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Big data in Environmental and human health risk assessment: opportunities and challenges

Vikas Kumar
Universitat Rovira i Virgili, vikas.kumar@urv.cat

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Vikas Kumar
Environmental Engineering Laboratory, Departament d'Enginyeria Quimica, Universitat Rovira i Virgili, Av. Països Catalans 26, 43007 Tarragona, Catalonia, Spain (vikas.kumar@urv.cat)

Abstract: Big Data is broad term for large data sets arriving from multiple sources with typological and structural complexities which presents integrational, analytical and visualization challenge to extract meaningful information. In the human health risk assessment, the amount of data is exploding from basic science to clinically based omics, High Throughput Screening (HTS) to biosensors, large scale biomonitoring to multigenerational individual and population based studies. The scattered “Big Data” captures the opportunities as well as challenges in accessing, integrating, managing and analysing the datasets of diverse data types. The aim of this study is to perform a systematic review of the literature, current data infrastructure and potential modelling and mining tools available to exploit the current big data pool in this research domain. Current challenges and limitation of Big Data research in the transdisciplinary field of human health risk assessment are also identified and discussed with some recommendation and future research direction. Based on limited literature and the evidence available so far, Big Data does show good potential as a force for increasing value of large datasets, provided it is approached and promoted in more organized way and build on collaborative culture. Research in this field can use sophisticated technologies to gain insight from their clinical, biomonitoring, consumer and other environmental and socio-economic data repositories and make informed decisions. However, research and applications of Big Data in environmental and human health risk are at a prenatal stage of development, and need continuous institutional and community support to build scalable platform.

Keywords*: Big Data; Data integration; Human health risk assessment; Toxicity assessment*.