



UNCG's Dr. Deborah Lekan (right), Cone Health's Dr. Marjorie Jenkins, and their collaborators are tapping into electronic health records to improve patient outcomes.

Big data boom

UNC Greensboro is developing smarter solutions to real-world problems.

If we must be hospitalized, most of us hope to leave healthier than when we entered – or at least well on the road to recovery.

But some patients head home and grow sicker instead of better, requiring more treatment. Some even end up back in the hospital.

What's the difference between patients who make a full recovery and patients who don't? One major element is what clinicians call "frailty" – a constellation of factors that include age, nutrition, psychological health, social supports and more.

When UNC Greensboro Assistant Professor of Nursing Deborah Lekan did her dissertation on frailty several years ago, she conducted a painstaking analysis of information drawn from electronic health records, which had just begun to change how providers cared for patients.

"I basically had PDF copies of nursing documentation and physician notes," Lekan says. Getting the information was time consuming and limited by how many records she could analyze herself.

But now, she and collaborators at UNCG and Cone Health System are harnessing the power of computers, sophisticated statistical techniques and machine learning to dive much deeper.

Their goal? Identify patients at risk of not fully recovering, in real time, and improve the care provided to them.

The project sets machine learning algorithms loose on clinical measurements, notes from nurses and doctors, demographic information and other data to see if they can predict which patients will need additional care.

"One of the benefits of our models is they actually tell us how important different variables are," Assistant Professor of Computer Science Somya Mohanty says. Clinicians should be able to see key features putting a person at high risk of readmission

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and strategically target interventions.

Patient readmission, especially among older patients, is a critical and costly issue. With changes to Medicare, hospitals can even face penalties if patients must be readmitted within a month.

But the frailty project will break ground in other ways, too. One outcome is essentially a road map which illustrates how UNCG and Cone Health collaborated to tap into the massive amounts of data in Cone's electronic health record system. It provides a guide to legal and technical issues other researchers and hospitals will face in using such data.

The software Cone uses is one of the most commonly used electronic health record systems, so the research could have applications at thousands of hospitals.

Lekan eventually visualizes an app for a hospital's electronic health records.

"It could red-alert the nurse," Lekan says. "It could prioritize treatments and flag the care specialists we want to loop in. Timely interventions are critical."

> Expertise in Big Data Analytics

In the burgeoning field of big data research, scientists scoop up vast amounts of information increasingly available in our digital world, discover new insights and train computers to make predictions. Here's a snapshot of some of the big data buzz across disciplines at UNCG:

Tackling our region's most vexing issues.

Students and professors are collaborating across disciplines to help local and state government better understand the data they have, and in the process create better solutions to community problems. Recent partnerships target the opioid epidemic, eviction rates, asthma and substandard housing and even government spending.

Rapid response. In cybersecurity research funded by the U.S. Department of Energy, Mohanty used machine learning to predict attacks on computer networks. Now, the computer scientist is part of an effort funded initially by the National Oceanic and Atmospheric Administration to track tweets during and after hurricanes to help identify areas of focus for disaster recovery efforts.

> Big data applications are limitless.

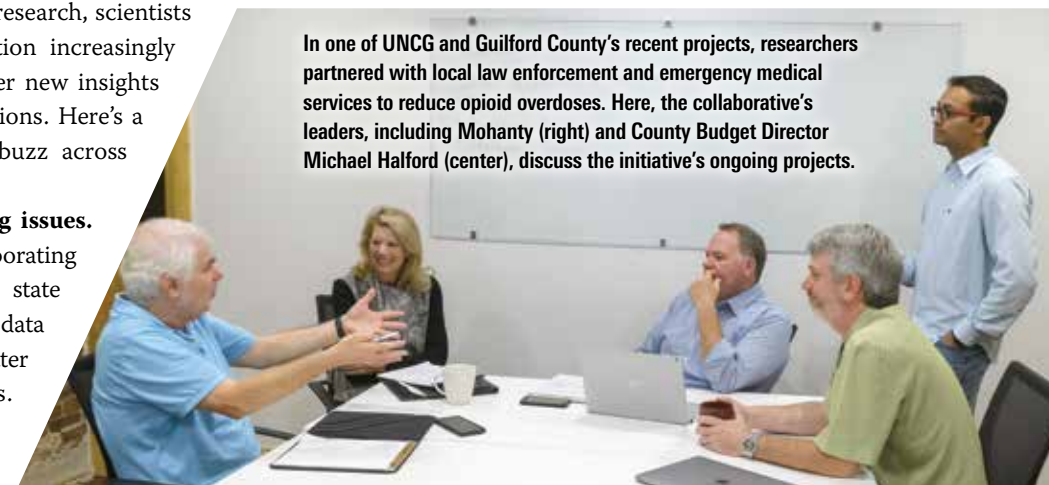
Genomic analyses for complex diseases. Finding fraud in stock price trends. Tracking domestic violence. And that's just from the portfolio of a single data scientist in UNCG's Institute for Data, Evaluation, and Analysis. IDEA connects university experts with external groups seeking help with data-informed decision making. Learn more at idea.uncg.edu.

Ramping up research. Assistant Professor of Computer Science Prashanti Manda and Mohanty are teaching computers how to read complex academic journal articles. The goal is to make research more accessible, cut down on duplicate research and help scientists more quickly expand their knowledge.

Rhetoric writ large. Assistant Professor of English Aaron Beveridge has created software to better understand how social media influences the media and popular opinion. "What I'm interested in, broadly, are the ways in which social networks are a macroscopic form of persuasion," Beveridge says.

Seeing the big picture. Professor of Computer Science Shan Suthaharan's latest computational modeling project seeks to improve detection of macular degeneration – the leading cause of age-related vision loss – using digital medical images. He's also interested in the consequences of big data use. Suthaharan is working on smarter machine learning techniques that take privacy into consideration.

See the full version of this article in the Spring 2019 issue of UNCG Research Magazine at researchmagazine.uncg.edu.



In one of UNCG and Guilford County's recent projects, researchers partnered with local law enforcement and emergency medical services to reduce opioid overdoses. Here, the collaborative's leaders, including Mohanty (right) and County Budget Director Michael Halford (center), discuss the initiative's ongoing projects.



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