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FIU researchers developed an algorithm that can diagnose a stroke with 83 percent accuracy

MIAMI (Month April 3, 2023) Research from [Florida International University's College of Business](#) (FIU Business) found that a machine learning (ML) algorithm that uses hospital data and social determinants of health data can help diagnose a stroke quickly – before the results of laboratory tests or diagnostic images are available – with 83 percent accuracy.

The findings suggest that there may be a way to reduce stroke misdiagnosis in patients and enhance patient monitoring. The discovery will allow medical personnel to identify a stroke patient or patients at risk of a stroke sooner, improving the patients' medical outcome.

Stroke is among the most common and dangerous misdiagnosed medical conditions, and timely detection is key to effective management and improved outcomes. Patients who are treated within an hour of the onset of symptoms have a much greater chance of surviving and avoiding long-term brain damage. This is known as the “golden hour.” Data indicates that Blacks, Hispanics, women, older adults on Medicare and residents of rural areas are less likely to be diagnosed during this crucial window. Currently used pre-hospital stroke scales miss approximately 30 percent of cases.

The ML algorithm that helps better diagnose strokes was developed using data of suspected stroke patients such as age, race, and number of underlying conditions. The algorithm “learns” and improves the more data it analyzes. Social determinants of health (SDoH) are non-medical factors, such as income and housing stability, access to transportation, race, and social isolation, that affect a wide range of health outcomes. Using all of this information, the ML algorithm helps to quickly diagnose a potential stroke patient.

“As we add more data it’s learning data,” said Min Chen, associate professor of information systems and business analytics at FIU Business and one of the researchers. “Our algorithm can incorporate a lot of variables to analyze and interpret complex patterns, which will allow emergency department care teams to make better and faster decisions. This data-driven approach will help make it easier to identify stroke patients and ensure that they get the care they need in a timely manner.”

Published in the January 2023 issue of the *Journal of Medical Internet Research*, the study outlines how researchers developed the ML stroke prediction algorithm using the emergency department and hospitalization records from hospitals in the state of Florida from 2012 to 2014, merged with the SDoH data from the American Community Survey.

Their analysis included 143,203 hospital visits of unique patients. Patients who ended up being diagnosed with stroke tended to be older, have more chronic conditions, and have Medicare as the primary payer.

If a hospital is using the researchers’ ML algorithm, when a patient arrives with stroke or stroke-like symptoms, an automated, computer-assisted screening tool will quickly analyze all the patient’s information. If it predicts that the patient is at a high risk for stroke, a pop-up will be triggered to alert the emergency department team.

This study fills a critical gap in the current efforts to support stroke triage. Current ML methods developed to assist in detecting a stroke have focused on interpreting clinical notes and diagnostic imaging results, which may not be available when a patient arrives at a hospital, particularly in rural and underserved communities.

This type of technology is undergoing pilot testing in the ERs of several prominent healthcare systems. To facilitate the widespread implementation of this kind of ML-enabled decision support systems, it is important to have widespread health information exchange that enables patients' data to flow seamlessly across providers and also a standardized way to collect the granular SDoH data.

Chen conducted the study with Professors Xuan Tan of Clara University and Rema Padman of Carnegie Mellon University.

About FIU Business:

Florida International University's [College of Business](#) plays a pivotal role in the development of global business leaders. With nearly 10,000 undergraduate and graduate students, FIU Business is widely recognized for its expertise in international business, real estate, data analytics, entrepreneurship, healthcare management, and a broad range of financial services. For more information about FIU Business, visit www.business.fiu.edu.

About FIU:

[Florida International University](#) is a [top public university](#) that drives real talent and innovation in Miami and globally. Very high research (R1) activity and high social mobility come together at FIU to uplift and accelerate learner success in a global city by focusing in the areas of environment, health, innovation, and justice. Today, FIU has two campuses and multiple centers. FIU serves a diverse student body of more than 58,000 and 290,000 Panther alumni. U.S. News and World Report places dozens of FIU programs among the best in the nation, including international business at No. 2. Washington Monthly Magazine ranks FIU among the top 20 public universities contributing to the public good.