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Machine Learning based Postpartum Depression risk level detection in Sri Lanka

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Postpartum Depression (PPD) is approaching epidemic rates in many South Asian countries. Because of that, it requires community-level public health interventions such as screening, early detection, and treatment. It occurs in some mothers after childbirth because of their physical, behavioural and emotional changes. This mental disorder is hard to detect and its symptoms are complex. In Sri Lanka, previous studies have shown that 15.5% at 10 days and 7.8% at 4 weeks will have a PPD prevalence after a childbirth. The main objective of this research is to present a new model to detect PPD risk levels of mothers within 6 months after child delivery using Machine Learning (ML) techniques. ML is fast, accurate, and very advanced method that can be used to detect risk levels which includes techniques such as Feed-Forward Neural Network (FFANN), Adaptive Neuro-Fuzzy Inference System with Genetic Algorithm (ANFIS - GA), Random Forest (RF), and Support Vector Machine (SVM). After reviewing past literature, we can find many models that have gotten the best performance through these models. As an initial step here, we have collected data and pre-processed the dataset to improve the quality of the dataset. For that, we have used standard ways to identify risk levels based on Edinburgh Postpartum Depression Scale (EPDS) and score guide. Then, the risk levels were classified into four classes mild, moderate, severe, and profound, for the dataset of 686 Sri Lankan mothers. After that, each ML model was trained on the dataset, and the best model was identified depending on the model's performance for detecting risk levels. According to that, as multi-classification models, the FFANN, SVM, and RF have given 95.62%, 93.43%, and 92.7% accuracies, respectively. The FFANN model for 25 epochs, has given the best performance among classification models. When considering ANFIS - GA model, it was shown a testing error of 0.0496 as the best result as a regression model with 500 generations. Here multi-classification models have given their output as risk-level class names, while the regression model has given output as risk level values of user-entered data. Then, comparing the model performances in this research and previous research works, it is concluded that FFANN with multi-classification has the best performance when detecting PPD risk levels. Further, it helps to identify more influenced factors relevant to the PPD. According to that, this method with the improvements can be used as a screening tool for PPD.

Keywords: Feed-Forward Neural Network (FFANN), Machine Learning (ML), Postpartum Depression (PPD)