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Big Data Challenges in Neuroimaging, Informatics and Genomics Computing.

The explosive growth in web-based storage, management, processing, and accessibility of biological and clinical data has been driven by our need for fundamental understanding of biological and physiological characteristics of disease processes. The enormous volume and complexity of biomedical data propel technological advancements realized as exponential increases in storage capability, processing power, and bandwidth capacity and transfer velocity. The rapid increases in data collection, computational processing, and statistical powering promote and facilitate collaborative, distributed team science and fuel the pace and volume of scientific discoveries, which ultimately advance our knowledge of diverse types of human health conditions and improve the efficacy of clinical interventions in disease diagnosis, treatment, and prevention. Despite its translational promise, Big Biomedical Data present significant challenges in handling, analyzing, and visualizing heterogeneous, incomplete, incongruent, and multi-scale data with little or no common data element standards, with or without Cloud service. We illustrate Big Data problems in the context of neuroimaging and genetics applications, and discuss Big Data discovery and analytics issues. (Received May 24, 2013)