Using big data to power an energy revolution

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Researchers inside the University at Buffalo's Center for Computational Research, a National Science Foundation supported supercomputing facility. Credit: Douglas Levere

Can big data improve how electricity is produced, delivered and consumed in the Northeastern United States?

University at Buffalo researchers think so, which explains their leadership role in a National Science Foundation effort that aims to find solutions to urgent societal problems through the examination of massive sets of raw data.

Announced Monday, the NSF plan centers on creating four Big Data Innovation Hubs. UB will work in the Northeast hub, a $1.25 million initiative led by Columbia University that includes a few dozen universities, as well as partners in industry, government and nonprofits.

"We are relying increasingly on a diverse energy supply that includes fossil fuels as well as renewables such as wind and solar power and equally complex distribution and usage systems. Our group will examine how to support discovery and use of data and information about these systems to manage them for optimum performance," said Abani Patra, PhD, professor in the Department of Mechanical and Aerospace Engineering, School of Engineering and Applied Sciences.

Patra, who will lead UB's portion of the work in the innovation hub, also directs UB's Computational and Data-Enabled Science and Engineering initiative, a new advanced degree and certificate program that is part of UB's "E Fund" initiative, which supports programs that will have a high impact both inside and outside the university.

Massive datasets and novel computational techniques are changing how individuals and societies approach day-to-day tasks. Data analytics promises to deliver individually tailored treatment to patients, massively reduce energy use in buildings, and radically improve teaching methods in schools, among other advances.

The idea for a Big Data hub network came in 2012, after President Obama announced a $200 million National Big Data Research & Development Initiative to apply data analytics to education,

environmental and biomedical research, and national security.

The NSF, one of six federal agencies involved, proposed an add-on initiative that would divide the country into "regional innovation hubs," each harnessing experts in academia, industry, government, and the non-profit sector, to address problems too big for any one to take on alone.

The Northeast Hub will address four overarching themes: education; data sharing; ethics and policy; and privacy and security. A series of workshops over the next three years will give partners a chance to brainstorm and collaborate on projects that address high-priority needs in the region.

The Northeast is home to some of the oldest and most diverse cities in the United States, and many of the nation's top universities, hospitals and banks.

"It's an ideal laboratory for testing the potential for data science to improve lives," said Kathleen McKeown, a computer scientist who heads Columbia's Data Science Institute. "The Northeast Hub will focus on extracting insights from large amounts of data that can bring about tangible results."

Provided by University at Buffalo