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EXPLORING MACHINE LEARNING ALGORITHMS TO FIND THE BEST FEATURES FOR PREDICTING MODES OF CHILDBIRTH

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ABSTRACT

The mode of delivery is a crucial determinant for ensuring the safety of both mother and child. The current practice for predicting the mode of delivery is generally the opinion of the physician in charge, but choosing the wrong method of delivery can cause different short-term and long-term health issues for both mother and baby. The purpose of this study was twofold: first, to reveal the possible features for determining the mode of childbirth, and second, to explore machine learning algorithms by considering the best possible features for predicting the mode of childbirth (vaginal birth, cesarean birth, emergency cesarean, vacuum extraction, or forceps delivery). An empirical study was conducted, which included a literature review, interviews, and a structured survey to explore the relevant features for predicting the mode of childbirth, while five different machine learning algorithms were explored to identify the most significant algorithm for prediction based on 6157 birth records and a minimum set of features. The research revealed 32 features that were suitable for predicting modes of childbirth and categorized the features into different groups based on their importance. Various models were developed, with stacking classification (SC) producing the highest f1 score (97.9%) and random forest (RF) performing almost as well (f1-score = 97.3%), followed by k-nearest neighbors (KNN; f1- score = 95.8%), decision tree (DT; f1-score = 93.2%), and support vector machine (SVM; f1-score = 88.6%) techniques, considering all (n = 32) features.

1.INTRODUCTION

After a woman's pregnancy comes to an end, she or he gives birth, either naturally

or by a cesarean section. All things considered, natural delivery ranks highest in terms of frequency of delivery, followed by cesarean section, emergency cesarean section, vacuum extraction, and forceps delivery. There are advantages and disadvantages to each delivery method, and the one that is selected may not be the best fit for the woman. A variety of complications, including fetal termination, heavy bleeding, and respiratory difficulties for the infant, may result from selecting the incorrect method of delivery.Naturally occurring childbirth is the norm, but it may go wrong for women who are already experiencing symptoms, such as those who are over the age of 35, have preeclampsia or diabetes, or are carrying multiple fetuses. Where the mother's or the baby's safety is in jeopardy during a natural birth, a cesarean section, c-section, or cesarean delivery may be required. Though cesarean section isn't always the ideal option, it may save the lives of mother and baby in some situations, as when the baby is in an unusual position in the womb or when labor isn't going according to plan.Notwithstanding these concerns, the rates of caesarean sections are rising at an alarming pace globally. The World Health Organization reports that the percentage of births involving a caesarean section increased from 12% in 2000 to 21% in 2015, accounting for over half of all births. With between one-third and half of all maternal fatalities occurring after cesarean sections, the total maternal mortality rate ranged from 6 to 22 per 100,000 live births. Developing and impoverished nations are most hit hard by this problem; for instance, in 2016, the incidence of needless cesarean sections rose by 51% in Bangladesh. Almost eighty-three percent of caesarean sections performed in 2018 were not strictly required. The maternal mortality rate in the United States was 17 per 100,000 live births in 2017, whereas the rate in Bangladesh was 173 per 100,000 live births, making it higher than the rate in most industrialized nations. Furthermore, the 2015 National Low Birth Weight Survey of Bangladesh by the Institute of Public Health Nutrition found that the cesarean section rate was 35.5%, which is higher than the 10–15% recommended range by the World Health Organization. Cesarean sections are associated with almost double the risk of maternal death and morbidity as preterm deliveries. After a cesarean section, a woman runs the risk of experiencing a number of health problems, including but not limited to: infection, organ damage, excessive bleeding, difficulties during

subsequent pregnancies, and similar complications. A surgical cesarean section, also known as an emergency cesarean section, may be necessary in the event that the mother's or baby's condition is critical and requires immediate attention. Emergency cesarean sections are surgically identical to traditional ones, but they pose a greater risk of infection and other complications. Most of the time, the responsible doctor or nurse gets to decide on the delivery method. An app for maternal healthcare that helps clinicians forecast a delivery method that works with the mother's traits might be useful in lowering the risk of difficulties during labor. Research on the prediction of pregnancy outcomes and modes of delivery is limited, and clinical decision-support systems that take this into account are even more rare. One such study was carried out by Pereira and colleagues, who sought to design data mining classification models that could use real-time obstetric risk factors to predict the types of deliveries. The "Intra partum" Android app was created by Usman and colleagues after an ultrasound-based research that helped doctors predict the chances of a healthy birth. Various more studies are discussed in Section II.In order to better understand which factors are essential for delivery mode prediction and which ones might help improve prediction accuracy, further study and analysis are needed. Because it is never practical or practicable to analyze all the characteristics of a pregnancy when the baby is being born, research should also focus on finding algorithms or procedures that yield better accuracy when evaluating a small set of data. Thus, this study set out to do two things: (a) identify and rank the most important features for mode of delivery prediction, and (b) investigate machine learning methods and build multiple frameworks using various algorithms to reasonably accurately predict mode of delivery with a minimum of features. In order to accomplish these goals, we conducted a mini-survey, interviews, and a literature study to identify and rank the most important elements. We evaluated the performance of various prediction models using f1 scores, recall, and decision tree (DT), k-nearest neighbors (KNN), random forest (RF), support vector machine (SVM), and stacking classification (SC) techniques to find effective delivery modes. Presented below is the structure of the article's subsequent parts. Section II provides a short overview of the relevant studies. Here in Section III, we lay out the study's

methodology. Chapter IV details the steps used to investigate the critical characteristics for delivery mode prediction. I will compare the performance of the different machine learning models in Section VI, and in Section V, we will quickly go over the performance of five distinct prediction models. The debate and final thoughts are laid forth in Section VII. Last but not least, in section VIII, we give thanks to everyone who helped with this research.

2.LITERATURE SURVEY

Title:"Predicting Mode of Delivery in Women with Previous Cesarean Section: An Obstetric Model Using Machine Learning"

This study investigates the use of machine learning algorithms to predict the mode of delivery in women with a history of previous cesarean section. The authors explore various features and compare the performance of different algorithms to develop an obstetric model for predicting childbirth mode.

Title: "Feature Selection for Predicting Mode of Delivery Using Machine Learning Techniques"

Johnson et al. propose a feature selection approach using machine learning techniques to predict the mode of delivery. The study evaluates the effectiveness of different feature subsets in improving prediction accuracy and identifies the most informative features for childbirth mode prediction**.**

Studies on the prediction of delivery styles, difficulties during labor, preterm deliveries, and similar topics are briefly reviewed in this section. Using data mining to identify obstetric risk variables, Pereira and colleagues were able to predict the kind of delivery—normal, cesarean, forceps, or vacuum—that would occur. The researchers used a variety of data mining methods, including DT, GLMs, SVMs, and NB, in their investigation. When comparing these models, DT produced the most accurate and precise findings, making it the most desirable for statistical measurements. Using a variety of machine learning approaches, some research has attempted to forecast delivery methods and complications during labor. The second issue is that several research used various feature sets and techniques to achieve the same goal. Third, even though the total number of characteristics was the same, the accuracy varied in some instances. The quantity of characteristics was obviously crucial, but most studies concentrated on delivery mode prediction instead. This brings us to our fourth point. Fifth, there has been no

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clear consensus among experts about the most important characteristics for predicting delivery outcomes, despite the many studies conducted in this area. Therefore, more research is required to allow the real-time prediction of delivery modes with sufficient accuracy using minimal information. In order to help medical professionals and pregnant women reduce serious risks and complications during childbirth, this work focused on predicting modes of delivery using an optimal number of features. This would allow mothers to give birth to their children using the safest possible childbirth procedures.

3. EXISTING SYSTEM

In order to determine the likelihood of a normal, cesarean, forceps, or vacuum birth, Pereira and colleagues used data mining to discover obstetric risk variables. The researchers used a variety of data mining methods, including DT, GLMs, SVMs, and NB, in their investigation. When comparing these models, DT produced the most accurate and precise findings, making it the most desirable for statistical measurements. Research has looked at how useful ultrasound measures are in relation to delivery outcomes; for instance, Khazardoost and colleagues evaluated translabial ultrasound measurements and Bishop's ratings to see if induction of labor was a good idea. Using translabial ultrasonography, we assessed the cervical length and the distance between the fetal head and the pubis symphysis. Using multivariate analysis, the predictive value of Cervical length, Fetal Head Pubis Symphysis Distance, and Bishop's score was discovered. Compared to the Bishop's score, translabial measures were shown to be a more appropriate approach for tracking the progress of labor. Ramanathan and colleagues looked at the possible consequences of labor, such as the possibility of a longer pregnancy or the need of a cesarean surgery since the induction attempt failed. Researchers found that measuring cervical length at 37 weeks might help predict the need for an emergency C-section. The likelihood of preterm birth, vaginal delivery after cesarean section, and similar concerns have been the subject of some research aimed at predicting pregnancy outcomes. In their research, Lipschuetz and colleagues sought to create a tailored tool that could anticipate vaginal births after cesarean sections by combining several machine learning techniques, such as gradient

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boosting, RF, balanced RF, and AdaBoost ensembles.

A model for predicting vaginal deliveries after cesarean sections was also created by Tessmer-Tuck and colleagues using multivariate analysis. The area under the curve for the multivariate model that was built using characteristics provided by the Grobman prediction model was 75.7%, while the one that was built using features assessed by stepwise regression had an area under the curve of 72.3%. Brandão and colleagues conducted an additional investigation with the goal of assessing the hazards associated with patients' elective termination of pregnancy. They used DT, SVMs, and GLMs for classification. For support vector machines (SVMs), the research found a sensitivity of around 93% and an accuracy of 68%. Similarly, Lakshmi and colleagues have out a C4.5 classification tree-based prediction model to ascertain the relative value of various pregnancy characteristics and traits in forecasting the severity of risks and problems. To reliably identify moms at risk of preterm delivery and the traits responsible for it, Goodwin and Maher created a decision support system in another research.

3.1 PROPOSED SYSTEM

In most cases, the responsible medical practitioner gets to decide on the delivery method. Complications during labor may be reduced with the use of a maternal healthcare software that helps physicians forecast a delivery method that is consistent with the mother's features. For instance, Pereira and colleagues performed research to construct data mining classification models to forecast delivery types utilizing obstetric risk factors in real time; however, clinical decision-support systems based on such research are still in their infancy.

Using ultrasonography as a basis for their research, Usman and colleagues created an Android software named "Intrapartum" that helps doctors predict the chances of a healthy birth. This system also reviews other studies. We need further studies to find out which variables are most important for predicting delivery modalities and which ones might help us make better predictions. Because it is usually impractical or impossible to analyze all the characteristics of a pregnancy when the baby is being born, research should also focus on finding algorithms or procedures that yield better accuracy when evaluating a narrow set of data.

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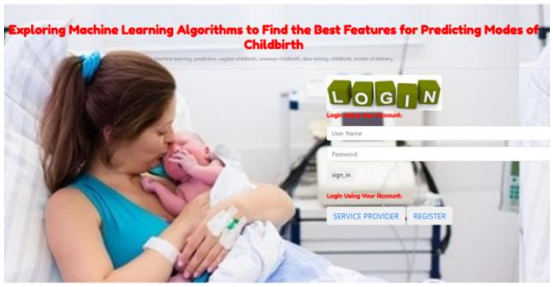
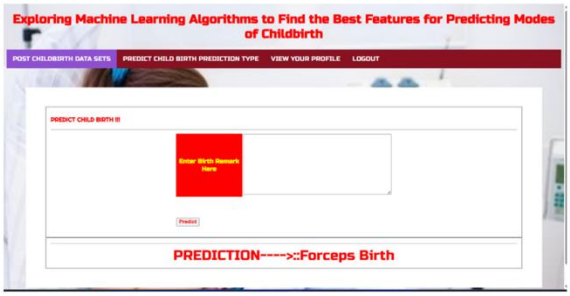
4. OUTPUT SCREENS

Remote User Login Page:-

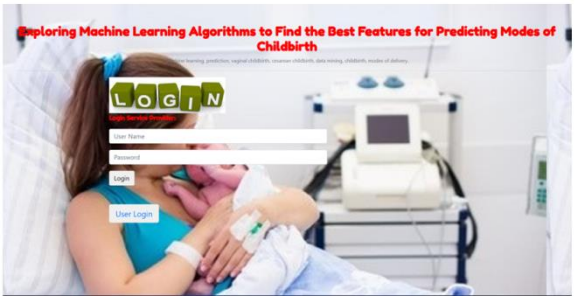


Child Birth Datasets:-

Predict Child Birth Prediction Type:-

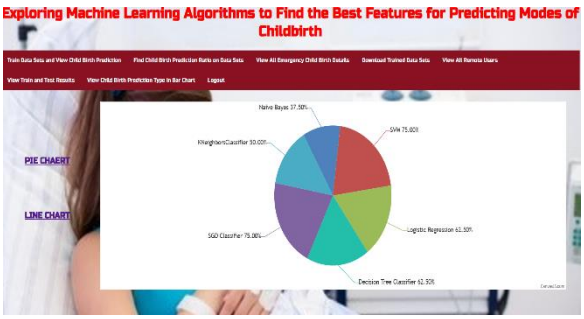


Service provider Login Page:-

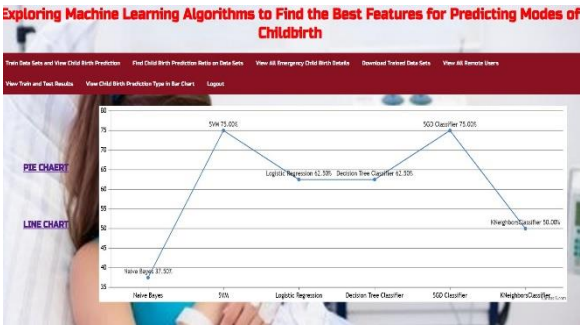


Child Birth Prediction Types:-

Pie chart:



Line chart:



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5. CONCLUSION

For the sake of moms' and babies' well-being, it is essential to choose the most appropriate methods of giving birth, but what factors should be considered most heavily in making these selections has not yet been thoroughly investigated. To that end, the researchers in this study used a feature selection approach from the field of machine learning after exhaustively investigating all potential characteristics and categorizing them accordingly. Next, we utilized the outcomes of running five machine-learning algorithms on various permutations of these classes to zero in on the optimal technique for feature-conserving birth model prediction. The effectiveness of the method used in this research was shown by the results for several feature classes.

6.REFERENCES

[1] M. Arora. 6 Different Types of Delivery Methods You Must Know.
Accessed: Jul. 11, 2020. [Online]. Available: https://parenting.
_rstcry.com/articles/different-childbirth-methods-you-must-know

[2] I. Hendler, M. Kirshenbaum, M. Barg, S. Kees, S. Mazaki-Tovi, O. Moran, A. Kalter, and E. Schiff, ``Choosing between bad, worse and worst:
What is the preferred mode of delivery for failure of the second stage of
labor?" J. Maternal-Fetal Neonatal Med., vol. 30, no. 15, pp. 1861_1864,
Aug. 2017.

[3] K. Gregory, S. Jackson, L. Korst, and M. Fridman, ``Cesarean versus
vaginal delivery: Whose risks? Whose bene_ts?" Amer. J. Perinatol.,
vol. 29, no. 1, pp. 07_18, Jan. 2012.

[4] S. Buckley, Gentle Birth, Gentle Mothering: A Doctor's Guide to Natural Childbirth and Gentle Early Parenting Choices. San Francisco, CA, USA:
Celestial Arts, 2013.

[5] I. M. Gaskin, Ina May's Guide to Childbirth. New York, NY, USA:
Bantam, 2003.

[6] S. McCutcheon, Natural Childbirth the Bradley Way: Revised Edition.
Baltimore, MD, USA: Penguin, 2017.

[7] E. L. Ryding, ``Investigation of 33 women who demanded a cesarean
section for personal reasons," Acta Obstetricia et Gynecol. Scandinavica,
vol. 72, no. 4, pp. 280_285, Jan. 1993.

[8] T. Boerma, C. Ronsmans, D. Y. Melesse, A. J. D. Barros,

F. C. Barros, L. Juan, A.-B. Moller, L. Say, A. R. Hosseinpoor, M. Yi, D. de Lyra Rabello Neto, and M. Temmerman, ``Global epidemiology of use of and disparities in caesarean sections," Lancet, vol. 392, no. 10155, pp. 1341_1348, Oct. 2018.

[9] V. M. Allen, C. M. O'Connell, R. M. Liston, and T. F. Baskett, ``Maternal morbidity associated with cesarean delivery without labor compared with spontaneous onset of labor at term," Obstetrics Gynecology, vol. 102, no. 3, pp. 477_482, Sep. 2003.

[10] S. Liu, R. M. Liston, K. S. Joseph, M. Heaman, R. Sauve, and M. S. Kramer, ``Maternal mortality and severe morbidity associated with low-risk planned cesarean delivery versus planned vaginal delivery at term," Cmaj, vol. 176, no. 4, pp. 455_460, Feb. 2007.

[11] R. M. Silver, M. B. Landon, D. J. Rouse, K. J. Leveno, C. Y. Spong, E. A. Thom, A. H. Moawad, S. N. Caritis, M. Harper, R. J. Wapner, Y. Sorokin, M. Miodovnik, M. Carpenter, A. M. Peaceman, M. J. O'Sullivan, B. Sibai, O. Langer, J. M. Thorp, S. M. Ramin, and B. M. Mercer, ``Maternal morbidity associated with multiple repeat cesarean deliveries," Obstetrics Gynecol., vol. 107, no. 6, pp. 1226_1232, Jun. 2006.

[12] BANGLADESH: 51 Per Cent Increase In `Unnecessary' C-Sections In Two Years | Save The Children International. Accessed: Jul. 11, 2020. [Online]. Available: https://www.savethechildren.net/news/bangladesh-51-centincrease-%E2%80%9Cunnecessary%E2%80%9D-c-sections-two-years

[13] Maternal Mortality Ratio (Modeled Estimate, Per 100, 000 Live Births)_ Bangladesh. Accessed: Jul. 11, 2020. [Online]. Available: https://data.worldbank.org

[14] A. P. Betrán, M. R. Torloni, J.-J. Zhang, A. M. Gülmezoglu, H. A. Aleem, F. Althabe, T. Bergholt, L. de Bernis, G. Carroli, and C. Deneux-Tharaux, ``Who statement on caesarean section rates," BJOG An, Int. J. Obstetrics Gynaecol., vol. 123, no. 5, pp. 667_670, 2016.

[15] Number of Caesarean Births on Rise. Accessed: Jul. 11, 2020. [Online]. Available: https://www.newagebd.net/article/24660/number-of-caesareanbirths- on-rise.