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Raymond D. Aller, MD, and Hal Weiner

Data-extraction system demonstrates potential for pathology laboratories

Just as parents instill in their children a desire to improve themselves, in part through interactions with others, some software developers are "teaching" their tools to interact and adjust accordingly.

Funding from the Centers for Disease Control and Prevention and other sources has helped spur such innovation, which in turn has spawned the free online machine learning-based information-extraction system IDEAL-X. The IDEAL-X software, developed at Emory University, which holds the intellectual property rights to it, was created to make machine learning easier and more intuitive, without requiring users to program machine learning algorithms. The system initially was used to unlock data in Emory's cardiology biobank. But in 2015, it also passed muster with Emory's pathologists, who had tested its usefulness for biomedical research and clinical diagnosis against manual data-extraction methods for pathology reports.

In the Emory pathology study, supported in part by grants from the CDC, software developers, working with pathologists, created a testing dataset for IDEAL-X using anatomic pathology reports from 50 patients. As the reports were loaded into IDEAL-X, the software presented a text file of the document in the left panel of the system's user interface, while the right panel displayed attributes of interest and associated values. Users of the system initially typed desired values into the attribute list, but as they navigated from report to report, IDEAL-X began guessing which text represented the desired value in the new document, populating the structured list with the same value. If IDEAL-X guessed wrong, users could highlight the incorrect value and replace it with the correct value. In this way, IDEAL-X learned to guess more accurately, so that by the time a fourth report appeared, for instance, IDEAL-X was identifying values more accurately, even if it had not seen a particular value before, such as the term "gentleman" as a gender value. After the system processed all files, it created a master output file to allow users to easily navigate the structured results of their queries.

The software users who facilitated the Emory pathology study accelerated this process by providing a "seed" vocabulary before they began their interaction, says Shuai Zheng, PhD, who developed IDEAL-X as his PhD research project while at Emory but is now a computer scientist at the CDC. Unlike in the past, he adds, researchers do not have to rely on domain experts to create and modify queries. Furthermore, IDEAL-X can look for constrained values, such as specified ranges for lab results or disease types.

The system "is trying to maintain the researcher's workflow as much as possible, while IDEAL-X tries to learn important information on the fly," says James Lu, PhD, associate professor in the math and computer science department at Emory, who, along with Fusheng Wang, PhD, formerly of Emory but now associate professor of biomedical informatics at Stony Brook University, New York, was Dr. Zheng's co-advisor for his PhD project.

In the Emory pathology study, IDEAL-X achieved 93 percent precision using an adaptive vocabulary, when compared to manual information extraction, both in presenting diagnoses and relevant genetic markers to researchers—all by machine reading of the pathology reports.

In a separate study funded by the CDC, a team at Emory Hospital assessed how well the software could comb through electronic health records to report venous thromboembolism, a condition that may be underestimated, according to the agency, and for which there is no national surveillance based on natural language processing. Using IDEAL-X, researchers identified 176 out of 181 VTE events, a 97 percent sensitivity rate.

The success of the Emory initiatives, adds Dr. Zheng, piqued the interest of the CDC's Division of Blood Disorders, which is continuously seeking ways to accelerate the pace of research. "It would be impractical to process free text on a national scale to get that insight," he explains. So, to further evaluate the software's effectiveness, the agency awarded funding for IDEAL-X research projects to the University of Oklahoma Health Sciences Center and Duke University Medical Center.

Collaborating on the project at the University of Oklahoma is research biostatistician Justin Dvorak, PhD. Last summer Dr. Dvorak put an IDEAL-X-populated data set through its paces to determine if patients have VTE, based on their EHRs. In 1,144 patients analyzed, IDEAL-X was found to be 94 percent accurate at spotting VTE and 99 percent accurate at determining its absence, when compared to manual analysis, Dr. Dvorak says.

The biggest ongoing success story for IDEAL-X, however, is its use in Emory Hospital's cardiology biobank. Started in 2003, the biobank now includes blood draws from 7,000 patients, says Salim Hayek, MD, cardiology and clinical investigator at Emory.

As the Emory biobank fellow, Dr. Hayek was looking for objective methods to evaluate EHR data and replace subjective manual analysis when he learned of IDEAL-X. "Throughout the years, the way we gathered data has evolved," he explains. "Initially, they [the cardiology biobank] just used an Excel spreadsheet with certain columns to input biobank information. We even designed an application on the iPad to try to put the information into an online SQL database. Truly, the quality of the data was hit and miss."

The cardiology biobank implemented IDEAL-X in 2012, and within a short time, it went from a registry with about 25 percent of data missing to less than five percent of data missing, Dr. Hayek says. In the past five years, he continues, "we've been using it regularly and compared it at several time points with manual extraction. We've found tremendous improvement in the quality and accuracy of the data, truly reflecting what's in the patient's chart."

Ultimately, Dr. Hayek says, he hopes every EHR will include such capabilities. "What I would like to see is an integration of this type of technology within electronic medical records. We can imagine this happening, not just for research purposes, but for clinical use." —*Scott Mace*

Seacoast adds patient payment module to lab billing system

Seacoast Laboratory Data Systems has released a patient payment plan module for its SurroundLab AR lab billing system.

"The patient payment plan module provides flexible payment plan options, allowing you to help your patients find a comfortable payment arrangement within your organization's collection policies," according to a press release from Seacoast. "For example, you can limit the number of allowed payment months or set a minimum amount for which the patient arrangement can be offered, by using the configuration settings that you control."

The module integrates with the company's Easy Pay online patient payment center, which allows users to view and track their payment schedule and history and receive email notifications when a new statement is available. All payments processed via the Easy Pay portal are automatically posted in SurroundLab AR.

Patients cite lab work as most helpful electronic health record offering

The majority of U.S. residents who access their electronic health records find lab test results to be the most helpful EHR information, according to survey findings from Accenture Consulting.

Sixty-seven percent of EHR users surveyed by the consulting firm found such systems helpful for accessing lab work and blood test results, Accenture reported in its "2018 Consumer Survey on Digital Health: US Results." The survey included questionnaire responses from 2,301 adult U.S. residents, of whom 1,007, or 44 percent, reported having used their EHR.

The survey respondents were asked to provide up to three answers to the question, "Which of the following types of information in your electronic health record most helps you manage your health?" The other responses were physician notes pertaining to medical visits or medical conditions, 55 percent; prescription medication history, 41 percent; x-rays or nuclear imaging results, 31 percent; immunization status, 23 percent; personal profile information, 23 percent; and billing information, 20 percent.

The survey participants cited a need to stay informed as the primary reason for using their EHR, followed by curiosity about the contents of their record and a desire to make sure their records are accurate.

The survey is available at www.bitly.com/digital_survey.

Ovation and Hc1.com collaborate to serve small laboratories

The health care customer relationship-management platform vendor Hc1.com and Ovation, producer of a clinical laboratory information-management system and commercialization platform, have teamed up to serve small laboratories.

The companies have integrated their offerings to provide small, specialized testing laboratories with a LIMS, as well as client relationship and analytics solutions. "There is a tremendous amount of innovation happening at startups and small labs, especially in the genetic and molecular testing areas," said Brad Bostic, chairman and CEO of Hc1.com, in a press release. "This integration levels the playing field by providing affordable access to world-class LIMS and analytics solutions needed to grow their businesses and compete with larger labs."

Ovation's cloud-based LIMS is a scalable out-of-the-box solution for clinical diagnostics labs, while Hc1.com's live analytics enables lab managers to immediately visualize health care data in real-time dashboards for an instant view of performance. The combined offering allows joint customers to access standardized reports that provide insight on quality metrics, as well as financial and sales performance.
Ovation, 617-202-2507

Philips launches platform to advance artificial intelligence

The health technology company Royal Philips has introduced HealthSuite Insights to further adoption of analytics and artificial intelligence in various health care domains.

The offering includes tools and technologies to build, maintain, deploy, and scale AI-based solutions and to curate and analyze health care data. It will provide AI-based tools for genomics, diagnostic imaging, patient monitoring, and oncology.

HealthSuite Insights was designed for medical personnel who use patient data daily, such as clinicians and hospital managers. "With the HealthSuite Insights platform, we give them the ability to bring all the relevant patient

information together, curate the data, and use the power of AI to support precision diagnosis, personalized therapy, early intervention, and greater hospital efficiency," said Philips' chief innovation and strategy officer, Jeroen Tas, in a press release.

Philips is also launching Insights Marketplace, a component of HealthSuite that will provide a private ecosystem for curating present and future AI technology from the vendor and, later this year, from third parties. From Insights Marketplace, AI assets from Philips and others will be available for licensing.

"AI assets built using the Insights platform are designed to be secure regardless of the execution environment, with sophisticated identity and access management, integrated blockchain services, and data collection and management services built in," according to a press release from the company. "The Insights platform can be deployed on a health care cloud infrastructure, such as the Philips HealthSuite digital platform, or on premise at a provider site."

[Philips](#), 800-453-6860

Update to health app brings lab test results to Apple iPhone

Apple has enhanced the Health Records section of its Health app to allow Apple iPhone users to view their lab test results and other medical records on those devices.

The new feature, which is included in the iOS 11.3 release, aggregates patient-generated data with data from that person's electronic health record. However, the user must be a patient at a participating health care institution.

Besides providing clinical lab results, Health Records offers information about allergies and other medical conditions, immunizations, medications, medical procedures, and clinical vitals.

The Health Records platform adheres to Fast Healthcare Interoperability Resources, or FHIR, protocols for transmitting medical data. Providers send information to Apple, which aggregates the data and sends it to patients' iPhones, while notifying those users of the updates. Health Records data are encrypted and protected with the user's iPhone passcode.

Twelve medical institutions nationwide, including Johns Hopkins, Cedars-Sinai, Penn Medicine, and Geisinger, participated in the testing phase of the project, and as of CAP TODAY press time, 27 more had committed to participate, Apple reported.

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