Harnessing Big Data for Predictive Public Health Interventions

Abstract

This paper examines how big data methodologies can improve the prediction and management of disease outbreaks. The growing availability of health-related data, which ranges from electronic health records (EHRs) to real-time environmental and social media insights, helps public health agencies with an unprecedented opportunity to shift from reactive to proactive interventions and be ready for these big health interventions. By means of integrating and interpreting vast and diverse datasets using existing big data frameworks such as Hadoop and Spark, we will be able to identify hotspots of disease and forecast future outbreaks. We will conduct work building distributed clustering algorithms to analyze these data at a large-scale, while we also outline the relevance and significance of predictive modeling techniques, in particular deep learning methods that are specifically built for big data platforms. The paper will address challenges of real-time processing and ethical considerations with big data in public health. Ultimately, this work aims to produce a scalable and comprehensive solution that can provide timely and regional early warnings for an outbreak, and help facilitate public health action.

References

1. Asri, H., Mousannif, H., Al Moatassime, H., & Noel, T. (2015). Big data in healthcare: Challenges and opportunities. In *2015 IEEE International Conference on Communications Workshop (ICCW)* (pp. 278-283). IEEE.
2. Ahmed, I., Ahmad, M., Jeon, G., & Piccialli, F. (2021). A Framework for Pandemic Prediction Using Big Data Analytics. Big Data Research, 25, 100190.
3. Madhavan, S., Bastarache, L., Brown, J. S., Butte, A. J., Dorr, D. A., Embi, P. J., Friedman, C. P., Johnson, K. B., Moore, J. H., Kohane, I. S., Payne, P. R., Tenenbaum, J. D., Weiner, M. G., Wilcox, A. B., & Ohno-Machado, L. (2021). Use of electronic health records to support a public health response to the COVID-19 pandemic in the United States: a perspective from 15 academic medical centers. *Journal of the American Medical Informatics Association, 28(2), 393–401*.