



MACHINE LEARNING & AI
FOR **HEALTHCARE**
A HIMSS EVENT

FEBRUARY 11, 2019
ORLANDO, FL



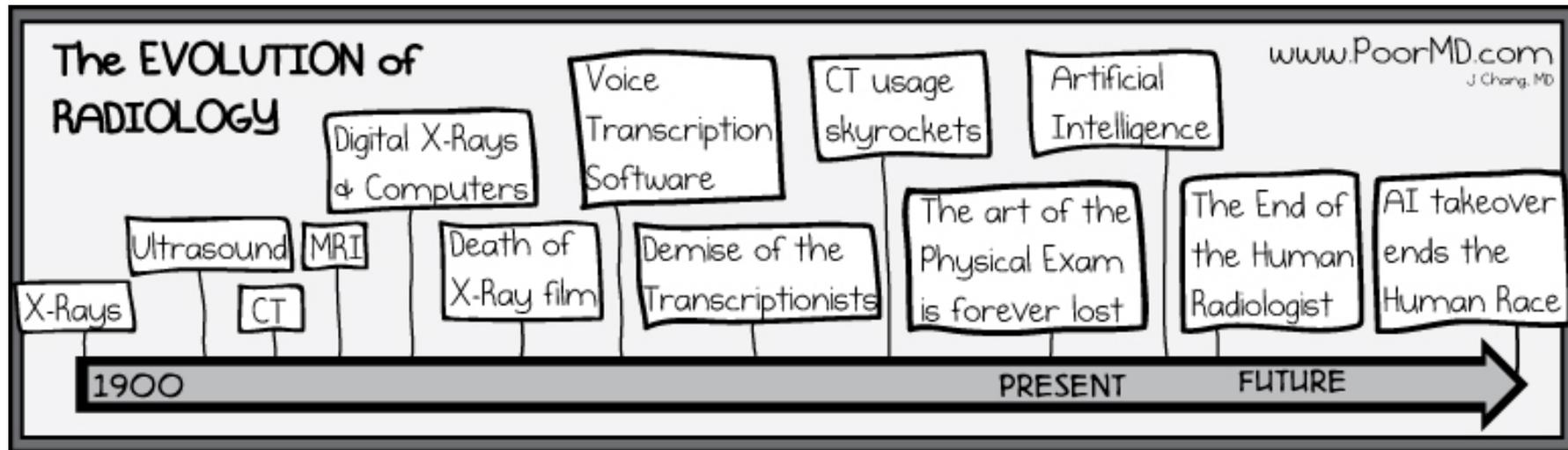
AI and Imaging

Your Data as a Strategic Asset

www.HIMSSConference.org | #smartHIT

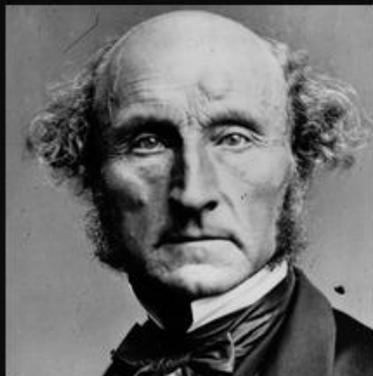


AI in Imaging: Hype or Not?





AI in Imaging: Hype or Not?



Every great movement must
experience three stages:
ridicule, discussion, adoption.

~ John Stuart Mill



AI in Imaging: Data is an Asset

Vast amounts of annotated data

+

Multiple training runs

Increase model inference accuracy

Solution: Increase amount of training data



Microsoft



AI in Imaging: Data is an Asset

MIT Sloan
Management Review

What's Your Data Worth?

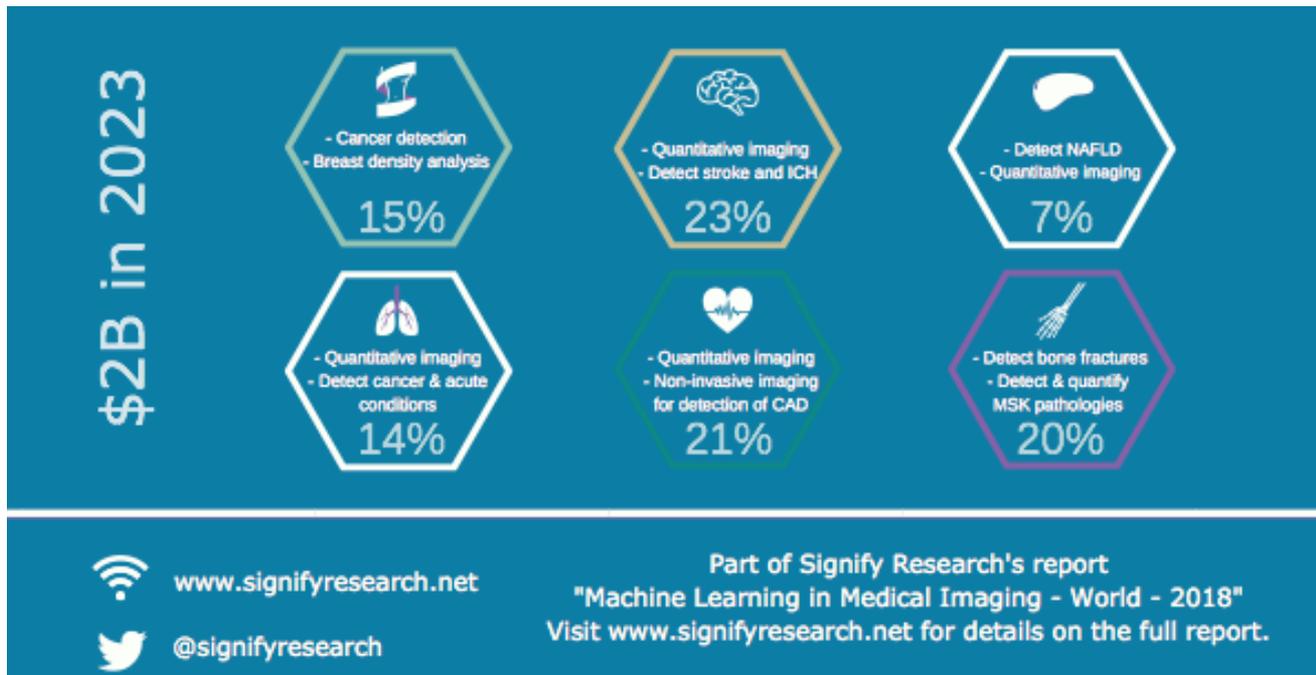
SPRING 2017
ISSUE

Many businesses don't yet know the answer to that question. But going forward, companies will need to develop greater expertise at valuing their data assets.



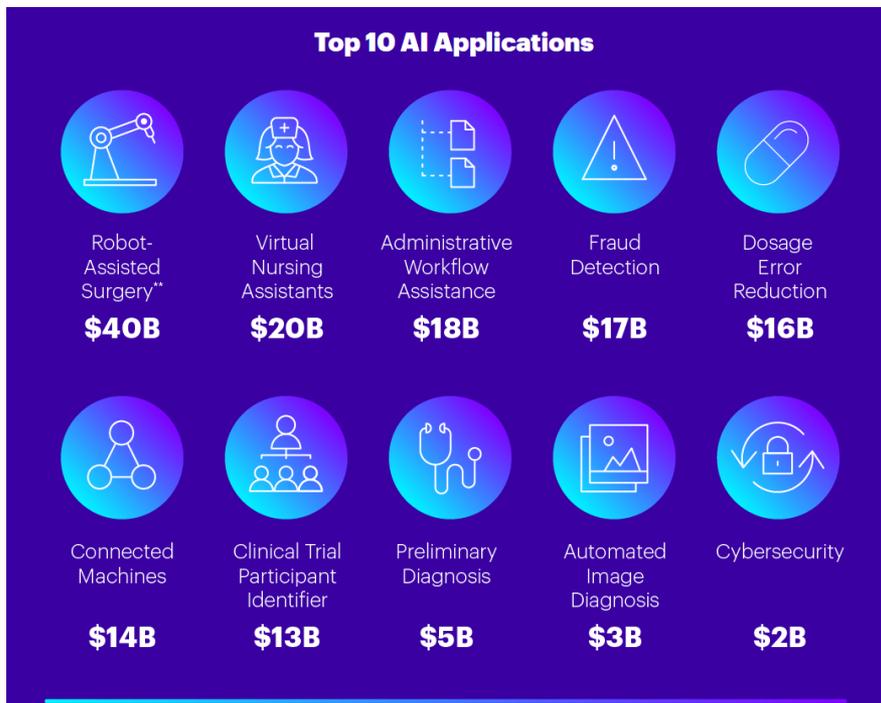


AI in Imaging: Data is an Asset





AI in Imaging: Data is an Asset





Local Model Training is Necessary

Variable generalization performance of a deep learning model to detect pneumonia in chest radiographs: A cross-sectional study

<https://doi.org/10.1371/journal.pmed.1002683>

Conclusion

Pneumonia-screening CNNs achieved better internal than external performance in 3 out of 5 natural comparisons. When models were trained on pooled data from sites with different pneumonia prevalence, they performed better on new pooled data from these sites but not on external data. CNNs robustly identified hospital system and department within a hospital, which can have large differences in disease burden and may confound predictions.



Local Model Training is Necessary

"If a given hospital, clinic, or practice has significant variation in their population's makeup or imaging protocols, then it is highly likely that this model doesn't do 'X' and perform as it is supposed to. Don't trust any algorithms without validating them on your local data, patients, or protocols!"



Local Model Training is Necessary

Better medicine through machine learning: What's real, and what's artificial?

<https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1002721>

“Irrational extrapolation”—the assumption that algorithms trained on an easy-to-obtain set of patients or data will lead to accurate models that act in each patient’s best interest—must be stringently avoided until algorithms can correct for such biases and use clinical data to reason about disease severity and trajectory.



Democratizing AI Research in Healthcare



Democratizing AI in Health

MENU

Democratizing AI in Health

The future of health relies on the notion of Artificial Intelligence (AI), or the capability of intelligent systems to sense the world, comprehend, act and learn.

[DISCOVER AI SOLUTIONS >](#)

The banner features a smiling woman in a light blue checkered shirt looking at a tablet. The background is a vibrant blue with a network of white nodes and lines, overlaid with several circular icons: a hand pointing, a document with a checkmark, a brain with gears, and a molecular structure. At the bottom, there are silhouettes of several people in white lab coats, suggesting a medical or research setting.



Infrastructure Matters

- What is GPU starvation anyway?
- Why do we care?
- How is this related to AI in healthcare?

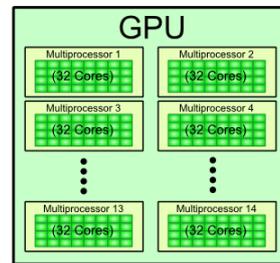
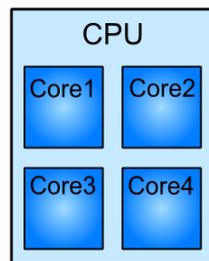




Infrastructure Matters

- Fast compute
 - GPUs for highly parallel workloads
- Fast networks
 - 100 Gbps!
- Fast storage
 - Highly-scalable, low-latency storage optimized for parallel access
 - Scale-out all-flash arrays

CPU/GPU Architecture Comparison





Infrastructure Matters

- Bring AI from the lab to the bedside
- Is your IT infrastructure ready?
- What may have worked yesterday ~~may not~~ will not work tomorrow
- Retrofitting is not always a good idea





Integrating AI to Existing Workflows

- Train models appropriately
- Clinical use requires:
 - High accuracy
 - Specificity & sensitivity depending on use
- Low latency
 - Even under heavy load



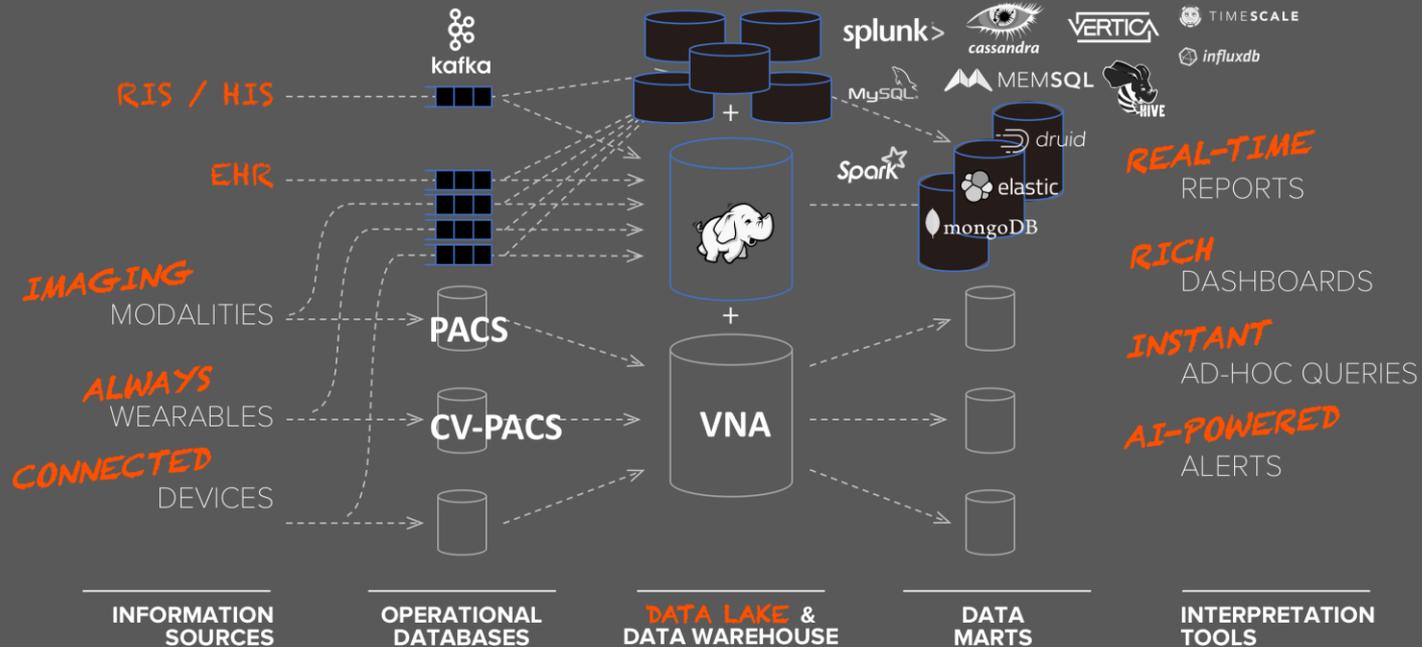


Data Hub: Clinical & Research Imaging

- Most organizations have data silos
 - Silo for clinical data (PACS, VNA)
 - Silo for research
- Moving data between silos is slow and annoying



DATA LAKE OR A DATA ZOO?





Key Takeaways

- Data is valuable in general, more so in healthcare
 - Healthcare data is extremely valuable to train AI/DL models
- Everyone should be involved in training models
 - No one can expect to rely on shrink-wrapped models or products for AI in Imaging
- Infrastructure Matters for AI in Imaging
 - GPU compute, fast networks, fast storage
- It is possible to start small
 - Anyone can do this
 - Everyone should
 - Open source software, online courseware, simple infrastructure

A nighttime cityscape featuring a body of water in the foreground that reflects the lights of buildings and palm trees. The sky is dark blue, and the city lights are vibrant, creating a bokeh effect. The palm trees are illuminated from below, casting a warm glow. The buildings in the background are lit up, with some having blue accents. The overall scene is a mix of urban architecture and natural elements.

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Pure Storage

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