

# **ANNOTATED BIBLIOGRAPHY**

## **Harnessing Big Data for Predictive Public Health Interventions**

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DATA 603 Platforms for Big Data Processing

Ahmed, I., Ahmad, M., Jeon, G., & Piccialli, F. (2021). *A Framework for Pandemic Prediction*

*Using Big Data Analytics*. Big Data Research, 25, 100190.

<https://doi.org/10.1016/j.bdr.2021.100190>

This paper offers a novel methodology for pandemic prediction using Big Data analytics considering the COVID-19 pandemic. The authors investigate how to enhance healthcare monitoring and pandemic prediction through the integration of IoT (Internet of Things) and Big Data technology. To predict the pandemic's progress, the framework employs machine learning algorithms—particularly neural networks—on data gathered from a variety of IoT devices. The utilization of real-time data and IoT integration is responsible for the noteworthy 99% forecast accuracy. The study explores various types of data analysis, including prescriptive, diagnostic, predictive, and descriptive analytics. Diagnostic analytics examines the relationships between factors like COVID-19 symptoms, while descriptive analytics helps in understanding the overall dataset. Neural network models enhance predictive analytics, which is the foundation of this framework, providing real-time insights into possible epidemics. Furthermore, prescriptive analytics yields actionable insights, enabling medical practitioners to base their decisions on the forecasts. The authors emphasize that the combination of Big Data and IoT is essential for real-time health monitoring and pandemic control, making the framework a valuable tool for future pandemic preparedness. This work offers a scalable method that can be adapted to address various public health emergencies, contributing significantly to the expanding field of healthcare data analytics.

Asri, H., Mousannif, H., Al Moatassime, H., & Noel, T. (2020). *Big Data in healthcare:*

*Challenges and Opportunities.* <https://doi.org/10.1109/CLOUDTECH.2015.7337020>

The authors of this study explore big data's growing importance in healthcare, highlighting both its benefits and problems. The research explores the potential use of the huge amount of healthcare data produced by hospital records, mobile devices, and other sources to improve healthcare services. One of the main advantages mentioned is that big data may help with early diagnosis, improve patient outcomes by allowing medical professionals to make better decisions in real time, and improve illness prediction. Additionally, the concept of "reality mining" is presented, which requires gathering information from several devices to examine and forecast health patterns based on human behavior. The study notes several difficulties despite these benefits, such as concerns about data privacy, the difficulty of handling unstructured data, and the cost of putting big data solutions into practice. The authors stress that although big data has a lot of promise, overcoming these obstacles is essential to maximizing its advantages in the healthcare industry. For data scientists, politicians, and healthcare professionals looking to use big data to revolutionize the healthcare sector, this essay offers crucial insights.

Adenyi, A. O., Okolo, C. A., Olorunsogo, T., & Babawarun, O. (2024). Leveraging big data and

analytics for enhanced public health decision-making: A global review. *GSC Advanced*

*Research and Reviews*, 18(2), 450-456. <https://doi.org/10.30574/gscarr.2024.18.2.0078>

This paper provides a comprehensive review of how big data and analytics are revolutionizing public health decision-making on a global scale. The authors concentrate on combining sizable, diverse datasets from several sources, including social media,

wearable technology, environmental sensors, and electronic health records. By analyzing these databases, public health professionals can find trends in healthcare, risk factors, and illness patterns, which increases the precision and promptness of public health actions. Utilizing cutting-edge analytical methods like machine learning and predictive modeling, the study shows how big data may be used to improve customized medicine, forecast disease outbreaks, and allocate healthcare resources optimally. Several case studies that show the useful applications of big data in public health are also highlighted in the paper, such as social media mining for public sentiment analysis and real-time disease surveillance. The authors do, however, also discuss important issues, such as connectivity, quality, and data privacy. They urge governments, academic institutions, and business to work together to create moral frameworks that guarantee fair access and responsible data use. For scholars, decision-makers, and medical professionals looking to use big data to inform and improve public health initiatives, this paper is a valuable resource.

Venna, S. V., Narra, S. R., Nandanampati, S. S. R., Tadisetti, T. P. S., Tata, R. K., & Senthil, A. (2023). Big Data Analysis in Healthcare: A Comprehensive Overview: Exploring the Benefits of Big Data for Health Care Programs. *2023 9th International Conference on Advanced Computing and Communication Systems (ICACCS)*, 441-448.

<https://doi.org/10.1109/ICACCS57279.2023.10113099>

This paper presents a comprehensive overview of the potential benefits of using big data in healthcare. The authors examine how data mining, machine learning, and predictive analytics can improve clinical decision-making, patient monitoring, and healthcare

administration. The study demonstrates how big data may be utilized to predict patient outcomes, increase diagnostic accuracy, and expedite medical procedures. It provides real-world examples of big data applications, such as predictive analytics for illness management and economical resource allocation. Notwithstanding the enormous potential, the authors note many difficulties, such as the requirement for sophisticated computing infrastructure, the complexity of maintaining big datasets, and data privacy issues. They also go into ethical issues with big data in healthcare, like protecting patient privacy and permission. All things considered, this essay highlights how big data is transforming the healthcare industry and how important it is to build robust mechanisms to manage the moral and technical issues that come up when it is used. This article is a great resource for legislators, data scientists, and healthcare managers who want to use big data to enhance healthcare systems.

Rehman, A., Naz, S., & Razzak, I. (2021). Leveraging Big Data Analytics in Healthcare Enhancement: Trends, Challenges, and Opportunities. *Multimedia Systems*, 28(1339–1371). <https://doi.org/10.1007/s00530-020-00736-8>

This paper explores the important role that big data analytics plays in the healthcare industry, emphasizing how it may revolutionize patient care, clinical decision-making, and predictive analytics. The authors explore the five major healthcare domains—medical image processing, bioinformatics, clinical informatics, public health informatics, and medical signal analytics—where big data has the most influence. A variety of architectures and repositories for managing and analyzing large healthcare datasets, including genomic and Electronic Health Record (EHR) data, are presented in the study. It also covers the

benefits of using big data to healthcare, such as early illness detection, better patient outcomes, and lower healthcare expenses. However, the study also points up several difficulties, including problems with security, privacy, and the complexity of combining organized and unstructured data. To overcome these challenges and properly utilize big data in healthcare, the authors urge continued study and development. Healthcare workers, data scientists, and policymakers that want to use big data to improve patient outcomes and healthcare delivery may find this thorough review to be helpful.

Batko, K., & Ślęzak, A. (2022). The use of Big Data Analytics in healthcare. *Journal of Big Data*, 9(3), 1-24. <https://doi.org/10.1186/s40537-021-00553-4>

This paper explores how Big Data Analytics (BDA) can transform healthcare by utilizing both structured and unstructured data for more informed decision-making. The authors focus on the integration of big data technologies within medical facilities in Poland and present the results of research conducted on a sample of 217 medical institutions. The study shows how advanced analytical methods may be used to assist clinical, corporate, and administrative choices using big data. One of the main conclusions is that a growing number of healthcare institutions are using data-driven healthcare strategies, which combine conventional databases with unstructured data sources including emails, sensor data, and data from medical devices. The authors also discuss challenges in implementing Big Data Analytics, including concerns around data privacy, system integration, and the complexity of processing large datasets. Despite these hurdles, the paper demonstrates how BDA can significantly improve patient care, predictive modeling, and healthcare management. This study is particularly relevant for healthcare professionals, data scientists,

and policymakers looking to leverage big data to enhance medical decision-making and operational efficiency. The authors conclude that although the application of big data analytics in healthcare has the potential to completely transform the sector, it necessitates continuous investments in data protection, infrastructure, and professional development. Healthcare institutions may fully benefit from Big Data by tackling these issues, which will increase the efficiency of healthcare systems generally and result in improved patient outcomes and more accurate diagnoses.

Shilo, S., Rossman, H., & Segal, E. (2020). Axes of a revolution challenges and promises of big data in healthcare. *Nature Medicine*, 26(1), 29–38.

<https://doi.org/10.1038/s41591-019-0727-5>

This article discusses the difficulties associated with implementing big data in healthcare while also examining its revolutionary potential. The authors discuss the distinct challenges of medical big data in comparison to data in other areas and look at a variety of medical data sources, such as biobanks, wearable technology, and electronic health records (EHRs). The study presents a variety of "axes" of healthcare data, including longitudinal follow-up, phenotyping depth, and participant count, offering a framework for comprehending the multifaceted character of big data in healthcare. The authors also discuss how modern data analysis techniques like machine learning and predictive analytics may be used to enhance illness prediction, diagnosis, and treatment using big data. However, the paper also notes important difficulties, including challenges with integration, data protection, and the high expense of building the required infrastructure. According to the study's findings, big data has enormous potential to transform healthcare, but its effective application depends on

resolving these ethical and technological issues. This research is extremely pertinent to data scientists, medical practitioners, and legislators who want to use big data to enhance public health and patient care.

Imran, S., Mahmood, T., Morshed, A., & Sellis, T. (2021). Big Data Analytics in Healthcare — A Systematic Literature Review and Roadmap for Practical Implementation. *IEEE/CAA Journal of Automatica Sinica*, 8(1), 1-22. <https://doi.org/10.1109/JAS.2020.1003384>

This paper offers a thorough analysis of big data analytics' (BDA) uses in the medical field, with an emphasis on patient care. The authors highlight the difficulties in bringing BDA into practice, including the complex nature and level of resources needed to succeed in healthcare systems. They look at the advantages of utilizing NoSQL databases in the medical field and suggest a novel architecture called Med-BDA that is intended to get around the drawbacks of existing solutions. To maximize the utilization of healthcare data and enhance clinical results, operational performance, and cost-effectiveness, this architecture makes use of several big data principles. The paper offers useful advice for healthcare executives and professionals by outlining successful implementation techniques for big data analytics in medical organizations. The study's roadmap aims to help healthcare companies navigate the hurdles of implementing big data technologies and make sure they can handle the increasing volume, velocity, and diversity of healthcare data.



Belle, A., Thiagarajan, R., Soroushmehr, S. M., Navidi, F., Beard, D. A., & Najarian, K. (2020). Big Data Analytics in Healthcare. *BioMed Research International*, 2020(370194), 1-16. <https://doi.org/10.1155/2015/370194>

This paper explores the growing role of big data analytics in healthcare, focusing on three key areas: medical image processing, signal processing, and genomics. The authors talk about how managing and analyzing sizable, intricate healthcare datasets with the use of big data analytics may enhance patient care, diagnostic precision, and healthcare delivery. One of the study's advantages is the way it looks at several big data modalities, such genetic and physiological data, and how they work together to give a more complete picture of patient circumstances. The authors also discuss the difficulties of combining structured and unstructured data in healthcare, including issues with scalability, data protection, and the requirement for sophisticated algorithms to handle big datasets. This paper is particularly helpful for politicians, data scientists, and healthcare professionals who want to use big data to enhance medical decision-making. Potential uses for the suggested frameworks include real-time health monitoring, tailored medication, and illness prediction.

Sabet, C., Hammond, A., Ravid, N., Tong, M. S., & Stanford, F. C. (2023). Harnessing big data for health equity through a comprehensive public database and data collection framework. *npj Digital Medicine*, 6(91). <https://doi.org/10.1038/s41746-023-00844-5>

This research proposes a comprehensive public database for gathering anonymous patient data to investigate the potential of big data analytics for reducing gaps in healthcare. The authors stress that the U.S. Department of Health and Human Services has committed \$90 million to help health centers increase their data capabilities, showing that data-driven

solutions may help eliminate disparities in health care. With improved data collection and analysis, the study emphasizes how community health centers (CHCs), which provide healthcare to more than 30 million Americans, may improve healthcare access and equity. The authors talk on the difficulties in incorporating big data into public health, including issues with data privacy, standards, and guaranteeing fair data representation. They provide solutions to these problems, such as making infrastructural investments and creating fair data gathering measures. To optimize the influence of these technologies, the paper's conclusion discusses the wider implications of big data in promoting health equity and highlights the necessity of cooperation between academics, politicians, and healthcare practitioners. Policymakers, data scientists, and healthcare administrators who want to use big data to solve systemic health inequities may find this paper very pertinent.

