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Child Malnutrition Prediction Using Machine Learning Algorithm

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Abstract

Malnutrition remains one of the most pressing public health challenges, particularly in developing nations, where children under five years of age are highly vulnerable. Early prediction and intervention are essential to reduce morbidity, mortality, and long-term developmental impairments associated with undernutrition. With the rapid advancement of data-driven technologies, Machine Learning (ML) offers promising avenues for predicting malnutrition by analyzing complex health, demographic, and socio-economic data. This study focuses on malnutrition prediction through optimized machine learning algorithms. The proposed approach leverages diverse datasets that include anthropometric measurements, dietary intake patterns, household income, sanitation, and access to healthcare services. After extensive preprocessing and feature selection, multiple machine learning models such as Logistic Regression, Decision Trees, Random Forests, Support Vector Machines, and Gradient Boosting were trained and evaluated. An optimization strategy was applied to enhance predictive performance and reduce model complexity. Furthermore, the study highlights the interpretability of feature importance, showing that maternal education, sanitation access, and dietary diversity are significant predictors. By enabling early detection, such predictive systems can guide targeted nutritional interventions, improve resource allocation, and contribute towards achieving Sustainable Development Goal 2: Zero Hunger.

Keywords— Machine Learning, Malnutrition, Prediction, Public Health