Overcoming Barriers to Data Sharing

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ENGINEERING

Key Computer Science Faculty Collaborators

Fei Fei Li, PhD
Creator of ImageNet

Chris Manning, PhD
Stanford AI Lab Director

Andrew Ng, PhD
Deep Learning Pioneer

Chris Re', PhD
Founder, Snorkel AI

Radiology

ORIGINAL RESEARCH • SPECIAL REPORT

A Roadmap for Foundational Research on Artificial Intelligence in Medical Imaging: From the 2018 NIH/RSNA/ACR/The Academy Workshop

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Biomedical Imaging Center, Rensselaer Polytechnic Institute, Troy, NY (G.W.); and National Institute of
Health, Washington, DC (K.K.). Received March 17, 2019; revision requested March 19; revision receive
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Conflicts of interest are listed at the end of this article.

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Area	Current State
Software use cases for AI	AI algorithms are being created based on use cases developed at single institutions working with single developers, limiting diversity and generalizability to widespread clinical practice.

Area	Current State of the Art
Data needs for machine learning research	Few public image data sets are available, mostly small in size and lacking real-world variation.

ORIGINAL ARTICLE

https://doi.org/10.1016/j.jacr.2019.04.014

A Road Map for Translational Research on Artificial Intelligence in Medical Imaging: From the 2018 National Institutes of Health/RSNA/ACR/The Academy Workshop

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Radiology

ORIGINAL RESEARCH • SPECIAL REPORT

Ethics of Using and Sharing Clinical Imaging Data for Artificial Intelligence: A Proposed Framework

David B. Larson, MD, MBA • David C. Magnus, PhD • Matthew P. Lungren, MD, MPH • Nigam H. Shah, MBBS, PhD • Curtis P. Langlotz, MD, PhD

"After clinical data are used to provide care, the primary purpose for acquiring the data is fulfilled. At that point, clinical data should be treated as a form of public good, to be used for the benefit of future patients."

https://pubs.rsna.org/doi/pdf/10.1148/radiol.2020192536

Publicly-Released AI-Ready Radiology Datasets

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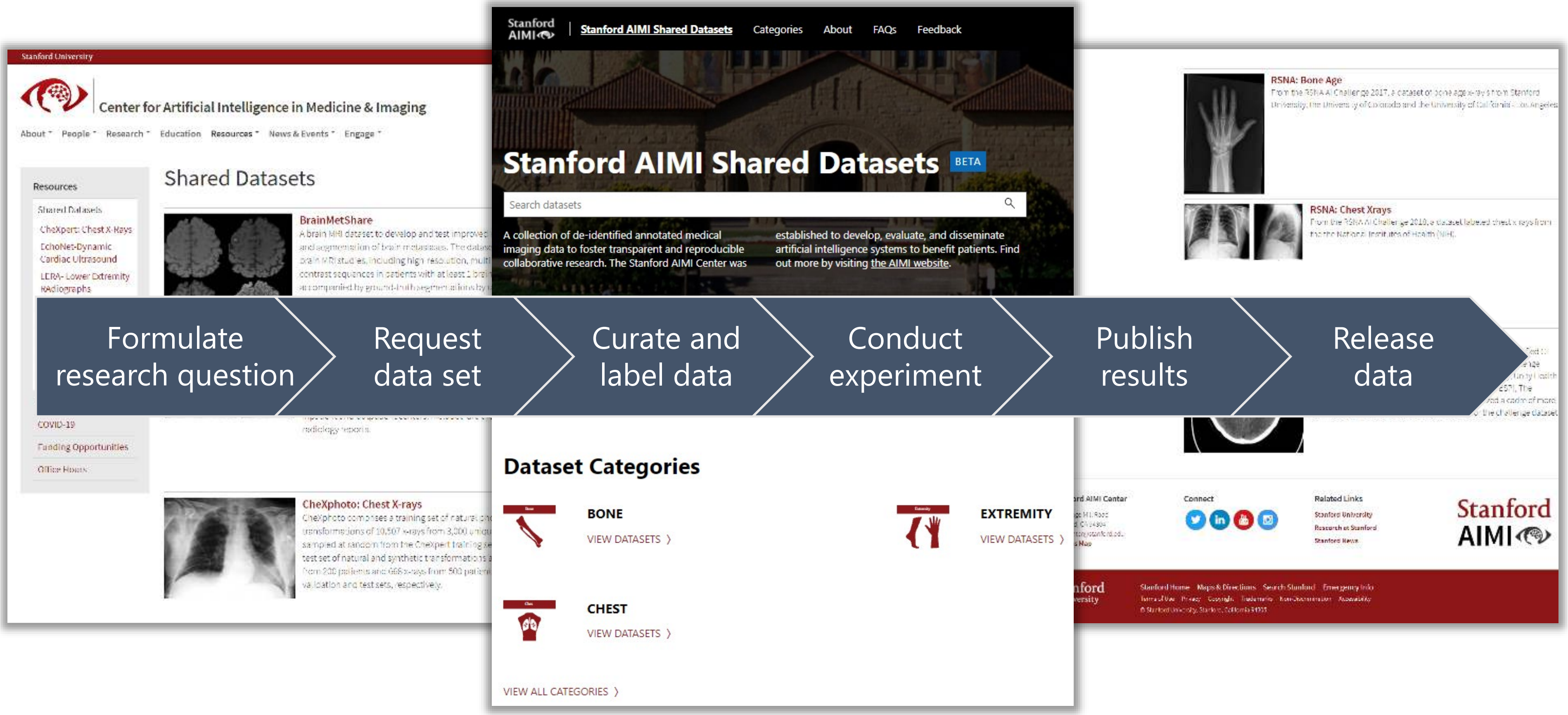
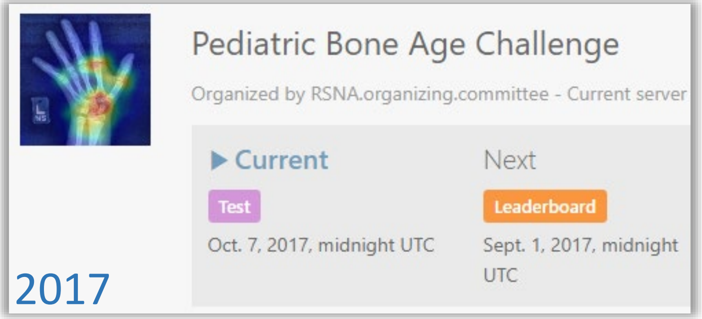
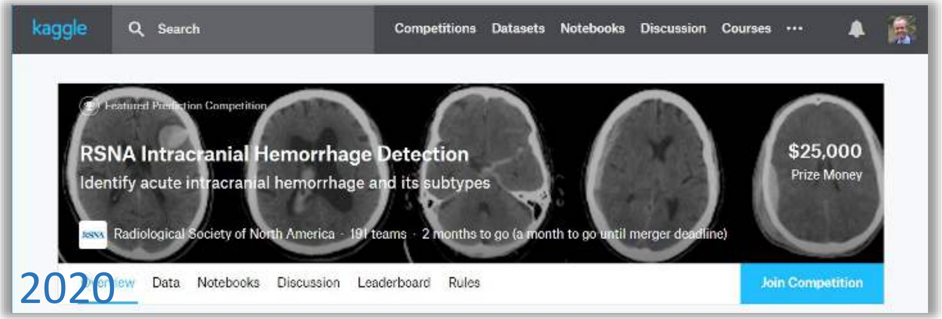


https://aimi.stanford.edu/research/public-datasets

RSNA Data Science Challenges





https://www.rsna.org/en/education/ai-resources-and-training/ai-image-challenge/

Overcoming Barriers to Data Sharing

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- Barriers to “AI-readiness” of data
  - Volume, labels, diversity
- Barriers to organizational readiness for data release
  - Organizational capacity
    - Many or no privacy offices, lack of an IRB
  - Risk aversion
    - HIPAA breach, public announcements
  - Legal deliberations
    - Patient consent
    - Data use agreements
    - Commercial use
  - Technical factors
    - De-identification
    - Format harmonization
    - Data hosting, user tracking
  - Cost

Persistence, enlightened IRB

Mission-related sharing, mandates

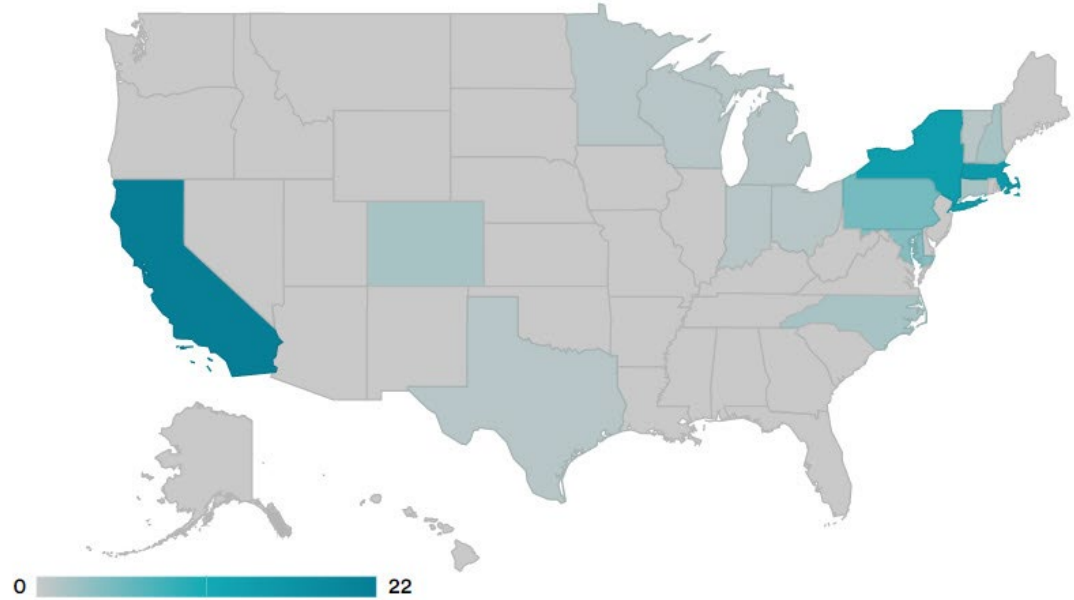
Current language being expanded

Non-commercial only

DICOM Anonymizer, OMOP

Box→Microsoft, RSNA, MIDRC

Geographic Distribution of Cohorts to Train Deep Learning Algorithms



REBECCA ROBBINS/STAT
SOURCE: "GEOGRAPHIC DISTRIBUTION OF US COHORTS USED TO TRAIN DEEP LEARNING ALGORITHMS," JAMA 2020.

STAT

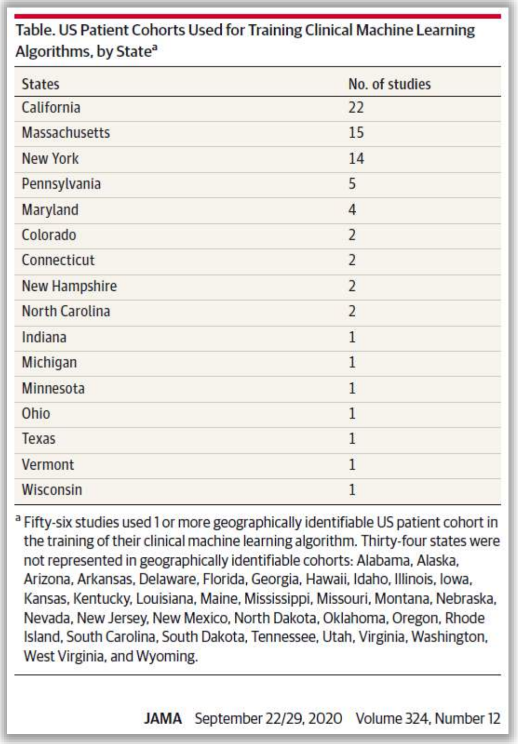
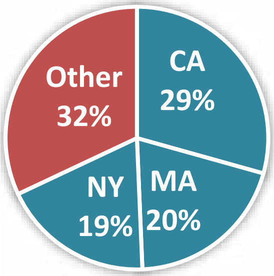


Table. US Patient Cohorts Used for Training Clinical Machine Learning Algorithms, by State[a]

States	No. of studies
California	22
Massachusetts	15
New York	14
Pennsylvania	5
Maryland	4
Colorado	2
Connecticut	2
New Hampshire	2
North Carolina	2
Indiana	1
Michigan	1
Minnesota	1
Ohio	1
Texas	1
Vermont	1
Wisconsin	1

[a] Fifty-six studies used 1 or more geographically identifiable US patient cohort in the training of their clinical machine learning algorithm. Thirty-four states were not represented in geographically identifiable cohorts: Alabama, Alaska, Arizona, Arkansas, Delaware, Florida, Georgia, Hawaii, Idaho, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maine, Mississippi, Missouri, Montana, Nebraska, Nevada, New Jersey, New Mexico, North Dakota, Oklahoma, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Utah, Virginia, Washington, West Virginia, and Wyoming.

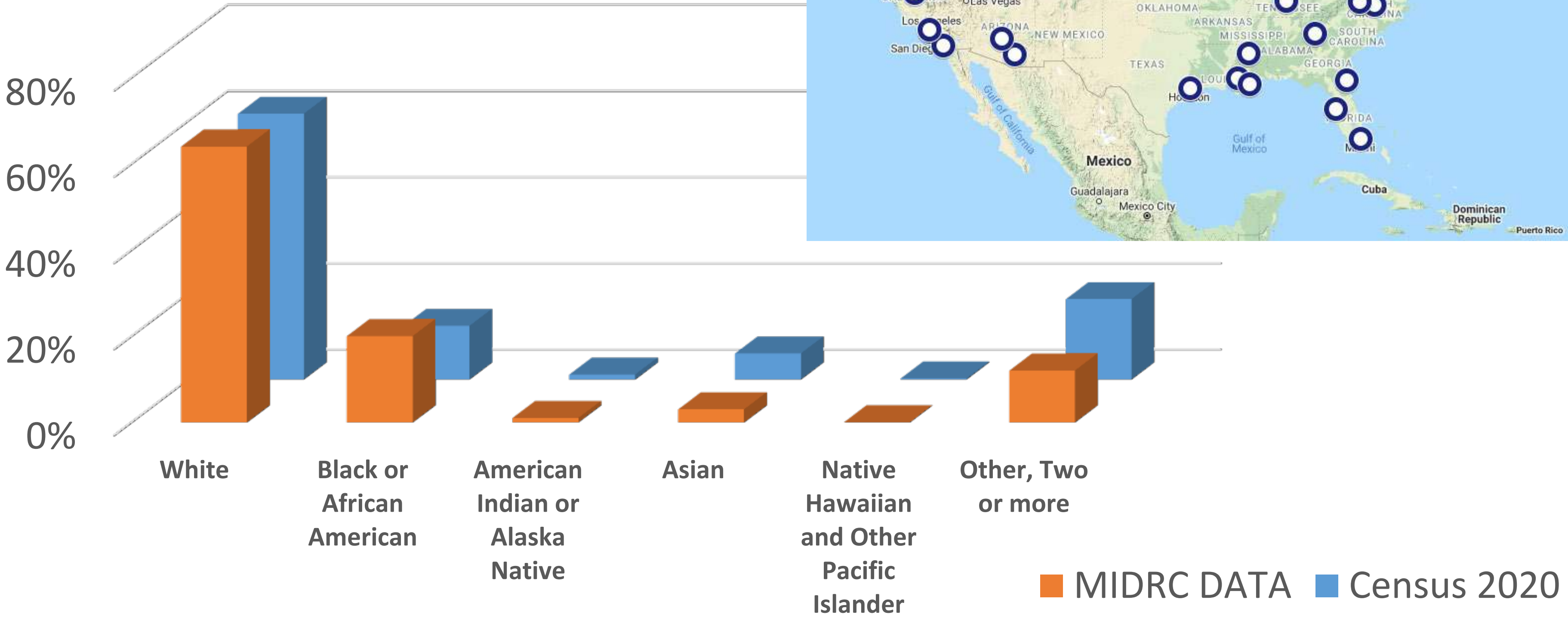
JAMA September 22/29, 2020 Volume 324, Number 12



Kaushal A, Altman R, Langlotz C. JAMA. 2020;324: 1212–1213.

MIDRC

MEDICAL IMAGING AND DATA RESOURCE CENTER.



Conclusions

- Lack of data is a key bottleneck.
- Wide public release of data can be accomplished.
- Data readiness and organizational readiness are distinct concepts.
- Recommendations:
    - Large organizations need guidance on best practices.
    - Inexperienced organizations need help from centers of excellence.
    - Sustainable models will require both central and distributed investment.

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