

ABSTRACT

The increase in health risk rates and low awareness of health risks during pregnancy in rural areas has led to the need for an adaptive and inclusive monitoring system. This study developed the SEHATI mobile application as a platform to support the health of pregnant women, equipped with early risk detection features using a meta model-based machine learning stacking approach. The model used combines XGBoost and Random Forest as base learners, with a Gradient Boosting Classifier as the meta learner, to enhance prediction accuracy and generalization in limited data conditions. In addition to predictive functions, the SEHATI app includes various features to support the needs of pregnant women, such as food recommendations, air quality information, the MamaShare community, and a Shop feature. Meanwhile, a web dashboard is specifically provided for medical personnel (midwives) to monitor detection results, manage pregnant women's data, and accelerate data-driven medical decision-making. Model testing results demonstrate good classification performance, with an average accuracy of 86.6% (maternal health, diabetes, and hypertension). Evaluation through the classification report shows consistent precision, recall, and F1-score values, particularly after applying the hypertuning method. Functional testing through black-box testing showed that all features ran according to the scenario, and the results of the User Acceptance Testing (UAT) showed a good level of satisfaction from pregnant women (90.71%) and midwives (96.67%) for the first iteration and 98.57% for the second iteration, with the majority stating that the system was easy to use, informative, and helpful in monitoring pregnancy health. This study demonstrates that integrating machine learning technology in the form of a meta-model into mobile systems and dashboards can effectively support maternal health services, particularly in areas with limited access to medical facilities.

Keywords: pregnant women, diabetes, hypertension, meta model, XGBoost, Random Forest, machine learning