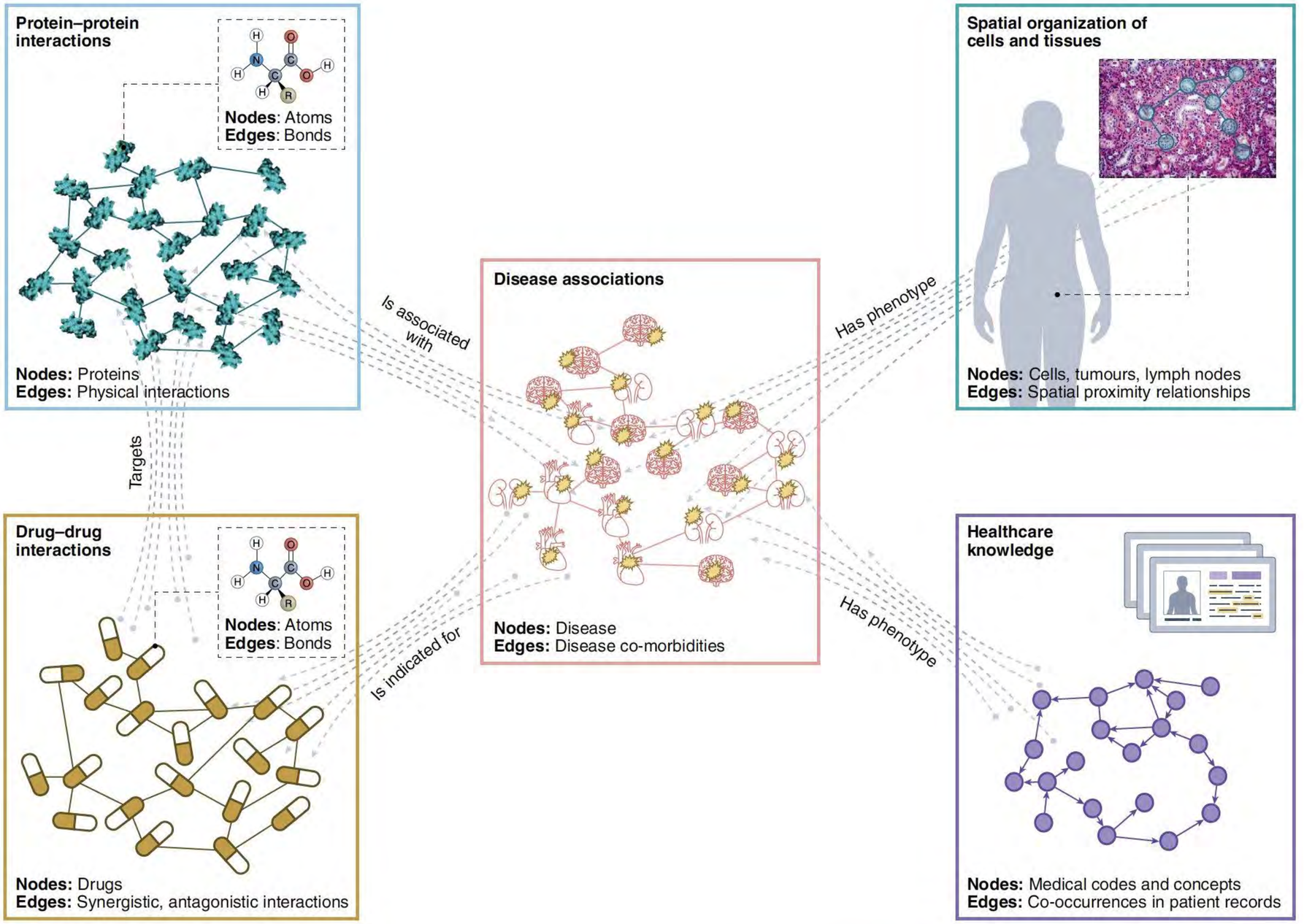
The development of a **machine learning** algorithm to identify **occupational** injuries in agriculture using pre-hospital care reports.

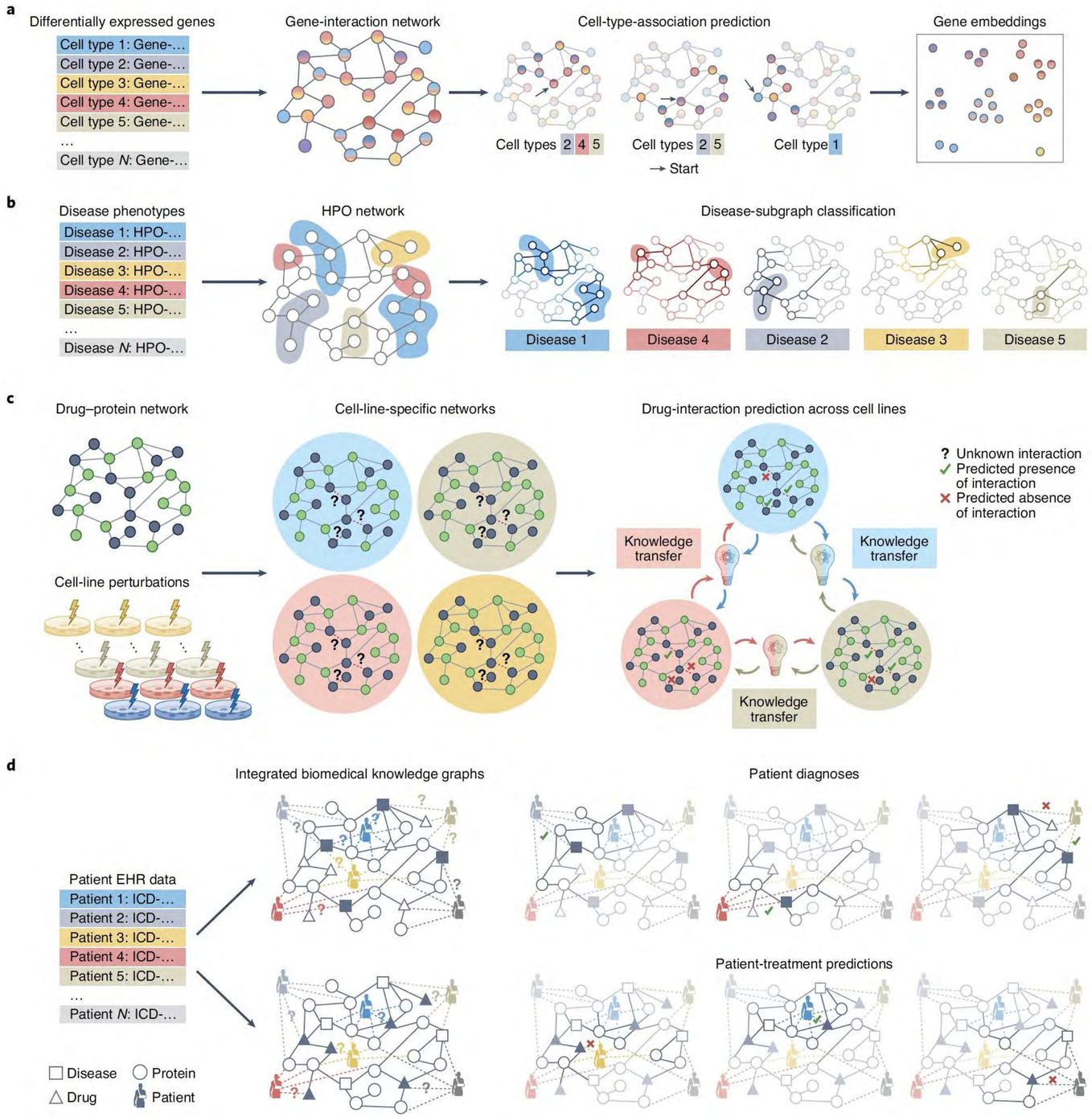
Scott E, Hirabayashi L, Levenstein A, Krupa N, Jenkins P.

Health Inf Sci Syst. 2021 Jul 29;9(1):31. doi: 10.1007/s13755-021-00161-9. eCollection 2021 Dec.

PMID: 34422257 Free PMC article.

This paper describes the development of a Naive Bayes **machine learning** algorithm to identify **occupational** injuries in agriculture using existing administrative data, specifically in pre-hospital care reports (PCR). METHODS: A Naive Bayes **machine lea** ...


Protein–protein interactions
Nodes: Atoms
Edges: Bonds
Nodes: Proteins
Edges: Physical interactions
Is associated with
Disease associations
Nodes: Disease
Edges: Disease co-morbidities
Has phenotype
Spatial organization of cells and tissues
Nodes: Cells, tumours, lymph nodes
Edges: Spatial proximity relationships
Targets
Drug–drug interactions
Nodes: Atoms
Edges: Bonds
Nodes: Drugs
Edges: Synergistic, antagonistic interactions
Is indicated for
Has phenotype
Healthcare knowledge
Nodes: Medical codes and concepts
Edges: Co-occurrences in patient records
Biological scale


a
Differentially expressed genes
Cell type 1: Gene-…
Cell type 2: Gene-…
Cell type 3: Gene-…
Cell type 4: Gene-…
Cell type 5: Gene-…
…
Cell type N: Gene-…
Gene-interaction network
Cell-type-association prediction
Cell types 2 4 5
Cell types 2 5
→ Start
Cell type 1
Gene embeddings
b
Disease phenotypes
Disease 1: HPO-…
Disease 2: HPO-…
Disease 3: HPO-…
Disease 4: HPO-…
Disease 5: HPO-…
…
Disease N: HPO-…
HPO network
Disease-subgraph classification
Disease 1
Disease 4
Disease 2
Disease 3
Disease 5
c
Drug–protein network
Cell-line perturbations
Cell-line-specific networks
Drug-interaction prediction across cell lines
? Unknown interaction
✓ Predicted presence of interaction
✕ Predicted absence of interaction
Knowledge transfer
Knowledge transfer
Knowledge transfer
d
Integrated biomedical knowledge graphs
Patient diagnoses
Patient EHR data
Patient 1: ICD-…
Patient 2: ICD-…
Patient 3: ICD-…
Patient 4: ICD-…
Patient 5: ICD-…
…
Patient N: ICD-…
Patient-treatment predictions
Disease
Protein
Drug
Patient

nature machine intelligence

ARTICLES

https://doi.org/10.1038/s42256-020-0154-9

Check

Deep-learning-based prediction of late age-rela macular degeneration progression

Qi Yan[1,7] ✉, Daniel E. Weeks[2,3], Hongyi Xin[1], Anand Swaroop[4], Emily Y. Chew[5], Heng Huar Ying Ding[3,7] ✉ and Wei Chen[1,2,3,7] ✉

Both genetic and environmental factors influence the etiology of age-related macular degeneration (AMD), a leading

nature

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nature › news › article

WS · 22 JULY 2019

l protein-folding algorithms solve tructures faster than ever

ep learning makes its mark on protein-structure prediction.

nature cancer

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Article | Open Access | Published: 29 August 2022

Multimodal integration of radiology, pathology and genomics for prediction of response to PD-(L)1 blockade in patients with non-small cell lung cancer

Rami S. Vanguri, Jia Luo, Andrew T. Aukerman, Jacklynn V. Egger, Christopher J. Fong, Natally Horvat, Andrew Pagano, Jose de Arimateia Batista Araujo-Filho, Luke Geneslaw, Hira Rizvi, Ramon Sosa, Kevin M. Boehm, Soo-Ryum Yang, Francis M. Bodd, Katia Ventura, Travis J. Hollmann, Michelle S. Ginsberg, Jianjiong Gao, MSK MIND Consortium, Matthew D. Hellmann, Jennifer L. Sauter ✉ & Sohrab P. Shah ✉

Nature Cancer (2022) | Cite this article

7547 Accesses | 95 Altmetric | Metrics

Article | Open Access | Published: 17 December 2020

Multimodal fusion with deep neural networks for leveraging CT imaging and electronic health record: a case-study in pulmonary embolism detection

Shih-Cheng Huang ✉, Anuj Pareek, Roham Zamanian, Imon Banerjee & Matthew P. Lungren

Scientific Reports **10**, Article number: 22147 (2020) | Cite this article

THE LANCET
Digital Health

REVIEW | ONLINE FIRST

PDF [3

Artificial intelligence in COVID-19 drug repurposing

Yadi Zhou, PhD † • Prof Fei Wang, PhD † • Prof Jian Tang, PhD † • Prof Ruth Nussinov, PhD • Prof Feixiong Cheng, PhD • Show footnotes

Open Access • Published: September 18, 2020 • DOI: https://doi.org/10.1016/S2589-7500(20)30192-8 •

Clinical Natural Language Processing

Machine learning applied to records

Multi-language

Anonymization

Section Detection

NER (Named Entity Recognition)

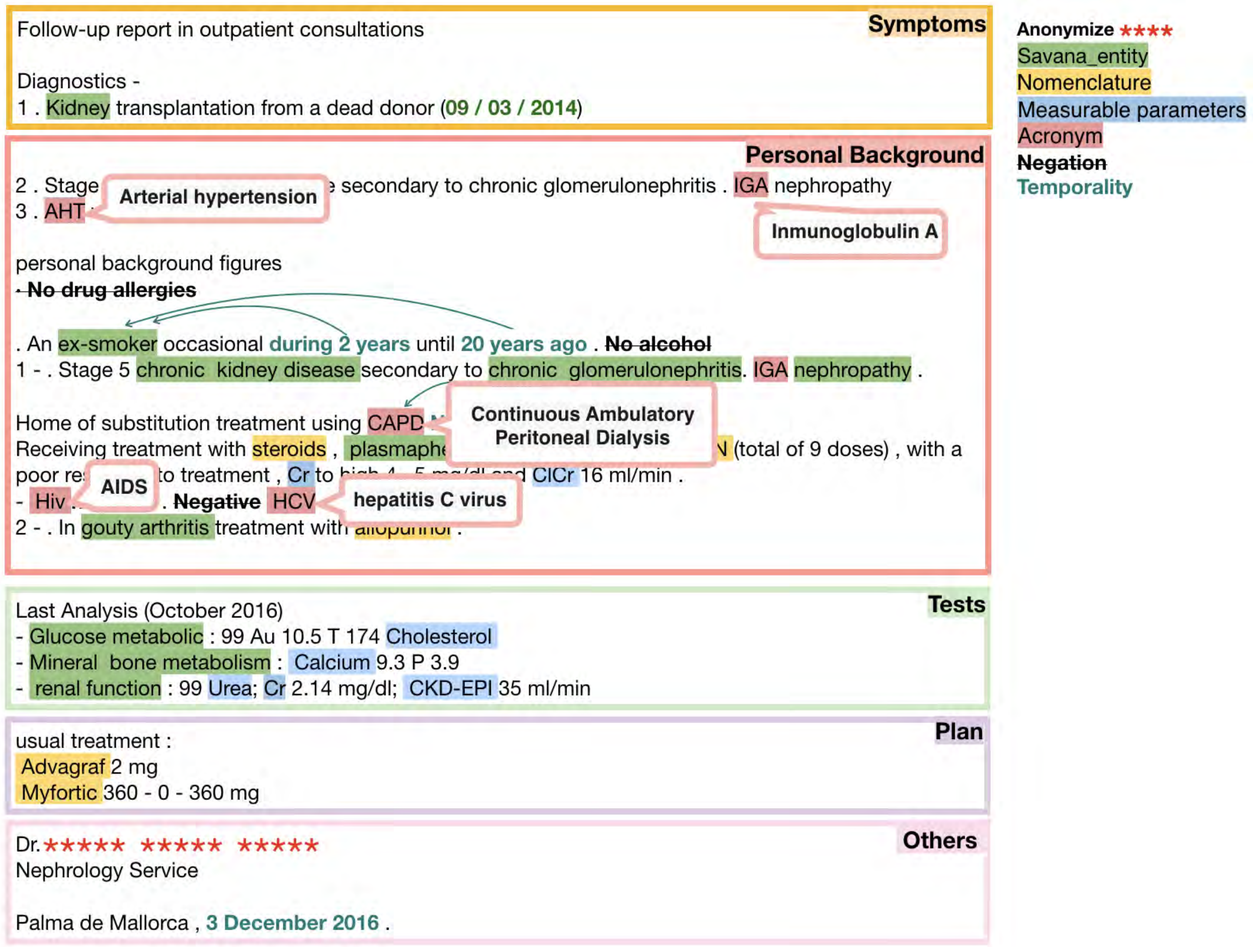
Negation/Speculation

Temporality

NED (Named Entity

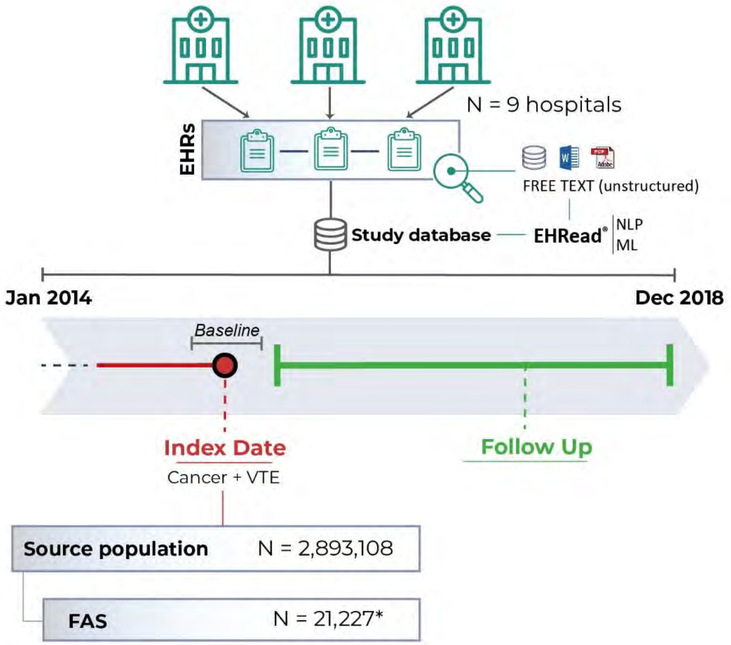
Disambiguation

AcronymNED

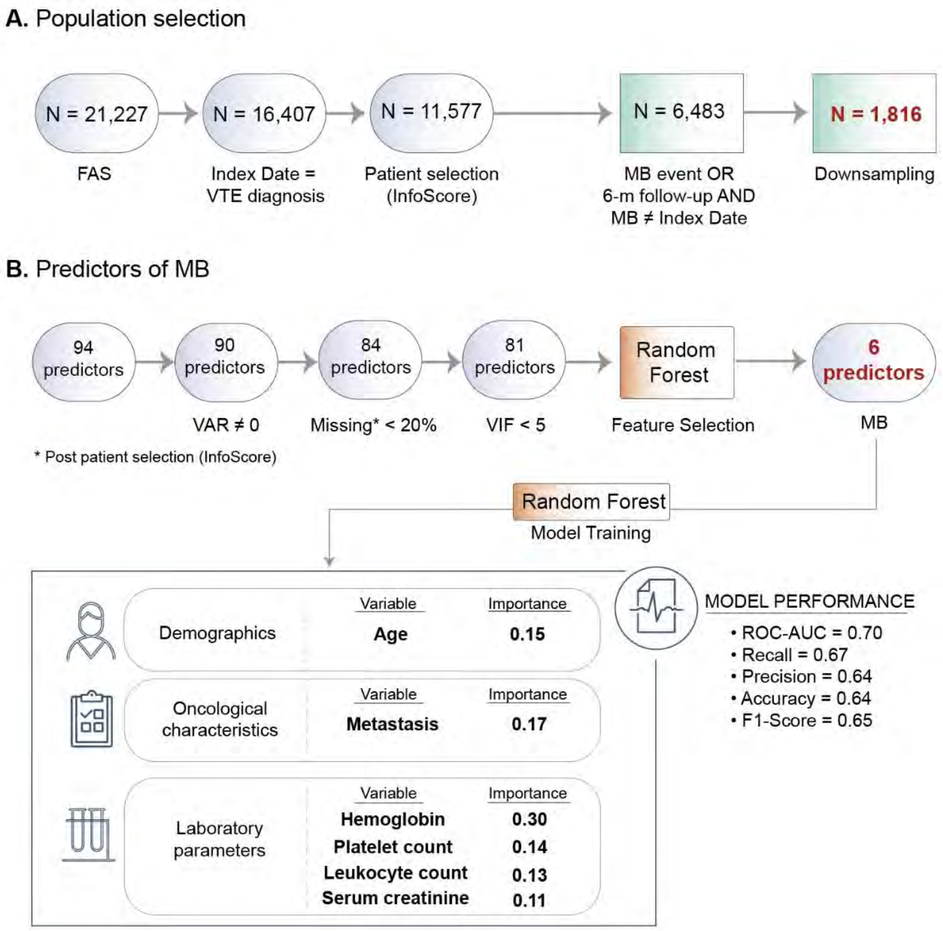


Predicting major bleeding in Cancer+VTE patients treated with oral anticoagulants

1. Data collection and processing

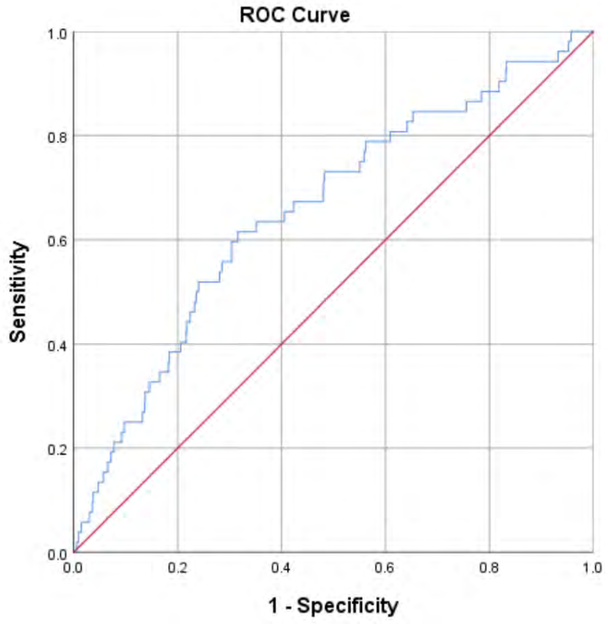


2. Model training and internal validation



3. External validation

Cohort of **2,218 patients** from a **prospective** cancer + thrombosis registry (TESEO) from the Spanish Society for Medical Oncology (SEOM)[1]

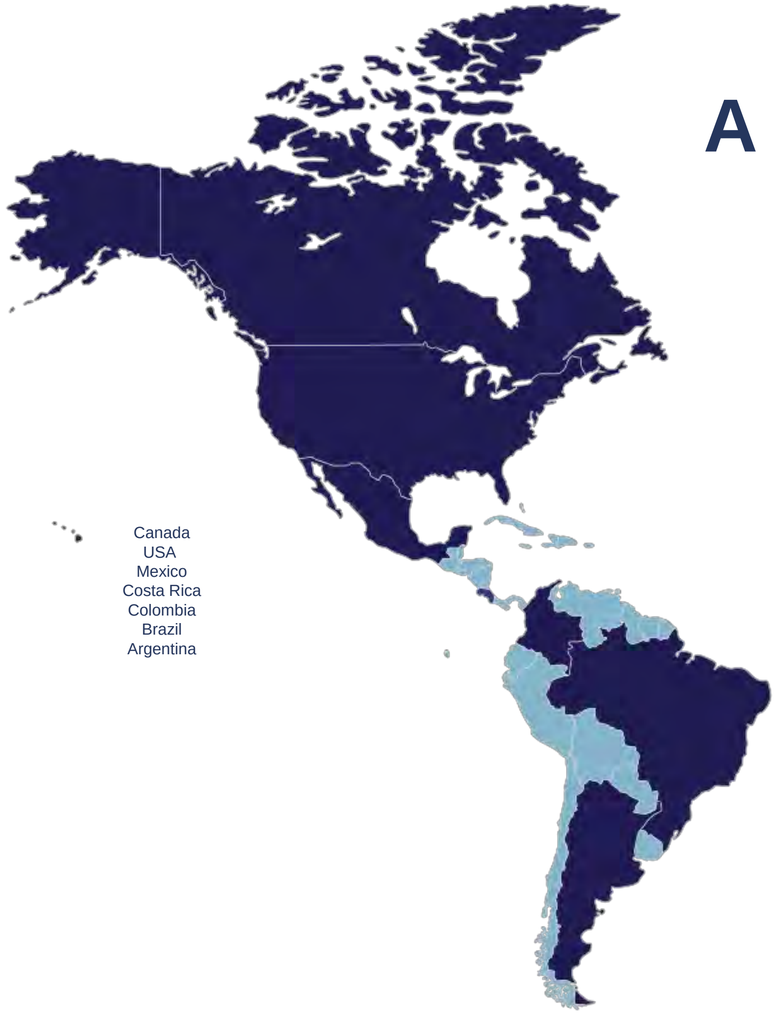


[1] Muñoz AJ, et al. Clin Transl Oncol. 2020 Aug;22(8):1423-1424.

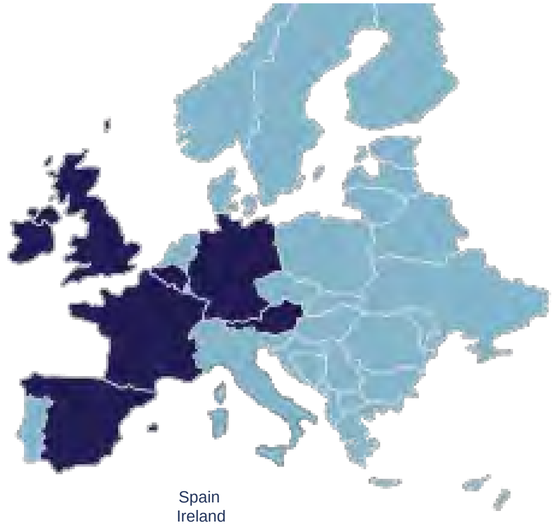
A Global Research Ecosystem

We connect a network of

200 hospitals



Canada
USA
Mexico
Costa Rica
Colombia
Brazil
Argentina

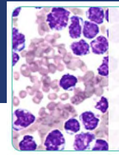


Spain
Ireland
UK
France
Belgium
Switzerland
Austria

+200 Partners:

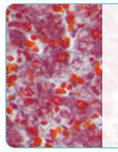
SAVANA

With high-validity virtual registries across 16 Therapeutic Areas.



Hematology

Chronic Lymphocytic Leukemia	*Closed*
Multiple Myeloma and Amyloidosis	*Closed*

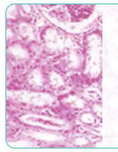


Hepatology

Predictive factors in hepatitis C	*Closed*
Thrombocytopenia in Chronic Liver Disease	*Closed*

Immunology

Primary & Secondary Immunodeficiencies	**Enroling**

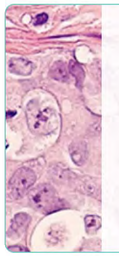


Nephrology

Chronic Kidney Disease	*Closed*

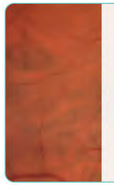
Neurology

Epilepsy	**Enroling**
Ischemic Stroke	**Enroling**
Motor Neuron Disease/Amyotrophic lateral sclerosis	*Closed*
Multiple Sclerosis	**Enroling**
Post-stroke spasticity with Botulinum Toxin	**Enroling**



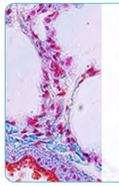
Oncology

Bleeding & Recurrence Risk-Cancer	**Enroling**
Head & Neck Cancer	**Enroling**
Metastatic Colorectal Cancer	**Enroling**
Neuroendocrine Tumors	**Enroling**
Prostate Cancer	**Enroling**



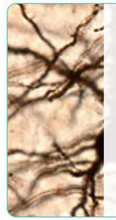
Ophthalmology

Conjunctivitis	*Closed*



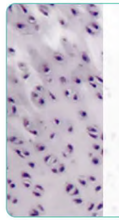
Pneumology

COPD	**Enroling**
COVID-19	**Enroling**
Severe Asthma	*Closed*



Psychiatry

Schizophrenia	**Enroling**



Rheumatology

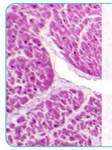
Spondyloarthritis	**Enroling**
Psoriatic Arthritis	**Enroling**
Rheumatoid Arthritis	**Enroling**
Rheumatoid Arthritis and Interstitial Lung Disease	**Enroling**

Traumatology & Orthopedics

Hip Fractures	*Closed*
Second Hip Fractures	**Enroling**
Carpal Tunnel	**Enroling**

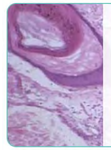
ICU

Sepsis	**Enroling**



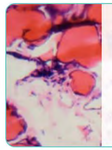
Cardiology

Anticoagulants in Atrial Fibrillation	*Closed*
Coronary disease and Diabetes Mellitus type II	*Closed*



Dermatology

Psoriasis *(Colombia only)*	**Enroling**
Onychomycosis	**Enroling**

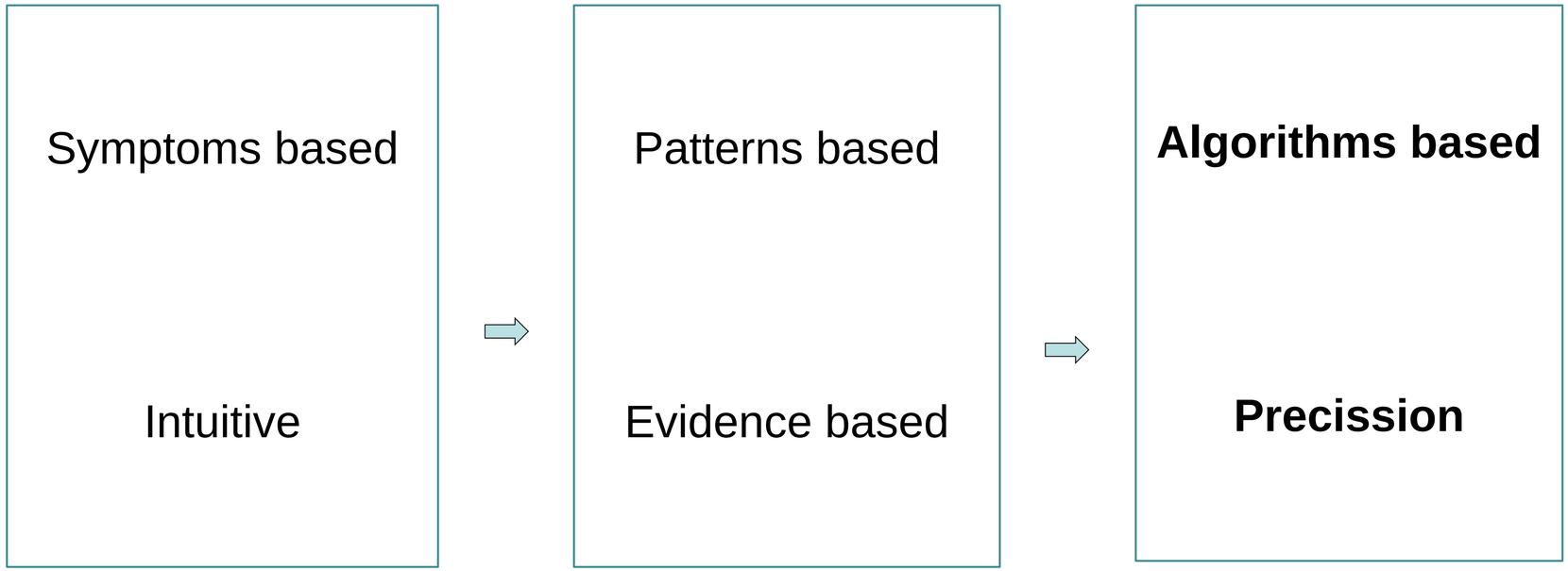


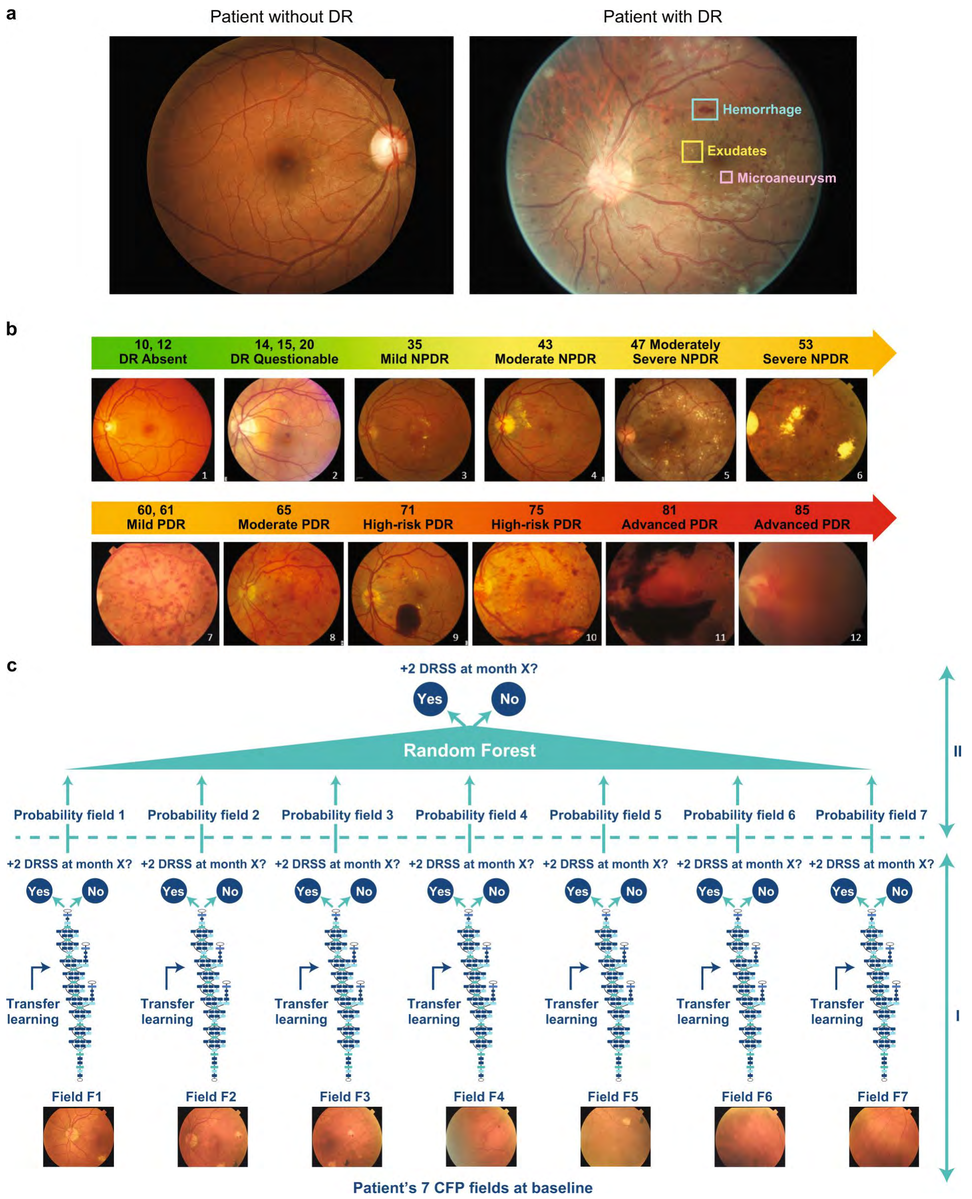
Endocrinology

Diabetes Mellitus Type I & II	*Closed*
Hyperparathyroidism	*Closed*

Gastroenterology

Crohn's Disease	*Closed*


Symptoms based
Intuitive
Patterns based
Evidence based
Algorithms based
Precission



September 3, 2020

Cost-effectiveness of Autonomous Point-of-Care Diabetic Retinopathy Screening for Pediatric Patients With Diabetes

Risa M. Wolf, MD[1]; Roomasa Channa, MD[2]; Michael D. Abramoff, MD, PhD[3,4,5,6,7]; et al

Author Affiliations

JAMA Ophthalmol. Published online September 3, 2020. doi:10.1001/jamaophthalmol.2020.3190

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

FDA News Release

For Immediate Release

A Human-Centered Evaluation of a Deep Learning System Deployed in Clinics for the Detection of Diabetic Retinopathy

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lauravar@google.com

THE LANCET

Log

COMMENT | VOLUME 393, ISSUE 10181, P1577-1579, APRIL 20, 2019

Purch

Reporting of artificial intelligence prediction models

Gary S Collins • Karel G M Moons

Published: April 20, 2019 • DOI: https://doi.org/10.1016/S0140-6736(19)30037-6 • Check for updates

THE LANCET

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PERSPECTIVES | DIGITAL MEDICINE | VOLUME 399, ISSUE 10325, P620, FEBRUARY 12, 2022

Bridging the chasm between AI and clinical implementation

Angela Aristidou • Rajesh Jena • Eric J Topol

Published: February 12, 2022 • DOI: https://doi.org/10.1016/S0140-6736(22)00235-5 • Check for updates

Correspondence | Published: 01 February 2021

DECIDE-AI: new reporting guidelines to bridge the development-to-implementation gap in clinical artificial intelligence

The DECIDE-AI Steering Group

Nature Medicine **27**, 186–187(2021) | Cite this article

FEATURED

MINIMAR (MINimum Information for Medical AI Reporting): Developing reporting standards for artificial intelligence in health care

Tina Hernandez-Boussard ✉, Selen Bozkurt, John P A Ioannidis, Nigam H Shah

Journal of the American Medical Informatics Association, Volume 27, Issue 12, December 2020, Pages 2011–2015, https://doi.org/10.1093/jamia/ocaa088

Published: 28 June 2020 **Article history** ▾

Comment | Published: 09 September 2020

Minimum information about clinical artificial intelligence modeling: the MI-CLAIM checklist

Beau Norgeot, Giorgio Quer, Brett K. Beaulieu-Jones, Ali Torkamani, Raquel Dias, Milena Gianfrancesco, Rima Arnaout, Isaac S. Kohane, Suchi Saria, Eric Topol, Ziad Obermeyer, Bin Yu & Atul J. Butte ✉

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Reading Race: AI Recognises Patient's Racial Identity In Medical Images

Imon Banerjee, Ananth Reddy Bhimireddy, John L. Burns, Leo Anthony Celi, Li-Ching Chen, Ramon Correa, Natalie Dullerud, Marzyeh Ghassemi, Shih-Cheng Huang, Po-Chih Kuo, Matthew P Lungren, Lyle Palmer, Brandon J Price, Saptarshi Purkayastha, Ayis Pyrros, Luke Oakden-Rayner, Chima Okechukwu, Laleh Seyyed-Kalantari, Hari Trivedi, Ryan Wang, Zachary Zaiman, Haoran Zhang, Judy W Gichoya

Background: In medical imaging, prior studies have demonstrated disparate AI performance by race, yet there is no known correlation for race on medical imaging that would be obvious to the human expert interpreting the images.

Methods: Using private and public datasets we evaluate: A) performance quantification of deep learning models to detect race from medical images, including the ability of these models to generalize to external environments and across multiple imaging modalities, B) assessment of possible confounding anatomic and phenotype population features, such as disease distribution and body habitus as predictors of race, and C) investigation into the underlying mechanism by which AI models can recognize race.

Findings: Standard deep learning models can be trained to predict race from medical images with high performance across multiple imaging modalities. Our findings hold under external validation conditions, as well as when models are optimized to perform clinically motivated tasks. We demonstrate this detection is not due to trivial proxies or imaging-related surrogate covariates for race, such as underlying disease distribution. Finally, we show that performance persists over all anatomical regions and frequency spectrum of the images suggesting that mitigation efforts will be challenging and demand further study.

Interpretation: We emphasize that model ability to predict self-reported race is itself not the issue of importance. However, our findings that AI can trivially predict self-reported race -- even from corrupted, cropped, and noised medical images -- in a setting where clinical experts cannot, creates an enormous risk for all model deployments in medical imaging: if an AI model secretly used its knowledge of self-reported race to misclassify all Black patients, radiologists would not be able to tell using the same data the model has access to.

~~Explainability~~

[Submitted on 21 Jul 2021]

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JAMA Neurology

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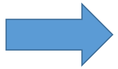
Original Investigation

January 13, 2020

Assessment of the Validity of the 2HELPS2B Score for Inpatient Seizure Risk Prediction

Aaron F. Struck, MD[1]; Mohammad Tabaeizadeh, MD[2]; Sarah E. Schmitt, MD[3]; et al

Interpretability



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Multi-Institutional Validation of a Mammography-Based Breast Cancer Risk Model

Adam Yala, MEng[1,2]; Peter G. Mikhael, BS[1,2]; Fredrik Strand, MD, PhD[3,4]; Gigin Lin, MD, PhD[5]; Siddharth Satuluru, BS[6]; Thomas Kim, MS[7]; ...

Transportability

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Research Letter

ONLINE FIRST

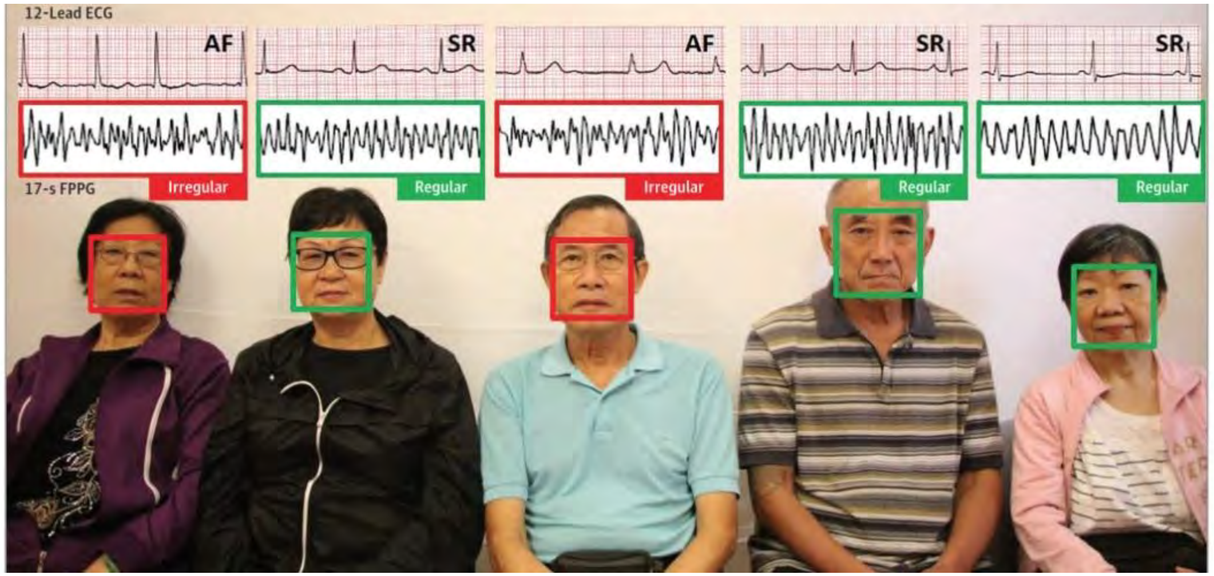
November 27, 2019

High-Throughput, Contact-Free Detection of Atrial Fibrillation From Video With Deep Learning

Bryan P. Yan, MD[1,2,3]; William H. S. Lai, BSc(Hons)[1]; Christy K. Y. Chan, MSc[1]; et al

» Author Affiliations | Article Information

JAMA Cardiol. Published online November 27, 2019.
doi:https://doi.org/10.1001/jamacardio.2019.4004



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Editor's Note

November 27, 2019

Diagnosing With a Camera From a Distance—Proceed Cautiously and Responsibly

Mintu P. Turakhia, MD, MAS[1,2,3]

» Author Affiliations | Article Information

JAMA Cardiol. Published online November 27, 2019.
doi:https://doi.org/10.1001/jamacardio.2019.4572

NHS X

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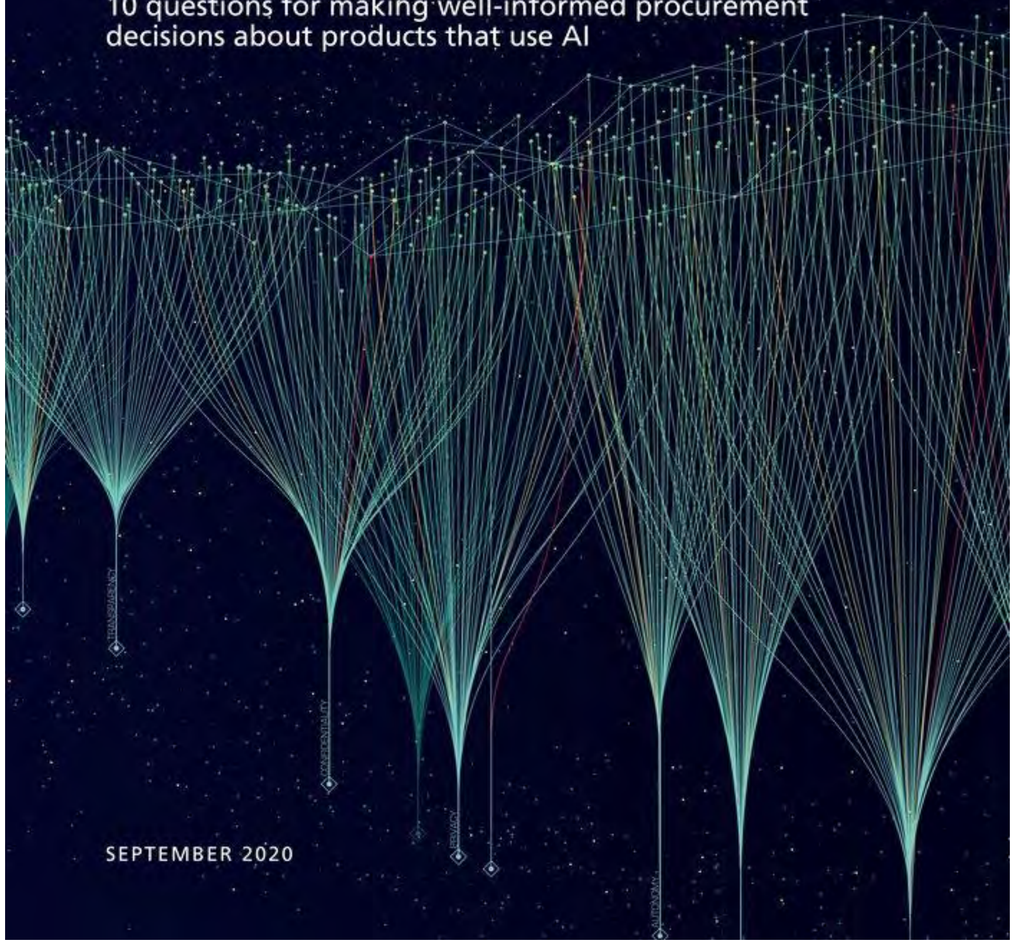

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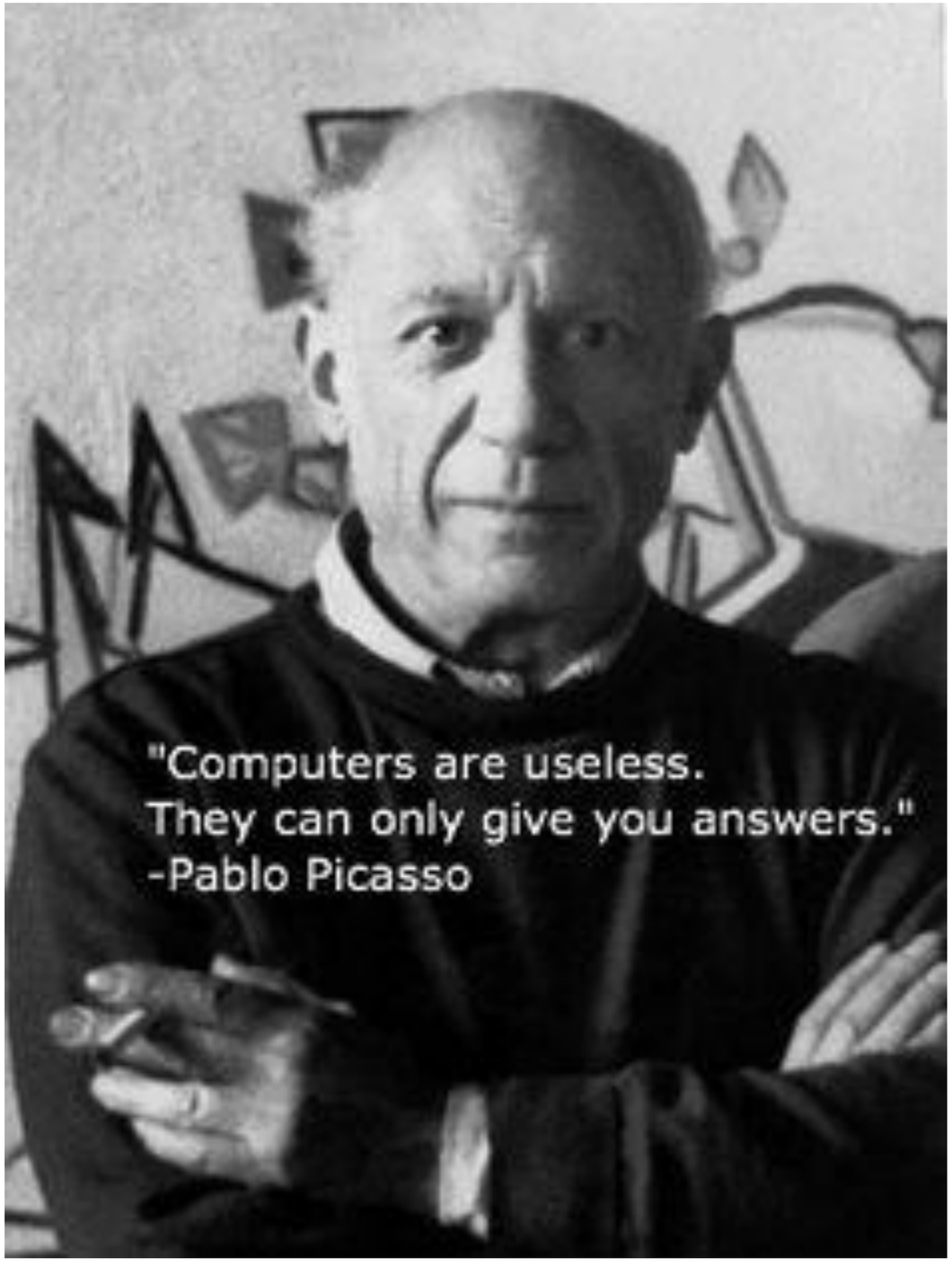
"Computers are useless.
They can only give you answers."
-Pablo Picasso

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