**Big Data Analytics Tools Have Become Essential For Crafting Systematic Strategies**

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Nowadays, with the proliferation of data generated every day, humanity are facing unparalleled challenges in its history. Estimates suggest that about 402.74 million terabytes are generated every day (Duarte, 2025), which not only poses more challenging problems for humans, but implies more potential that lies within the data itself. Big data analytics tools are developed by data scientists to unveil the power in big data to provide more precise suggestions for daily human production and activities. In history, the Kepler’s laws of planetary motion was derived by famous astronomer Kepler by analyzing the data observed by another astronomer Tycho. Such analytics is possible since the data are numerical. However, human teams cannot manually analyze terabytes of unstructured data (e.g., IoT sensor streams, social media sentiment) (Ren, 2022). With the development of computer science, manipulating these data with computers becomes possible, and scientists began developing new big data analytics tools for better outcomes. This paper argues that big data analytics tools have become essential for crafting systematic strategies by uncovering previously unnoticed patterns and powering personalized recommendation systems.

Firstly, big data analytics tools make it possible to uncover hidden correlations which could not be detected efficiently in the past. Prior to the advent and widespread adoption of big data analytics tools, a common belief held that everything in the world follows a specific law. For instance, the falling of an apple from the tree follows from the law of gravity, which was stated by Isaac Newton. With this belief, the question was deduced to find the hidden rule behind observations of the real world. A famous example of human beings’ success in processing huge amounts of data was the discovery of the Kepler’s Laws. Kepler, the well-known astronomer, continued the research of the rules of planetary motion on the basis of the observed data that came from another astronomer, Tycho Brahe. However, such cases are rare in the history of science, because manipulating so many numbers requires massive calculation, which is historically challenging. Besides, as data continues to explode, many data types that humans cannot calculate straightforwardly arose, like the boolean values. Hence, alternative methods are urgently needed, and big data analytics tools are well-suited for this. In fact, big data analytics tools that have matured have proved their indispensable value. In a 2022 research, researchers demonstrated that big data analytics tools could find hidden correlations implying cause and result relationships, which was hard for humans to investigate (Ren, 2022). In this research, big data analytics tools such as deep learning helped to uncover the underlying cause of production bottlenecks of a factory, which was the delay in logistics rather than the crash of cash flows. Also, such tools also helped to find the correlation between the weather patterns and the logistic delays across disparate datasets, which greatly helped the logistic company. Collectively, these cases exemplify the capacity of big data analytics tools to uncover hidden correlations, not to mention that such tools also make it possible to process vast quantities of data with the help of computer science.

Furthermore, big data analytics tools also enable personalized experiences by powering recommendation and decision systems across industries. The most significant influence on recommendation systems lies in the field of E-commerce platforms, especially in China. With methods like pop-up advertisements, companies strive to enhance precision marketing strategies leveraging big data analytics tools. Through a series of steps: data preprocessing, user profiling, user clustering, repurchase behaviour prediction and recommendation algorithm research, users’ needs are taken into account when providing them with accurate product recommendations based on their diverse and personalized characteristics. Research shows that such introduction of big data analytics tools into the strategies-making process could improve the marketing model’s precision by 78.8% (Luo, 2024). Moreover, beyond precision marketing, keeping track of users’ interests and dynamically making adjustments to strategies are also powered by big data analytics tools, without which humans lack the capacity to continuously monitor every customer around the clock and perform the necessary calculations with sufficient speed. The same research involved the construction of RFM (Recency, Frequency, Monetary) models, which could segment users dynamically, enabling targeted promotions. Such capabilities enabled cross-industry applications driving tailored outcomes. Big data analytics tools could be used not only in recommendation systems for commercial benefits, but in areas like education and medicine. In a 2024 study, researchers designed big data models analyzing students’ cognitive patterns to adjust curricula for students with diverse learning styles, therefore enabling teaching students according to their aptitude possible (Thimmanna et al., 2024). Also, customized teaching materials not only enhanced comprehension, but also fostered a more inclusive learning environment by accommodating different academic strengths and weaknesses. Other benefits such as facilitation of collaborative learning, promotion of lifelong learning and providing data-driven insights into educational policy making are also confirmed. Additionally, big data analytics tools are playing an increasingly important role in personalized medicine. Today’s healthcare workforce is faced with the availability of massive amounts of patient- and disease-related data. In a review article in 2016, researchers provided an overview of personalized medicine and came to the conclusion that when mined effectively, these data will help produce more efficient and effective diagnoses and treatment, leading to better prognoses for patients at both the individual and population level (Estape et al., 2016). All these examples showcase big data analytics tools enabling personalized experiences through recommendation and decision systems.

Concurrently, some researchers argue that while big data analytics tools enhance the adoption of systematic strategies in various areas, such as medicine and education, this could concurrently create greater barriers to equality. As a pertinent example, consider precision medicine. While big data analytics tools enable precision medicine in practice, their accessibility to everyone is not guaranteed. For instance, a 2012 research paper notes this concern, stating, “However, to the extent that personalized therapeutics improves health outcomes, and to the extent that this technology is preferentially used by the economically advantaged, the health gap between rich and poor will be predicted to increase.” (Ward, 2012). Undoubtedly, significant lag between supply and demand would characterize the initial stages of this technology's implementation. Technological advancements improving health outcomes might benefit economically advantaged individuals, whereas less privileged populations could continue to suffer. Nevertheless, the economics of such technologies have been significantly impacted by advancements in big data analytics tools. According to (Precision Medicine Needs an Equity Agenda, 2021):

“Since the release of the first draft of the human genetic sequence 20 years ago by The Human Genome Project international consortium, technical improvements in sequencing approaches and a staggering drop in the cost of genome sequencing have enabled an exponential increase in the number and size of genetic datasets” (p.737).

The development of big data analytics tools makes precision medicine increasingly accessible to everyone, due to their enhanced data processing capabilities. Furthermore, the process of building and processing the datasets utilized by big data models is another source of inequality. Historically, participants of European descent have predominantly been included in genetic studies spearheaded by researchers and consortia in the UK or the USA. Consequently, data from continents such as Asia and Africa remain underrepresented. Such inequalities and biases are, however, being actively tackled by scientists through various initiatives. Led by African scientists across 30 countries, the H3Africa initiative is building genetic research capacity and improving the representation of African genomes in genomic databases; this, given their fundamental diversity and inter-individual variation, will expand the human catalog of disease-related genetic associations. Similarly, a map of genetic diversity across Asian populations is being built by GenomeAsia 100K, while the ongoing Polyethnic-1000 project characterizes cancer-predisposing genetic factors across various ethnic groups in the New York City area. Scientists are actively working towards greater equity in the applications of big data analytics tools, with their efforts extending beyond the domain of precision medicine. Finally, the involvement of more people from different backgrounds in these initiatives is also necessitated by the need to increase diversity in such studies. Big data analytics tools retain their indispensable role in today’s world as the problem of inequality is being addressed efficiently.

In summary, big data analytics tools are a kind of newly developed tools which have become essential for crafting systematical strategies in many areas. Such tools not only have capabilities of facilitating the uncovering of hidden correlations which could not be detected efficiently in the past, but could enable personalized experiences by powering recommendation and decision systems across industries. Also, their application extends to many areas of everyday life, including weather forecasting and shopping recommendation systems. Although some are concerned about its widespread adoption and equitable application, scientists have been addressing such problems efficiently. In a world which is full of all kinds of data, big data analytics tools could make a big difference to everyone’s life.

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