The Ethics of Data Sharing, Academic-Commercial Partnerships and Patient Consent for the Performing of Advanced Computational Analyses

Moderator: Dr. David McClintock (UMich)
Panelists: Dr. Thomas Fuchs (MSKCC)
Dr. Mary Edgerton (MDACC)
Dr. Jeff Fine (UPMC)
Dr. Mark Lloyd (Insperata)
Dr. John Gilbertson (UPitt)
Dr. Enrique Terrazas (Quest)
Hot Topic - AI
AI in Healthcare

This AI doctor won’t just diagnose you, it will explain its decision too

A team of researchers from esteemed German research institutes have created an artificial intelligence (AI) medical companion that can diagnose patients and provide supporting evidence of its diagnoses.

While machine learning systems are increasingly being used to detect illnesses and conditions, the researchers felt that the conclusions reached by these systems are often incomprehensible to doctors and patients, making it difficult for them to accept the diagnosis without further testing.
How AI is reshaping the medical landscape

Radiology and dermatology among areas of medicine that will be altered by machines with capacity to learn

Marcy Cutler
CBC News
April 26, 2019

At the Humber River Hospital in northwest Toronto, artificial intelligence is helping to identify peak service times and other bottlenecks in the emergency room.

You can already find it in some emergency rooms — and soon we’ll see it in every aspect of health care. Artificial intelligence in health care carries huge potential, according to experts in computer science and health care.

AI Tool Could Help Diagnose Alzheimer's

Rod McCullom | Apr 16, 2019 | 2:00 PM

PET scans of normal (left) and Alzheimer's (right) brains. Science Source.

An estimated 5.7 million people in the U.S. have Alzheimer's disease—the most common type of dementia—and that number is expected to more than double by 2050. Early diagnosis is crucial for patients to benefit from the few therapies available. But no single assay or scan can deliver a conclusive diagnosis while a
As of 03/2019: 2,468 AI Startups, $57 B in funding!!

From Virtual Nurses To Drug Discovery: 106 Artificial Intelligence Startups In Healthcare

February 3, 2017

The number of startups entering the healthcare AI space has increased in recent years, with over 50 companies raising their first equity rounds since January 2015. Deals to healthcare-focused AI startups went up from less than 20 in 2012 to nearly 70 in 2016. Last year also saw two new unicorns emerge in the space: China-based iCarbonX and oncology-focused Flatiron Health.

“By 2025, AI systems could be involved in everything from population health management, to digital avatars capable of answering specific patient queries.” — Harpreet Singh Buttar, analyst at Frost & Sullivan.

We identified over 100 companies that are applying machine learning algorithms and predictive analytics to reduce drug discovery times, provide virtual assistance to patients, and diagnose ailments by processing medical images, among other things.
Automating AI

For other popular vendors, see: http://www.butleranalytics.com/20-machine-learning-service-platforms/

Slide (modified) courtesy of Toby Cornish, MD
All images from vendor's websites, current as of 5/20/18
DataRobot Celebrates One Billion Models Built on Its Cloud Platform

16/04/2019

DataRobot, the leader in automated machine learning, today announced that its customers have built one billion models on its Amazon Web Services (AWS) cloud platform a major milestone in AI adoption. DataRobot customers from around the world are using these machine learning models to better understand and glean actionable insights from accessible data.

Leveraging the scalability of AWS and the processing power of Intel Xeon processors, the DataRobot Cloud platform automates the data science workflow, enabling automation-first data scientists and citizen data scientists to build and deploy the most accurate predictive models in minutes. With the intelligence afforded by the DataRobot platform, organizations make informed decisions to improve productivity and efficiency, support business objectives, and increase revenue.

As a compute-intensive application, our cloud environment provides organizations with a flexible and scalable way to build the machine learning models required to improve business processes and impact business results, said Phil Gurbaki, VP of Product Management, DataRobot. Our customers build more than two and a half million models every day, and with each model, our solution gets smarter and more sophisticated. Having now learned from a billion models, DataRobot is putting the power of machine learning into the hands of users across a growing number of use cases, delivering real value to organizations across the globe.
AI In Healthcare - Many Opportunities

- Reduce readmission rates
- Reduce hospital Length-of-Stay (LOS)
- Prevent hospital acquired infections (HAIs)
- Predicting chronic disease
- Diagnosis in medical imaging
- Enhanced robotic surgery
- Personalized medicine
- Computational Pathology/Image Analysis
- ...and many more!
Use Cases: AI in Healthcare

• Clinical decision support and predictive analytics
  – Computationally based assay for 6-MP (mercaptopurine), predicts toxicity and compliance (ThioMon, University of Michigan)

• Imaging analytics
  – Discrimination of physiological versus pathological patterns of cardiac hypertrophic remodeling in 2D echocardiography (Mount Sinai, New York)

• Natural Language Processing
  – Automated speech analysis to measure subtle, clinically relevant mental state changes to predict psychosis onset in youths (Columbia University)
Issue: Developing AI Algorithms Requires Data!

Figure adapted from https://www.capgemini.com/2016/05/machine-learning-has-transformed-many-aspects-of-our-everyday-life/
Goals for Today

1. Have a constructive, honest discussion about the ethics of academic/commercial partnerships as it concerns the use of patient data
2. NOTE: Focus is on AI, but you could apply to this discussion to many different topics in healthcare
3. NOTE: We will be discussing GRAY ZONES!!
4. Please be civil and respectful in these discussions
5. Please use the microphones for all questions
6. Case scenarios to start discussion, but feel free to go your own direction!
Panel - Mix of Academia and Industry

- Dr. Thomas Fuchs (MSKCC)
- Dr. Mary Edgerton (MDACC)
- Dr. Mark Lloyd (Insperata)
- Dr. John Gilbertson (U Pitt)
- Dr. Enrique Terrazas (Quest)
- Dr. Jeff Fine (UPMC)
A researcher at an academic institution received NIH funding to develop new machine learning algorithms to triage prostate biopsies (cancer vs no-cancer)

After the project is completed, the researcher, with support from the department, begins working with the institutional tech transfer office to commercialize the algorithms developed.

A new company is formed, with the researcher and other departmental members as part owners of the company along with the institution itself.
Initial Questions

1. De-identified patient data was used to train, validate, and test the ML models - is there an obligation to inform patients at the time of biopsy that their data could be used for both research and potential commercial use?

2. Who owns the data???
Follow-up Question

3. What if the researcher continues to write for, and receives, additional federal grant funding to develop algorithms to triage cases from other organ types (breast, colon, stomach, etc.) using de-identified patient data, with the goal to augment the new company’s service offerings?
Case scenario

An institution consents all heme-onc patients upon arrival to clinic for use of leftover patient blood in the clinical labs for research studies. DNA is isolated from leftover blood and a large biorepository is created.

1. Should an institution be allowed to sell samples for research? For commercial use?
2. What if it’s leftover tissue from rare tumors for creating control slides for IHC? Should a patient be informed of this use and it’s risk?
Selling patient data and exclusive rights

1. Should an academic institution have the ability to sell patient data to commercial entities? To license data to commercial entities? To create a commercial entity to sell the data itself?
2. If they are able to sell this data, can they create exclusive contracts or should they be obligated to offer the data to any or all entities?
3. Does it matter if the academic institution is private or public?
Case Scenario

An academic department and a vendor enter into an agreement where the vendor will provide digital pathology and AI/computational pathology services to the department in exchange for payment (cash) and data (image, algorithm, and associated clinical/molecular patient data).

1. The IRB and lawyers for the academic institution approved this - any issues with this?
2. What if the only payment is data?