Title: Predictive Analytics in Public Health: Forecasting Malaria Incidence in Maharashtra

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Abstract:

Malaria remains a significant public health concern, particularly in regions with high transmission rates, such as Maharashtra. Accurately predicting malaria cases is crucial to the effective control and management of malaria. This study looks at malaria incidence in Maharashtra from 2012 to 2019, and it extends its methodology to predict malaria cases in specific districts of Maharashtra with high malaria burden. Regression models, such as Generalized Linear Models (GLMs) with linear, Poisson, and negative binomial distributions, as well as ensemble machine learning and advanced deep learning models, were used to capture and predict the patterns in monthly malaria case counts accurately. Critical predictive variables that are important for understanding the determinants of malaria incidence are integrated into the study, such as population density and meteorological data, including temperature, humidity, and rainfall. By conducting a thorough comparative analysis of the results derived from these models, more precise and dependable forecasts are achieved.

Through rigorous validation and analysis, this research presents a multidisciplinary strategy that incorporates statistics, machine learning, and deep learning techniques to predict the prevalence of malaria effectively. The applications of these methodologies offer a nuanced prediction capability, which is essential for the identification of potential outbreaks and the formulation of proactive intervention strategies. This research can make a significant contribution to the efforts to control the malaria burden in Maharashtra and minimize its effect on public health and economies in both urban and rural areas.