IISc Swarnajanti Fellow to investigate distributed algorithms to collectively process data

Professor Yogesh Simmhan from the Indian Institute of Science (IISc) Bangalore, a recipient of this year's Swarnajayanti Fellowship funded by the Department of Science and Technology, will investigate distributed algorithms, programming abstractions and software platforms to collectively process data in a rapid and scalable manner.

His research will help derive meaningful intelligence from large-scale temporal and dynamic property graphs. These graphs can be used to model information in diverse application domains like social networks, transit networks, financial technology, and healthcare. They can also grow to billions of vertices and edges in size, change frequently, and exceed the capacity of a single computer.

By allowing distributed systems to collectively process temporal and linked data in a rapid and scalable manner, his research will help translate data to actionable knowledge. The process would give rise to novel analytics and distributed algorithms over temporal graphs. Applications for such graph platforms include detecting fake news in social networks, identifying evolving health situations in epidemiological networks, efficient routing in logistics and supply chain, and understanding funds flow through GST and UPI financial networks to detect discrepancies.

Professor Simmhan heads the DREAM Lab at the Department of Computational and Data Sciences, Indian Institute of Science, Bangalore. His research group investigates the use of distributed computing systems to help solve applications of scientific and societal importance. This includes research into edge and cloud computing, the Internet of things, and software platforms for graphs and streaming applications.

Prof. Simmhan's research has resulted in over 100 high-impact peer-reviewed papers at top conferences and journals. He has won the Best Paper Award at the IEEE International Conference on Cloud Computing (CLOUD) 2019, the IEEE TCSC SCALE Challenge Award in 2019 and 2012, Distinguished Paper award at EuroPar 2018, the Microsoft Ship-It Award in 2009, and the IEEE/ACM Supercomputing HPC Storage Challenge Award in 2008. Several

software prototypes developed in his lab have been released in the public domain under an open-source license.

His interdisciplinary research has already had direct societal applications. One of these examine the efficient and equitable supply of water in mega-cities using Big Data platforms and network algorithms, and another looks at large-scale and low-cost air quality monitoring in urban spaces using Internet of Things technologies and edge analytics. These research prototypes and their field deployments will advance data-driven policymaking and transparency in public services, as well as help enhance the quality of life for the growing urban population in India.