ESTIMATING FETAL WEIGHT AT VARYING GESTATIONAL AGE USING MACHINE LEARNING

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Abstract - *Intrauterine growth restriction, which means that an unborn baby is not growing at normal rates, can put the babies at risk throughout pregnancy, delivery and after birth. Not growing at a normal rate can lead to low resistance to infections, troubles maintaining body temperature, or even death during delivery. The project is motivated by the impact that machine learning can have to help obstetricians to estimate the weight of a fetus better. We are trying to estimate the fetal weight using machine learning algorithms. It is to work together for an improved prediction, which may reduce prenatal morbidity and mortality and not meant to replace traditional clinical practices.*

Key Words*: *Machine learning, Fetal weight, Data collections, Feature extraction, Data training, Data testing, Data predictions

1.INTRODUCTION

Machine learning for healthcare technologies provides algorithms with self-learning that are able to increase the quality of treatment by analyzing external data on a patient's condition, their X-rays, CT scans, various tests, and screenings. It can provide an accurate estimation of fetal weight for obstetricians alongside traditional clinical practices, additionally as an efficient and effective support tool for pregnant women for self- monitoring. Obstetric ultrasound examination of physiological parameters has been mainly accustomed to estimate the fetal weight during pregnancy and baby weight before labor to observe fetal growth and reduces prenatal morbidity and mortality. However, the matter is that ultrasound estimation of fetal weight is subject to populations' difference, strict operating requirements for sonographers and lack of resources in remote areas.

1.1 EXISTING SYSTEMS

There are several methods can be used to predict fetal weight in clinical practice, consisting of abdominal palpation, parturient Symphysis-fundal height and abdominal girth measurements, and obstetric ultrasound. Among them, the ultra-sound estimation method is most reliable and objective and has been used extensively by obstetricians. It uses class of well-established regression models with multiple parameters standards for fetus. These are based totally on the logistic regression models. Some of the studies have indicated the necessity for medical intervention. This formed the inspiration for our thought that given the proper kind of medical intervention, LBW and HBW cases may be reduced and that we can help the mother achieve the conventional growth rates for her baby.

1.2 PROPOSED SYSTEM

This paper aims to benchmark the method we can use to estimate fetal weight. The major challenge here is data severity, its imbalance, unstructured format as well as missing values. Firstly, we can solve these issues with appropriate pre-processing steps and data cleaning techniques, we can build a classification model for the three- class problem of estimating fetal weight, and then develop a predictive model and the interface. We can use random under sampling and SMOTE techniques to handle the imbalanced data. We scan select the parameters for the proposed theory using Pearson's correlation technique. The data handling technique can be selected based on the accuracy of the classifier. Finally, the classifier with appropriate sampling technique and higher accuracy can be considered to predict individual patients

The conversion of raw data into processed data is the first stage in the picture above. Because there are various qualities in the raw data obtained, but only a few of those attributes are important for prediction, this is done through feature extraction. The first phase is feature extraction, which involves extracting the key attributes from the raw dataset's entire list of attributes. Feature extraction begins with a baseline of measured data and progresses to derived values or features. These traits are meant to be both informative and non-redundant, making learning and generalization easier. The feature extraction procedure

is followed by a classification procedure in which the data generated after feature extraction is divided into two distinct parts. The issue of classification is determining which set of categories a new observation belongs to. The test data set is used to predict the model's accuracy, while the training data set is used to train the model. The training data is separated in such a way that it maintains a higher proportion than the test data. To analyze data, the logistic regression algorithm employs a collection. It searches the data for specified attributes. In this situation, our proposed system's end goal is to predict the fetal weight

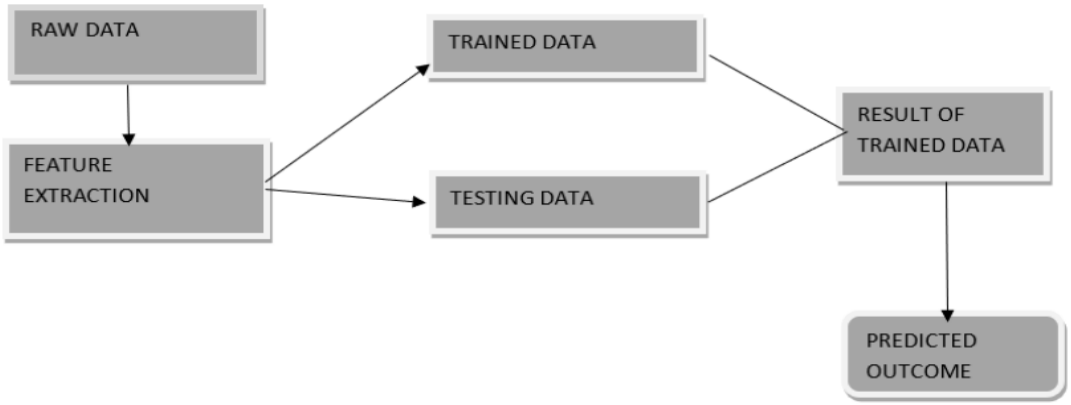

Fig -1: System Architecture

2. LITERATURE REVIEW

In this section we will discuss and review recent published papers in respective to the proposed system.

In this paper [1] the author is trying to tell that a singular method has been proposed to estimating fetal weight with the usage of ensemble device gaining knowledge of algorithms. The cubic spline characteristic has been used to fit the practical relationship among the BPD, AC, HC, and FL and the gestational age primarily based totally at the fitness facts of pregnant women. An ensemble device gaining knowledge of version has been proposed primarily based totally at the genetic set of rules with parallel optimization of a couple of parameters to are expecting the fetal weight at various gestational age. We have additionally evaluated the applicability of the ensemble version for the area of on real datasets. Comparing with the conventional ultrasound-primarily based totally estimation methods, it obtains the EFW greater appropriately and efficiently. Next, there are similarly medical checks in exclusive hospitals, and software program for each domestic and clinic packages are under improvement and shortly to be deployed. Estimation of fetal beginning weight amongst twins is any other direction of destiny research.

The paper [2] says that the absence of fetal weight statistics in populace beginning facts poses numerous demanding situations in reproductive epidemiology. Our attention become at the use of device gaining knowledge of algorithms that take as enter maternal and toddler beginning characteristics, and output anticipated fetal weights. We evaluated how anticipated fetal weights examine to real fetal weights through

- Estimating the correlation among anticipated and real fetal weights
- Evaluating the gestational week precise quantiles of real and anticipated fetal weights
- Inspecting the relation among smoking repute and small-for-gestational-age beginning, described the usage of real and anticipated statistics.

The paper [3] says that according to birth weight (BW), the neonates are described through the World Health Organization (WHO) has 3 groups, specifically low beginning weight (LBW, BW < 2500g), everyday beginning weight (NBW, 2500g < BW 4000g) which is likewise referred to as macrosomia.

- SMOTE (artificial minority over-sampling technique): The artificial minority over-sampling technique (SMOTE) become hired to resolve the imbalanced gaining knowledge of problem.
- SMOTE set of rules is a terrific artificial statistics augmentation set of rules which has been implemented in diverse areas
- SVM (aid vector device): Then, the aid vector device (SVM) set of rules become applied for fetal weight classification. SVM set of rules become used to classify fetal length earlier than fetal weight regression.

- DBN (deep notion network): The deep notion network (DBN) become hired to estimate the fetal weight primarily based totally on exclusive ultrasound parameters.
- DBN is a multilayer shape includes a sequence of man or woman RBMs (Restricted Boltzmann Machines). The RBM is a binary connectivity graph

The paper [4] says that ultrasound (US) is a prime device for expected fetal weight (EWF). Formulas of EFW are derived from 2D US parameters (USPs), including biparietal diameter (BPD), occipitofrontal diameter (OFD), belly circumference (AC), and femur length (FL). The specific ambitions are:

- To use correlation evaluation to cross-validate the importance amongst Ultrasound Parameter.
- To make use of K-approach set of rules to categorize fetal length with reference to the discriminative lessons for the schooling of the ANN to decorate the EFW accuracy.
- The paper concludes in proving the significance of selecting a particular grouping parameter for ANN to enhance EFW accuracy.

The paper [5] says that in medical practice, the increase parameters of the fetus are mainly received through ultrasound examination and are then as compared with the fetal increase standard curve. However, there are obstacles like obstetricians can only choose odd fetal improvement and an inexpensive frame weight primarily based totally at the modern results. This paper proposes using the effective capacity of a pc and an effective device gaining knowledge for set of rules and models to predict the fetal weight at any gestational age.

3. CONCLUSION

The extension of machine learning and predictive analysis in the field of medicine is a sort after area as it can help to provide better healthcare. Maternal health care should be primary importance considering its impact on fetal and infant health as well. The prediction of fetal birth weight just before the delivery is able to effectively guide obstetricians to choose a more reasonable delivery mode for pregnant women. Our project is not meant to replace the traditional clinical practices but to work in collaboration for an improved prediction, which can reduce prenatal morbidity and mortality. The approach uses the data collected from hospitals and uses simple machine learning algorithms which successfully provided a reasonable accuracy. This can be also used as an efficient and effective supportive tool for pregnant women for self-monitoring in certain situations. This can result in an improved delivery outcome during labor and further reduce complications for mothers and infants after labor. Hence, this project successfully classifies the patients and at the same time effectively provides the tips for taking the necessary care.

REFERENCES

[1] “Ensemble Machine Learning for Estimating Foetal Weight at Varying Gestational Age”, Yu Lu, Xi Zhang, Xianghua Fu, Fangxiong Chen, Kelvin K. L. Wong3, The Thirty-First AAAI Conference on Innovative Applications of Artificial Intelligence (IAAI-19)

[2] “Foetal Weight Estimation via Ultrasound Using Machine Learning”, Miao Feng, Li Wan, Zhi Li, Linbo Qing, And Xiaorong Qi, IEEE, July, 2019.

[3] “Machine Learning for Foetal Growth Prediction”, Ashley I. Naimi,Robert W. Platt and Jacob C. Larkin, PMC, March, 2019.

[4] “Efficient foetal size classification combined with artificial neural network for estimation of fetal weight”, Yueh-ChinCheng, Gwo-LangYan, Yu HsienChiu, Fong-Ming Chang, Chiung- HsinChang, Kao-ChiChung, December, 2012.

[5] “Prediction of foetal weight at varying gestational age in the absence of ultrasound examination using ensemble learning”, Yu Lu, Xianghua Fu, Fangxiong Chen, Kelvin K L Wong, November 2019.