Machine Learning-based Classifiers for the Prediction of Low Birth Weight

1. Low birth weight (LBW) is a global concern associated with fetal and neonatal mortality as well as adverse consequences such as intellectual disability, impaired cognitive development, and chronic diseases in adulthood.
2. The World Health Organization classifies low birth weight (LBW) as a weight of below 2,500 g obtained after birth for a live-born infant. Annually, more than 20 million infants (15%–20%) are born with LBW worldwide.
3. LBW is also influenced by many other factors discussed in previous studies, such as maternal educational level, residence (urban or rural), family income, maternal occupation and health status, birth order, miscarriage, interpregnancy interval, and multiple pregnancies.
4. In this Study paper they collected maternal data as

* included place of residence (urban or rural)
* maternity insurance (insured or uninsured)
* delivery type (caesarean section or vaginal)
* maternal age at delivery (< 18, 18–35, or > 35 years)
* gestational age in weeks
* preterm delivery (yes [< 37 weeks] or no [≥ 37 weeks of gestation])
* consanguinity (yes or no)
* pregnancy risk factors such as chronic blood pressure, hepatitis, thyroid disease, cardiovascular disease, and preeclampsia/eclampsia (yes or no)
* gravida; parity (i.e., number of previous live and non-live births)
* number of abortions
* number of previous live births
* Neonatal data included sex (male or female) and birth weight in grams.

1. The data were divided into a training set (80% of the data) and a test set (20%). For both rural and urban areas,
2. In this research paper we can observe comparison between algorithms as

* The average accuracy of all models was 87% or higher. Furthermore, all models had high mean specificity (≥ 88%), with the lowest specificity observed with ANN and the highest with RF (97%). However, the mean sensitivity ranged between 44% (for RF) and 74% (for LR). The mean PLR was higher for RF than for the other models, at 15.27. In contrast, the mean NLR varied between 29% (for LR) and 58% (for RF).
* They calculate the values of Sensitivity, Specificity, PLR (Positive likelihood ratio), NLR Negative likelihood ratio), Accuracy to find the best algorithm.
* As a result, LR was found to be the best approach for the prediction of LBW in this study.

1. This paper also shows that Variable importance based on machine learning methods: (A) decision tree, (B) random forest, (C) artificial neural network, (D) support vector machine, and (E) logistic regression in bar graph format.
2. Table 2 about Factors associated with low birth weight in infants based on logistic regression.
3. A table -3 about Performance comparison of ML classifiers in the prediction of LBW on a test dataset with 10 repetitions.
4. As a result, LR was found to be the best approach for the prediction of LBW in this study.