

Big Data Analytics as a Tool for Reducing Ergonomics Risk

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Editorial

The first step towards reducing ergonomic risks in a production system is to devise methods to understand and characterize the risk events. According to Drury [1], in recent years, Big Data Analytics (BDA) has developed computational methods to derive meaningful, actionable conclusions from huge data-sets also in the field of human factors/ergonomics (HFE). Ergonomic metering in complex production facilities is necessary to provide industrial enterprises higher levels of quantification and visibility in their ergonomic risks.

Big Data Analytics (BDA) methods can help companies make more informed business decisions by enabling data scientists, predictive modelers and examining large data sets to uncover hidden patterns, unknown correlations. For this reason, an ergonomic risk monitoring system is necessary. Internet of Things (IoT) can provide useful tools in order to develop a more detailed analysis of ergonomic programs. Kees et al. [2] define IoT as the connectivity of physical objects or industrial products, equipped with sensors and actuators, to the Internet via data communication technology, enabling interaction with and/or among these objects or products. There has been a compelling need to adopt data management systems in industrial operational processes and product-development principles in order to enhance IoT applications, while the development of big data is already lagging behind in integration with cloud computing. It has been widely recognized that these two technologies are interdependent and should be jointly developed: meaning that the widespread deployment of IoT drives the high growth of data [3]. Big data management is a complex process, particularly when abundant data originating from heterogeneous sources are to be used for business intelligence and decision-making [4]. Furthermore, big data management has become a key to the success of many enterprises, science, industries, engineering fields and government ventures. Traditional data storage and processing typically fed with relatively clean datasets generated by limited sources; hence, the results tended to be accurate. However, the evolution of data mining has revealed a serious management problem, as standard tools and procedures are not designed to manage such massive data volumes. At the same time, current infrastructures are not yet capable of addressing the distributed computational needs of managing big data and exploiting large quantities and varieties of data [5]. This is not only due to the growth in the volumes of datasets but also to their complexity and volatility that makes processing and analysis very hard to achieve through traditional data management techniques and

technologies. These aspects are very important when a company aims at analysing the ergonomic characteristics of its production system. In this case, data provided by different sources and geographically dispersed repositories must be taken into consideration. Bevilacqua et al. [6] proposed a data mining analysis for the assessment of the ergonomic, management and operational parameters which influence high accident risk situations.

Walker and Strathie [7] presented a number of proofs of concept demonstrations to show that long standing ergonomics methods can be driven from big data, and succeed in providing insight into human performance in a novel way. Over 300 ergonomics methods were reviewed and a smaller sub-set selected for proof-of-concept development using real on-train recorder data. The intersection of psychological knowledge, ergonomics methods and big data creates an important new framework for driving new insights.

According to literature review, the Big Data Analytics, which considers a very wide set of objective and predictive variables, can show new cause-effect correlations in occupational safety which had never been previously described, highlighting possible ergonomic risk groups and supporting decision-making in these areas.

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