



AI for Healthcare Workshop

March 11, 2021

Michael Goldman
Director, Data Science Institute



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Welcome!

This AI for Healthcare workshop is DSI's first virtual workshop.

We are pleased to host participants from a multitude of institutions across academia, industry, and government.

The goal for this workshop is to provide a platform to build new partnerships, showcase current research, and identify new areas of exploration and collaboration.

Three days, three topics:

March 11: Electronic Health Records

Discuss recent developments, challenges, and opportunities in data science for EHRs

March 18: Actionable AI in Healthcare

Survey recent applications of actionable and interpretable AI techniques and discuss current challenges and opportunities

March 25: COVID-19

Discuss and identify potential uses of AI technologies to facilitate rapid response to COVID-19

Thank you to our workshop organizers



Michael Goldman

- Director of LLNL's Data Science Institute
- MS in Electrical & Computer Engineering from UC Davis
- Aerial intelligence, surveillance, and reconnaissance domain; overhead imagery; ML; data compression; system development



Jose Cadena

- Research staff in LLNL's ML group
- PhD in CS from Virginia Tech
- Approximation algorithms for anomaly detection on network data; statistical ML for healthcare; Bayesian inference in distributed networks



Amy Gryshuk

- Program development liaison for LLNL's Strategic Science Engagements Office
- PhD in Molecular Pharmacology from SUNY Buffalo
- Develops & implements partnering strategies for multidisciplinary research collaborations; advances DOE's capabilities in HPC & AI at scale



Andre Goncalves

- Research staff in LLNL's ML group
- PhD in CS from University of Campinas, Brazil
- Bayesian models & convex optimization; problems in predictive oncology & Alzheimer's disease; reinforcement learning for protein engineering; UQ-powered ML for drug discovery; DL for climate forecasting



Priyadip Ray

- ML specialist in LLNL's Computational Engineering Division
- PhD in Electrical Engineering from Syracuse University
- ML techniques to model EHR data for discovery of efficient treatment strategies; Bayesian models for joint analysis of multiple heterogeneous genomic data; AI in healthcare



Jen Bellig

- Administrator of LLNL's Data Science Institute



Holly Auten

- Communications and web lead for LLNL's Data Science Institute

Day 1: March 11

Electronic Health Records (EHRs)

Throughout the day we hope to discuss recent developments, challenges, and opportunities in data science for EHRs.

EHRs can provide a wealth of information on a patient's clinical trajectory.

Employing statistical and machine learning methods for analyzing EHRs increases the potential for medical knowledge discovery.

EHRs have successfully been used for early detection/classification of diseases, patient risk stratification, and outcome prediction.

This session will feature a series of talks on recent work in statistics and machine learning specific to EHRs and will offer a panel of experts to discuss a number challenges associated with EHRs such as data privacy, standardization, and clinical controls.



AGENDA

AI in Healthcare Virtual Workshop
Day 1: Electronic Health Records
Thursday, March 11

8:00 am	Opening Remarks	Michael Goldman, LLNL
8:15 am	Overview of LLNL's AI in Healthcare	Amy Gryshuk, LLNL
8:45 am	Panel session with Q&A	
9:45 am	<i>Towards the Learning Health System: the Promise and Pitfalls of EHR Data</i>	Vincent Liu, Kaiser Permanente
10:15 am	<i>Joint Electronic Health Records Analysis via Multi-task Gaussian Processes</i>	Jose Cadena, LLNL
10:45 am	Break	
11:00 am	<i>Analysing National Health Registry Data - Examples from Norway</i>	Jan Nygard, Cancer Registry of Norway
11:30 am	<i>Modeling Electronic Health Records with Continuous-time Hidden Markov Models</i>	Braden Soper, LLNL
12:00 pm	Lunch	
1:00 pm	<i>De-identifying Electronic Medical Records through Artificial Intelligence</i>	Bradley Malin, Vanderbilt University
1:30 pm	<i>Pre-treatment Prostate-specific Antigen Records in Risk Prediction of Prostate Cancer</i>	Boya Zhang, LLNL
2:00 pm	Networking sessions	
3:00 pm	Adjourn (please fill out the Survey)	

Day 2: March 18

Actionable AI in Healthcare

Developing actionable models is more than just maximizing accuracy or predictive power.

The focus needs to be on generating results that are human-interpretable, consider realistic constraints, and can be taken into consideration to make an informed decision.

Today we will hear a number of technical talks surveying recent applications of actionable and interpretable AI for healthcare.

We will also provide a forum to discuss the current challenges and opportunities to further integrate machine learning models into medical practice and decision-making.



AGENDA

AI in Healthcare Virtual Workshop

Day 2: Actionable AI

Thursday, March 18

8:30 am	Opening Remarks	Michael Goldman, LLNL
8:45 am	Panel session with Q&A	
9:45 am	<i>Revealing Hidden Secrets: the Role of ML in Identifying Incipient Events</i>	Heather Meeks, Defense Threat Reduction Agency
10:15 am	<i>Early Prediction of Adverse Outcomes for COVID-19 Patients, with Shapley Interpretations</i>	Sam Nguyen, LLNL
10:45 am	Break	
11:00 am	<i>Beyond Image Interpretation: AI for MRI Acquisition and Reconstruction</i>	Akshay Chaudhary, Stanford University
11:30 am	<i>Building Reliable and Interpretable Clinical Models via Prediction Calibration</i>	Jayaraman Thiagarajan, LLNL
12:00 pm	Lunch	
1:00 pm	<i>On User-driven Explainability for Healthcare</i>	Prithwish Chakraborty, IBM
1:30 pm	<i>Intelligent Imaging to Study Degenerative Joint Diseases</i>	Valentina Pedoia, UCSF
2:00 pm	Networking sessions	
3:00 pm	Adjourn (please fill out the Survey)	

Day 3: March 25

AI and the COVID-19 Pandemic

COVID-19 is an infectious respiratory disease caused by the SARS-CoV-2 virus that emerged in late 2019 and has quickly spread throughout the globe.

This global health threat that has taken millions of lives, exerted significant pressure on often limited healthcare resources, and devastated countries and economies. The long-term impacts are still largely unknown.

Today our speakers will discuss and identify the potential use of AI technologies to facilitate rapid response to COVID-19, such as improving patient diagnosis, developing new treatments, and improving overall medical and hospital care.

We will also hear from panel of experts in the medical and AI fields on ongoing research efforts and key challenges paramount to furthering progress in medical AI systems with focus on infectious diseases and quick response to healthcare-related crises.



AGENDA

AI in Healthcare Virtual Workshop

Day 3: AI and the COVID-19 Pandemic

Thursday, March 25

8:30 am	Opening Remarks	Michael Goldman, LLNL
8:45 am	Panel session with Q&A	
9:45 am	<i>Guiding COVID-19 Response and Policies through Disease Modeling and Outbreak Analytics</i>	Bryan Lewis, University of Virginia
10:15 am	<i>Computational Drug Design for Small-molecule Antivirals</i>	Jonathan Allen, LLNL
10:45 am	Break	
11:00 am	<i>The Information Reformation in Smart Public Health</i>	Ben Smarr, UCSD
11:30 am	<i>Creating a Platform for Rapid Computational Antibody Design via Machine Learning, HPC, and Laboratory Experimentation</i>	Tom Desautels, LLNL
12:00 pm	Lunch	
1:00 pm	<i>Data Sharing in the Era of COVID-19</i>	Leo Anthony Celi, MIT
1:30 pm	<i>Evaluating the Spread of COVID-19 using AI-driven Simulation</i>	Brian Spears, LLNL
2:00 pm	Networking sessions	
3:00 pm	Adjourn (please fill out the Survey)	

General information

Talks and panels will be hosted through WebEx. The link can be found on Howspace: <https://dsi-healthcare.in.howspace.com>

REMINDER: No Sensitive Unclassified Information

We may record and take screenshots of video sessions.

Have a question or comment for speakers or panelists?

Use Howspace to submit your question/comment. You can find the “questions for speakers and panelists” window at the bottom of the current day’s Howspace page.

Join us at 2:00pm PST each day for additional networking opportunities

Go to the Networking page on Howspace and join the video chat for the networking session you are most interested in. (LLNL: Log off VPN to use this feature.)

Having technical issues or have general questions about the workshop?

Use the Event Support page on Howspace to connect with the organizers.



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- Established in 1952
- Situated in the San Francisco Bay Area
- One of 17 Department of Energy national labs
- Approximately 7,500 employees

Our mission is to strengthen the nation's security through world-class science, technology, and engineering

Biosecurity



Counterterrorism



Defense



Energy



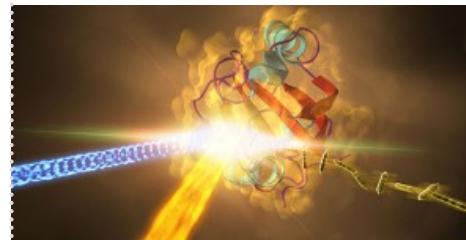
Intelligence



Nonproliferation



Science



Stockpile Stewardship



LLNL's missions have a growing focus on large-scale data analytics

What is the Data Science Institute?

Genesis | An integrating organization to address the explosive growth of data science and LLNL's dependence on it

Mission | Grow, strengthen, and sustain data science workforce, research, and outreach

Technical Focus | Encompasses a multitude of technical competencies (machine learning, statistics, computer science, and more)



Addressing the rapid growth of data science and its impact on LLNL's mission



National Security



Cognitive Simulation



Precision Medicine



Basic Science



Materials & Advanced Manufacturing



Energy

See our strategic plan for more: data-science.llnl.gov/about

Data Science Institute

data-science.llnl.gov

Data Science Summer Institute

dssi.llnl.gov

Contacts

datascience@llnl.gov

dssi-info@llnl.gov

dsi-news@llnl.gov (subscribe to our newsletter)



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