Artificial intelligence aids research to find best treatment for stroke patients

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After a stroke, each patient faces a unique path to recovery — a precision medicine approach could help them receive better, customized care. Credit: Virginia Tech

Studying human diseases is the equivalent of solving a massive and dynamic jigsaw puzzle with pieces that are constantly changing shape.

A team of researchers from the Nutritional Immunology and Molecular Medicine Laboratory (NIMML), a leading laboratory at the Biocomplexity Institute of Virginia Tech, and the Department of Biomedical and Translational Informatics at Geisinger Health System are now working together to find precise methods to treat stroke patients using computer algorithms, clinical data, and advanced computational methods.

In a new study, the collaborative team of experts has developed new computational methods to stratify stroke patients in an emergency setting, paving the way to data-driven triage process with higher fidelity.

"Advanced machine-learning methods will be driving the next generation of personalized medicine at the clinical and genomic levels; however, these methods and their outcomes will have an added value if we let models actively learn from experts and experts learn from models. Our team has applied AI successfully to develop a data-driven triage process for classifying stroke patients. Ongoing collaborative studies are also applying these same AI methods successfully in infectious and immune-mediated diseases," said Vida Abedi, a researcher at Geisinger Health System and adjunct faculty member in NIMML.

The rich, longitudinal data warehouse of the Geisinger Health System has detailed electronic health records with tens of millions of legacy clinical data and more than 3 million active participants. This data is one of the major strengths that allowed Geisinger to be selected to participate in the national Precision Medicine Initiative Cohort Program with the goal of improving the ability to prevent and treat diseases based on individual differences in lifestyle, environment, and genetics.

"My resolve to implement a revolutionary vision for precision medicine is the driving force that defines and underpins this successful collaboration. As opposed to the one-size-fits-all approach that

dominates health care today, by focusing on a unique iterative integration of large-scale clinical record mining using new AI systems, informatics analyses, and computer modeling, NIMML and Geisinger Health System are partnering effectively to make tangible progress toward the personalized, individual treatment of human diseases," said Josep Bassaganya-Riera, director of NIMML and CEO of BioTherapeutics.

At its core, AI is a complex computer algorithm that replaces the traditional rule-based strategy with a data-driven approach capable of learning from positive and negative experiences. AI algorithms are driving the future of precision medicine and provide better health-care support for diverse and dynamic patient populations.

On average, the electronic health records of a four-year patient contains about 32 petabytes of data. The application of AI in medicine will leverage the volume and exponential growth of clinical data to translate clinical information into new unforeseen insights for safer, more-effective and cost-efficient personalized healthcare.

 More information: Vida Abedi et al. Novel Screening Tool for Stroke Using Artificial Neural Network, *Stroke* (2017). DOI: 10.1161/STROKEAHA.117.017033

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