

Abstract

"Big Data and Theory" is part of the book "Encyclopedia of Big Data", Springer, 2017. This encyclopedia will be an essential resource for our times, reflecting the fact that we currently are living in an expanding data-driven world. Technological advancements and other related trends are contributing to the production of an astoundingly large and exponentially increasing collection of data and information, referred to in popular vernacular as "Big Data". Social media and crowdsourcing platforms and various applications "apps" are producing reams of information from the instantaneous transactions and input of millions and millions of people around the globe. The Internet-of-Things (IoT), which is expected to comprise tens of billions of objects by the end of this decade, is actively sensing real-time intelligence on nearly every aspect of our lives and environment. The Global Positioning System (GPS) and other location-aware technologies are producing data that is specific down to particular latitude and longitude coordinates and seconds of the day. Large-scale instruments, such as the Large Hadron Collider (LHC), are collecting massive amounts of data on our planet and even distant corners of the visible universe. Digitalization is being used to convert large collections of documents from print to digital format, giving rise to large archives of unstructured data. Innovations in technology, in the areas of Cloud and molecular computing, Artificial Intelligence /Machine Learning, and Natural Language Processing (NLP), to name only a few, also are greatly expanding our capacity to store, manage, and process Big Data. In this context, the Encyclopedia of Big Data is being offered in recognition of a world that is rapidly moving from gigabytes to terabytes to petabytes and beyond.