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BIG DATA IN CLIMATE AND EARTH SCIENCES: CHALLENGES AND OPPORTUNITIES FOR DATA SCIENCE

Prof. Vipin KUMAR

Regents Professor and William Norris Chair in Large Scale Computing
Professor of Computer Science and Engineering,
University of Minnesota

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Abstract

The climate and earth sciences have recently undergone a rapid transformation from a data-poor to a data-rich environment. In particular, massive amount of data about Earth and its environment is now continuously being generated by a large number of Earth observing satellites as well as physics-based earth system models running on large-scale computational platforms. These massive and information-rich datasets offer huge potential for understanding how the Earth's climate and ecosystem have been changing and how they are being impacted by humans' actions. This talk will discuss various challenges involved in analyzing these massive data sets as well as opportunities they present for both advancing machine learning as well as the science of climate change in the context of monitoring the state of the tropical forests and surface water on a global scale.

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Prof. Vipin Kumar is a Regents Professor at the University of Minnesota, where he holds the William Norris Endowed Chair in the Department of Computer Science and Engineering. He has authored over 300 research articles, and has coedited or coauthored 10 books including two text books "Introduction to Parallel Computing" and "Introduction to Data Mining", that are used world-wide and have been translated into many languages. Kumar's current major research focus is on bringing the power of big data and machine learning to understand the impact of human induced changes on the Earth and its environment. Kumar served as the Lead PI of a 5-year, $10 Million project, "Understanding Climate Change - A Data Driven Approach" [http://www.climatechange.cs.umn.edu/], funded by the NSF's Expeditions in Computing program that is aimed at pushing the boundaries of computer science research. Kumar has served as chair/co-chair for many international conferences in the area of data mining, big data, and high performance computing, including 25th SIGKDD Conference on Knowledge Discovery and Data Mining (KDD-2019).

Kumar has been elected a Fellow of the American Association for Advancement for Science (AAAS), Association for Computing Machinery (ACM), Institute of Electrical and Electronics Engineers (IEEE), and Society for Industrial and Applied Mathematics (SIAM). Kumar's foundational research in data mining and high performance computing has been honored by the ACM SIGKDD 2012 Innovation Award, which is the highest award for technical excellence in the field of Knowledge Discovery and Data Mining (KDD), and the 2016 IEEE Computer Society Sidney Fernbach Award, one of IEEE Computer Society's highest awards in high-performance computing.