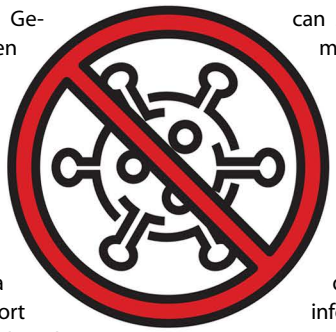
SOPHiA Genetics' First Multimodal Approach TO PREDICT COVID-19 DISEASE EVOLUTION

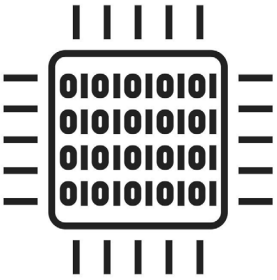
▶ *Trend Watch: AI Technology Helps in the Fight Against COVID-19*



Health-tech company SOPHiA Genetics, specializing in data-driven medicine, has launched a first-of-its-kind multimodal solution to predict COVID-19 disease evolution, opening new dimensions of insight into the fight against the worldwide pandemic.

This advancement goes beyond genomics, analyzing a wider spectrum of data to support researchers' efforts to understand and fight the disease. SOPHiA's unique multimodal approach aims to support containment efforts globally by demonstrating immediate benefits for community contact tracing and essential viral monitoring research. This important analysis can support paths to new protective measures and outbreak protocols around the world.

As part of the multimodal approach, the company has built an AI-powered solution to conduct full-genome analysis of SARS-CoV-2. It can compare insights from the viral genomic data with human "host" genetic information. In addition, the new SOPHiA Radiomics for COVID-19 offers a CT-based automated workflow for whole-lung segmentation and disease quantification. With an easy-to-use interface, radiomic features are extracted from lung abnormalities and well-aerated areas.



NIH Harnesses AI for COVID-19 DIAGNOSIS, TREATMENT, AND MONITORING

The National Institutes of Health has launched the Medical Imaging and Data Resource Center (MIDRC), an ambitious effort that will harness the power of artificial intelligence and medical imaging to fight COVID-19. The multi-institutional collaboration, led by the National Institute of Biomedical Imaging and Bioengineering (NIBIB), part of NIH, will create new tools that physicians can use for early detection and personalized therapies for COVID-19 patients.

"This program is particularly exciting because it will give us new ways to rapidly turn scientific findings into practical imaging tools that benefit COVID-19 patients," says Bruce J. Tromberg, Ph.D., NIBIB Director. "It unites leaders in medical imaging and artificial intelligence from academia, professional societies, industry, and government to take on this important challenge."

The MIDRC goals are to lead the development and implementation of new diagnostics, including machine learning algorithms, that will allow rapid and accurate assessment of disease status and help physicians optimize patient treatment.

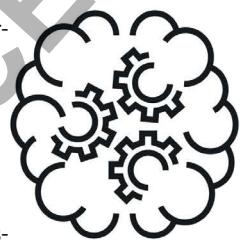
"This effort will gather a large repository of COVID-19 chest images," explained Guoying Liu, Ph.D., the NIBIB scientific program lead on this effort, "allowing researchers to evaluate both lung and cardiac tissue data, ask critical research questions, and develop predictive COVID-19 imaging signatures that can be delivered to healthcare providers."

Maryellen L. Giger, Ph.D., the A.N. Pritzker Professor of Radiology, Committee on Medical Physics at the University of Chicago, is leading the effort, which includes co-Investigators Etta Pisano, M.D., and Michael Tilkin, M.S., from the American College of Radiology (ACR), Curtis Langlotz, M.D., Ph.D., and Adam Flanders, M.D., representing the Radiological Society of North America (RSNA), and Paul Kinahan, Ph.D., from the American Association of Physicists in Medicine (AAPM).

"This major initiative responds to the international imaging community's expressed unmet need for a secure technological network to enable the development and ethical application of artificial intelligence to make the best medical decisions for COVID-19 patients," added Krishna Kandarpa, M.D., Ph.D., director of research sciences and strategic directions at NIBIB.

The MIDRC will facilitate rapid and flexible collection, analysis, and dissemination of imaging and associated clinical data. Collaboration among the ACR, RSNA, and AAPM is based on each organization's unique and complementary expertise within the medical imaging community, and each organization's dedication to imaging data quality, security, access, and sustainability.

UC Riverside Using AI TO IDENTIFY NEW COVID-19 DRUG CANDIDATES



A team from the University of California, Riverside, is joining the effort of many other academic and industry researchers to identify new drug candidates.

They have developed a machine learning drug discovery pipeline to identify hundreds of new potential drugs that could help treat COVID-19.

The drug discovery pipeline is a type of computational strategy linked to artificial intelligence—a computer algorithm that learns to predict activity through trial and error, improving over time.

The work is published in the journal Heliyon, in the paper titled, "Predicting novel drugs for SARS-CoV-2 using machine learning from a >10 million chemical space."

Efforts to repurpose drugs, such as Remdesivir, have achieved some success. A vaccine for the SARS-CoV-2 virus could be months away, though it is not guaranteed.

"As a result, drug candidate pipelines, such as the one we developed, are extremely important to pursue as a first step toward systematic discovery of new drugs for treating COVID-19," Anandasankar Ray, PhD, professor at UC Riverside said. "Existing FDA-approved drugs that target one or more human proteins important for viral entry and replication are currently high priority for repurposing as new COVID-19 drugs. We have developed a drug discovery pipeline that identified several candidates."

Joel Kowalewski, a graduate student in Ray's lab, used small numbers of previously known ligands for 65 human proteins that are known to interact with SARS-CoV-2 proteins, including the ACE2 receptor.

Next, they trained machine learning models to predict inhibitory activity and use them to screen FDA registered chemicals and approved drugs (~100,000) and ~14 million purchasable chemicals.

Kowalewski and Ray were thus able to create a database of chemicals whose structures were predicted as interactors of the 65 protein targets. They also evaluated the chemicals for safety.

Ray and Kowalewski used their machine learning models to screen more than 10 million commercially available small molecules from a database comprised of 200 million chemicals, and identified the best-in-class hits for the 65 human proteins that interact with SARS-CoV-2 proteins.

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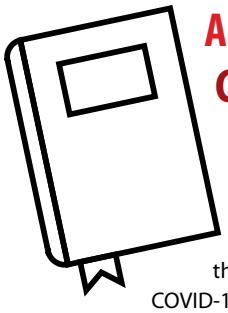

AI Tech Helping Scientists Sift Through COVID-19 PAPERS

A fast-growing set of AI tools might help researchers and clinicians quickly sift through the enormous amount of COVID-19 literature. Developers hope the new technology will help researchers to focus their efforts.

For example, the NIH's COVID-19 Portfolio, a website that tracks papers related to the SARS-CoV-2 coronavirus and the disease it causes, lists more than 28,000 articles — far too many for any researcher to read.

Driven by a combination of factors, including the availability of a large collection of relevant papers, advances in natural-language processing (NLP) technology, and the urgency of the pandemic itself these tools use AI to find the studies that are most relevant to the user, and in some cases to extract specific findings from the results.

Beyond the current pandemic, such tools could help to bridge fields by making it easier to identify solutions from other disciplines, says Amalie Trewartha, one of the team leads for the literature-search tool COVIDScholar, at the Lawrence Berkeley National Laboratory in Berkeley, Calif. There are several other research sifting tools in development, all still relatively unproven. The impetus for many of these efforts was a "call to action" in which the White House Office of Science and Technology Policy invited the AI community to develop tools for mining the COVID-19 literature.

AI Software Discovers New Ways to MAKE POTENTIAL COVID-19 DRUGS

Using AI software, University of Michigan researchers have found new solutions for manufacturing existing drugs-especially those that are now being tested in some COVID-19 clinical trials. To prevent future supply shortages, University of Michigan chemist Timothy Cernak and colleagues turned to a commercial drug synthesis AI program called Synthia. The software can help pharmaceutical manufacturers find the most efficient and cost-effective strategy for synthesizing medicines, most of which are fairly complex molecules that can be built in myriad ways.

Mr. Cernak and his colleagues programmed Synthia to search for new synthetic solutions. They limited their search to options that used cheap, abundant starting materials, didn't require expensive catalysts or equipment, and could produce kilogram-scale amounts of drug.

In the end, the software found novel solutions for making 11 out of the 12 compounds, including generic antivirals umifenovir and favipiravir, the researchers reported in a non-peer-reviewed preprint on ChemRxiv. The AI program came up with four different ways to synthesize umifenovir, for example, in one case with cheaper starting materials than those currently in use. However, the software was unable to come up with a solution for making remdesivir any other way than how Gilead makes it.

The researchers filed patents on all of their new synthetic routes. They want to license their manufacturing approaches to one or more pharma companies to ensure adequate supplies and low prices, a report in Science Magazine states.

Google Expands Free CoViD-19 Datasets

Google added more COVID-19 datasets to its free, public repository. The cloud giant also extended its free-querying offer for all of the COVID-19 public datasets for another year through Sept. 15, 2021.

Google's COVID-19 Public Dataset program is an effort to fight COVID-19 by making more data freely accessible to researchers and data scientists. Google Cloud pays for the storage of the COVID-19-related datasets. Additionally, researchers can use BigQuery ML to train machine learning models with this data inside BigQuery for free. It includes datasets from The New York Times, European Centre for Disease Prevention and Control, Google, Global Health Data from the World Bank, and OpenStreetMap.

RenalytixAI and AstraZeneca Collaborate TO IMPROVE OUTCOMES FOR PATIENTS WITH CHRONIC

RenalytixAI and AstraZeneca are joning up to develop and launch precision medicine strategies for cardiovascular, renal and metabolic diseases.

The first stage in the collaboration will use KidneyIntelX, an artificial intelligence-enabled in vitro diagnostic platform, to examine further improving outcomes for patients with chronic kidney disease (CKD) and its complications, in coordination with the Mount Sinai Health System. The goal of the first stage is to help improve guideline-based standard-of-care for optimal utilization of existing and novel therapeutics using the KidneyIntelX testing platform and proprietary care management software.

The first stage will assess the impact of AI-enabled in vitro diagnostic solutions to optimize utilization of therapeutics in CKD under current standard of care protocols. Based on study outcomes, a multi-center, randomized controlled trial will be initiated to evaluate uptake and adherence to new potassium-binding agents in patients with CKD and hyperkalemia. The studies will be conducted in coordination with the Mount Sinai Health System, where KidneyIntelX testing and care management software are being deployed for commercial clinical use.

RenalytixAI and AstraZeneca will use KidneyIntelX with the aim to: help improve physician uptake and patient adherence to existing potassium-binding therapeutics and other approved products in CKD through early identification of previously hidden high-risk patient groups; accelerate patient identification and recruitment for trials; and complement commercialization efforts with outcomes from KidneyIntelX results

"This collaborative approach reflects the shared vision of AstraZeneca and RenalytixAI to develop meaningful solutions to tackle significant challenges in healthcare in a holistic way," says Tarek Rabah, VP, AstraZeneca US Renal-Cardio. "We are committed to revolutionizing kidney care by driving innovation and identifying patients with significant unmet need and providing them with more personalized interventions."

"By using a more personalized approach, our goal is to help realize improved outcomes for more than 240,000 patients with chronic kidney disease within the Mount Sinai Health System," says Barbara Murphy, M.D., board member of RenalytixAI.

Program results are anticipated in early 2021.

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