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Big Data Analytics Enables Scientists to Model COVID-19 Spread

FAU College of Engineering and Computer Science Receives NSF RAPID Grant to Work with LexisNexis Risk Solutions to Predict COVID-19 Spread

BOCA RATON, Fla. (July XX, 2020) – Public health efforts depend heavily on predicting how diseases like COVID-19 spread across the globe. Researchers from Florida Atlantic University's College of Engineering and Computer Science in collaboration with LexisNexis Risk® Solutions, a global data technology and advanced analytics leader, have received a rapid research (RAPID) grant from the National Science Foundation (NSF) to develop a model of COVID-19 spread using innovative big data analytics techniques and tools. The project leverages prior experience in modeling Ebola spread to successfully model the spread of COVID-19.

Researchers will use big data analytics techniques to develop computational models to predict the spread of the disease utilizing forward simulation from a given patient and the propagation of the infection into the community; and backward simulation tracing a number of verified infections to a possible patient "zero." Users of the models and algorithms developed by FAU and LexisNexis Risk Solutions will conform to all applicable requirements of HIPAA and other privacy regulations.

The project also will provide quick and automatic contact tracing and is expected to help reduce the number of patients infected with COVID-19 and virus-related deaths. This new methodology, which includes coalition-building efforts, will also support solutions for a wide range of other public health issues.

"This National Science Foundation grant will enable our researchers to advance knowledge within the field of big data analytics as well as across different fields including medical, health care, and public applications," said Stella Batalama, Ph.D., dean of FAU's College of Engineering and Computer Science. "Through our collaboration with LexisNexis Risk Solutions, we will jointly address public health concerns of national and global significance using cutting-edge computer science, big data analytics, data visualization techniques, and decision support systems."

The era of "big data" is quickly changing how models are used to understand the dynamics of disease propagation. The FAU project, led by Borko Furht, Ph.D., principal investigator, a professor in the Department of Computer and Electrical Engineering and Computer Science, and director of the FAU NSF Industry-University Cooperative Research Center for Advanced Knowledge Enablement (CAKE) will use an innovative risk score approach in modeling and predicting COVID-19 spread.

"The HPCC Systems team at LexisNexis Risk Solutions has an outstanding relationship with Dr. Furht and FAU," said Flavio Villanustre, vice president, Technology and CISO, LexisNexis Risk Solutions. "FAU and LexisNexis Risk Solutions have been collaborating on several projects over the last five years. Our most recent work involved the NSF grant for modeling Ebola using the HPCC Systems platform and big data analytics. We are grateful to the NSF, FAU and Dr. Furht for their continued investment in research that helps the community."

"The data analytics expertise we will receive from LexisNexis Risk Solutions will enable us to develop a model that will automatically and quickly identify every contact of an infected person," said Furht, who received an NSF RAPID grant for modeling Ebola spread using big data analytics. "Our approach will be much faster and more efficient than methods that are done manually and we expect it to significantly reduce infection rates and the number of deaths in the United States and around the world."

For the project, COVID-19 spread patterns will be fed into a decision support system (DSS), which also contains information about social groups or individual people. Social groups could include nurses and doctors who had contact with a patient infected with COVID-19, passengers who travelled on the same plane with an individual diagnosed with COVID-19, or family members living with someone who contracted COVID-19, among others. Based on spread patterns, the DSS would then calculate probabilities for a social group or a given person to become infected with COVID-19. Data will be provided as reports to appropriate state and government agencies so that they can immediately contact and test people who have a high score related to the person who is infected with COVID-19.

"Because of a lack of actual social network data, mathematical compartmental modeling has been restricted to hypothetical populations. However, emerging LexisNexis Risk Solutions technologies could accelerate the accumulation of knowledge around disease propagation in the United States," said Furht. "For our research, we plan to calculate various scores related to COVID-19 spread including population density rank, household mortality risk, street level mortality risk, and county mortality risk."

Members of the FAU team for "Modeling Coronavirus Spread Using Big Data Analytics," include Taghi Khoshgoftaar, Ph.D., Motorola Professor; Waseem Asghar, Ph.D., an assistant (change to associate) professor; Ankur Agarwal, Ph.D., a professor; Behnaz Ghoraani, Ph.D., an assistant (change to associate) professor and a fellow of FAU's Institute for Sensing and Embedded Network Systems Engineering (I-SENSE); and Mirjana Pavlovic, Ph.D., an instructor, all within FAU's Department of Computer and Electrical Engineering and Computer Science.

The LexisNexis Risk Solutions team includes Flavio Villanustre, vice president, Technology and CISO; Arjuna Chala, senior director, Operations; Roger Dev, senior architect; and Jesse Shaw, principal statistical modeler.

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About FAU's College of Engineering and Computer Science:
The FAU College of Engineering and Computer Science is internationally recognized for cutting edge research and education in the areas of computer science and artificial intelligence (AI), computer engineering, electrical engineering, bioengineering, civil, environmental and geomatics engineering, mechanical engineering, and ocean engineering. Research conducted by the faculty and their teams expose students to technology innovations that push the current state-of-the art of the disciplines. The College research efforts are supported by the National Science Foundation (NSF), the National Institutes of Health (NIH), the Department of Defense (DOD), the Department of Transportation (DOT), the Department of Education (DOEd), the State of Florida, and industry. The FAU College of Engineering and Computer Science offers degrees with a modern twist that bear specializations in areas of national priority such as AI, cybersecurity, internet-of-things, transportation and supply chain management, and data science. New degree programs include Masters of Science in AI (first in Florida), Masters of Science in Data Science and Analytics, and the new Professional Masters of Science degree in computer science for working professionals. For more information about the College, please visit eng.fau.edu.

About LexisNexis Risk Solutions
LexisNexis Risk Solutions harnesses the power of data and advanced analytics to provide insights that help businesses and governmental entities reduce risk and improve decisions to benefit people around the globe. We provide data and technology solutions for a wide range of industries including insurance, financial services, healthcare and government. Headquartered in metro Atlanta, Georgia, we have offices throughout the world and are part of RELX (LSE: REL/NYSE: RELX), a global provider of information and analytics for professional and business customers across industries. For more information, please visit www.risk.lexisnexis.com and www.relx.com.

About HPCC Systems
HPCC Systems is an end-to-end data lake management solution created by LexisNexis Risk Solutions, an innovative pioneer in big data processing. Open source for nearly a decade now, HPCC Systems is a powerful, versatile platform that makes it easier for developers to see the data they're working with and manipulate it as needed. Flexible information delivery makes it easier for your clients to query and find the data they need — and it runs analysis and queries faster than other competitive platforms.

About Florida Atlantic University:
Florida Atlantic University, established in 1961, officially opened its doors in 1964 as the fifth public university in Florida. Today, the University, with an annual economic impact of $6.3 billion, serves more than 30,000 undergraduate and graduate students at sites throughout its six-county service region in southeast Florida. FAU's world-class teaching and research faculty serves students through 10 colleges: the Dorothy F. Schmidt College of Arts and Letters, the College of Business, the College for Design and Social Inquiry, the College of Education, the College of Engineering and Computer Science, the Graduate College, the Harriet L. Wilkes Honors College, the Charles E. Schmidt College of Medicine, the Christine E. Lynn College of Nursing and the Charles E. Schmidt College of Science. FAU is ranked as a High Research Activity institution by the Carnegie Foundation for the Advancement of Teaching. The University is

placing special focus on the rapid development of critical areas that form the basis of its strategic plan: Healthy aging, biotech, coastal and marine issues, neuroscience, regenerative medicine, informatics, lifespan and the environment. These areas provide opportunities for faculty and students to build upon FAU's existing strengths in research and scholarship. For more information, visit fau.edu.