IJIREEICE ISSN (O) 2321-2004, ISSN (P) 2321-5526

International Journal of Innovative Research in Electrical, Electronics, Instrumentation and Control Engineering

Impact Factor 8.021 ⁜ Peer-reviewed / Refereed journal ⁜ Vol. 11, Issue 7, July 2023, Pages 70-73

DOI: 10.17148/IJIREEICE.2023.11713

JANANI SURAKSHA: PAVING THE WAY OF SAFER PREGNANCY

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Abstract: Pregnancy is a critical phase in a woman's life that demands increased medical attention and care due to its vulnerability. Throughout this period, various irregularities might occur, and if not detected or treated promptly, they can result in severe consequences. These irregularities, known as "pregnancy complications," encompass a range of health issues arising from physiological changes during gestation, posing risks to the mother's well-being during pregnancy, delivery, and the postpartum period. This study aims to predict current health issues experienced by pregnant women using two distinct classification algorithms: the C4.5 decision tree and the Naive Bayes Classification Algorithm. Widely used in data mining for classification and prediction tasks, these algorithms analyze data from pregnant women at different stages of pregnancy to anticipate their present health status and related complications. The research strives to determine the superior algorithm for forecasting pregnant women's health conditions and associated complications. Applying these classification techniques to pregnancy data enables the assessment of health risks, potentially reducing maternal and fetal mortality rates

Keywords: Pregnancy Complications, C4.5 Decision Tree, Naïve Bayes Classification Algorithms, Fetal mortality rates, Physiological changes

I. INTRODUCTION

Pregnancy, a momentous and transformative phase in a woman's life, induces numerous intricate physiological changes that demand meticulous attention to prevent potential complications. In extreme cases, these complications could present life-threatening risks for both the expectant mother and her unborn child [1]. Pregnancy's progression is influenced by a myriad of factors, including hormonal shifts, fluctuations in blood pressure, temperature variations, weight changes, shifts in blood glucose levels, and susceptibility to infections [2]. Regrettably, these subtle shifts in physiological parameters often go unnoticed by both medical professionals and pregnant women, permitting complications to escalate into critical emergencies. The complexity of managing a pregnant woman's health during an emergency situation poses formidable challenges, resulting in devastating outcomes where the lives of either the mother, the child, or both hang in the balance [4]. Alarmingly, recent studies have revealed a distressing number of maternal deaths linked to pregnancy and childbirth complications. Equally concerning is the fact that nearly 99 percent of these maternal fatalities occur in underdeveloped countries. A global survey conducted in 2013 reported a staggering count of 289,000 pregnant women losing their lives during pregnancy, childbirth, or both, with the majority of these heart-wrenching tragedies unfolding in resource-limited settings [5]. Many of these fatalities could have been prevented with enhanced access to essential medical services, particularly during pregnancy. The precarious nature of pregnancy amplifies the impact of even minor negligence, whether from pregnant women or medical professionals, heightening the probability of severe complications that endanger the lives of both mother and child [6]. Early identification of impending complications holds the potential to avert or alleviate numerous causes of maternal mortality, safeguarding the well-being of pregnant women and their unborn babies [7]. Crucial physiological parameters, such as blood pressure, blood glucose levels, and weight, experience significant changes during pregnancy, potentially serving as early indicators of issues. Identifying these indicators empowers proactive interventions to prevent subsequent complications arising from these physiological. In the pursuit of proactive maternal care, researchers have explored innovative approaches to predict pregnant women's health conditions through data-driven analysis techniques. Two noteworthy methods gaining attention are the C4.5 decision tree algorithm and the Naive Bayes algorithm.

This research strives to delve into the intricacies of pregnancy and its potential complications, with the ultimate aspiration of advancing the understanding and management of maternal health for a safer and healthier future."

ISO 3297:2007 Certified

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II. LITERATURE REVIEW

Numerous research endeavours have been devoted to enhancing pregnancy care and evaluating risks. PregnancyLine, an innovative system employing visual analysis, utilizes vivid visual metaphors to furnish care plans and risk-related information to expectant mothers [1]. The Pregnancy Risk Detection System (PRDS) functions as an expert system, identifying pregnancy risk levels based on symptoms experienced by pregnant women [2]. Researchers have achieved significant advancements in predicting risks associated with pregnancy-induced hypertension by leveraging machine learning techniques such as logistic regression, decision tree, and random forest, thereby offering the potential for early detection and timely intervention [3]. Within the realm of ultrasound picture analysis, deep learning technologies hold promise for identifying cryptic pregnancies that may elude detection through conventional testing methods [4]. The importance of comprehending sleep disturbances during pregnancy is underscored, emphasizing the significance of personalized holistic care programs and real-time sleep monitoring technologies [5]. Collectively, these studies contribute to a comprehensive understanding of proactive measures aimed at ensuring healthier pregnancies and improved maternal outcomes.

III.METHODOLOGY

- **COLLECTION OF DATA**

With the help of existing data on pregnancy and two different classification strategies—the C4.5 and Naive Bayes algorithms—the purpose of this investigation is to decide this overall risk levels that women face throughout pregnancy. The selection of these all methods is based on commonly utilized in the process of classification and prediction in the field of data mining. The research is done in four distinct stages: the first is the data collection stage, the second is the data preprocessing stage, the third is the data analysis stage, and the fourth and final stage is the model evaluation stage.

- **PREPROCESSING OF DATA**

Amidst of this phase, tasks such as checking for aberrant, error-prone, missing, and irrelevant data, replacing correct data for erroneous and missing data, and removing useless data from the database are carried out. The process of validating data for assuring that it is current and comprehensive, also well as reviewing records to confirm that it is complete, meaningful, and usable After converting and altering data to the necessary format or syntax, the data are next normalized, and, as a last step, the complete dataset is divided into a training set and a test set.

- **SPLITTING DATA**

The data are distributed in a haphazard manner, with approximately 370 data samples serving as the training data and the remaining 230 data samples serving as the test data. The decision tree learning model is constructed with the help of training set, while the correctness of the final product is evaluated with the help of test result.

- **ACCURACY**

After the learning models are in existence, they put through their paces by being reviewed and interpreted with the help of the test data. This procedure of evaluation is being carried out with the intention of determining the degree of accuracy possessed by the learning models with regard to the prediction and categorization of the test data. The gathering of data through this review process was helpful in determining which method, among C4.5 and Naive Bayes algorithms, was the most accurate in forecasting the risk that was posed to women while they were pregnant.

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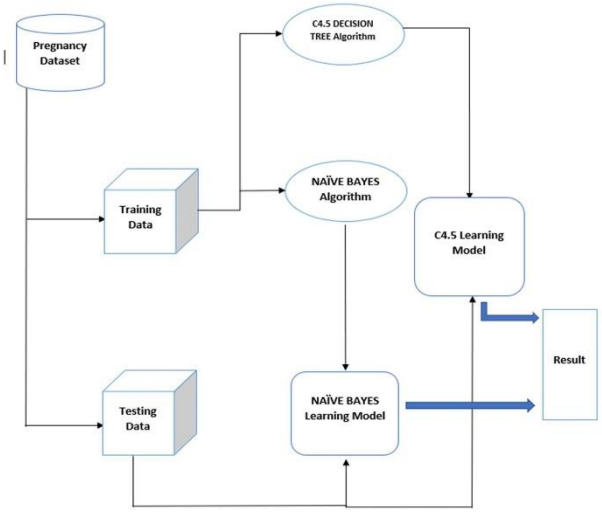

Fig. I System Architecture

IV. ALGORITHM

This research project is dedicated to the advancement of pregnancy care and health outcome predictions through the development of robust prediction-based learning models. The study employs two highly effective classification techniques: the C4.5 decision tree algorithm and the naive Bayes algorithm. By utilizing pregnancy-specific training data, the models are refined to enhance accuracy and provide valuable insights into the complex health conditions and potential outcomes associated with pregnancy.

The significance of this algorithmic approach lies in its potential to transform the understanding of expectant mothers' health conditions, empowering healthcare professionals to make informed decisions. The seamless integration of cutting-edge algorithms with comprehensive pregnancy data ensures a data-driven and comprehensive approach, effectively optimizing the well-being of both the mother and the fetus during this critical period. Overall ultimate vision of this research is to contribute significantly to the field of pregnancy care, with a strong focus on improving maternal health outcomes. By leveraging advanced technology and sophisticated data analysis, the study envisions a future of elevated care for expectant mothers and their unborn children. This pioneering methodology employed in this research holds immense promise in revolutionizing the landscape of pregnancy care. Through meticulous exploration and novel insights, the study aims to have a positive impact on the lives of expectant mothers worldwide, driving progress in pregnancy care and ensuring a safe and nurturing environment for every mother-to-be. These innovative approaches strive to create a brighter and healthier future for both mothers and infants, promoting maternal well-being and reducing the risks associated with pregnancy.

V. CONCLUSION

In conclusion, this project has shed light on the critical importance of proactive maternal healthcare and risk assessment during pregnancy. The journey through pregnancy is a delicate and transformative phase, demanding vigilant attention and timely interventions to safeguard the health of both the mother and the unborn child. Our exploration of various physiological parameters, such as hormonal fluctuations, blood pressure, weight, and blood glucose levels, underscores their pivotal roles in determining the well-being of expectant mothers. The distressing statistics revealed through the literature survey emphasize the urgent need to address high maternal mortality rates, particularly in developing countries. Improved access to essential medical services during pregnancy and early identification of potential complications are essential to reducing these devastating outcomes. The potential of data-driven analysis techniques, exemplified by the C4.5 decision tree algorithm and Naive Bayes algorithm, offers promising avenues for predicting health conditions and identifying potential complications in pregnant women. By leveraging these algorithms, healthcare professionals can make timely and informed decisions, ensuring optimal care for expectant mothers. The findings of this research hold great potential for revolutionizing maternal care worldwide, contributing to the reduction of maternal mortality rates. Proactive health forecasting during pregnancy empowers healthcare providers and pregnant women with valuable insights, enabling informed decisions and preventive measures. As we move forward, continued efforts from researchers, healthcare professionals, policymakers, and the global community are imperative to enhance maternal care and create a world where every expectant mother receives the best possible support and care throughout their pregnancy journey. Embracing data-driven approaches and advanced

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technologies will drive us towards improved maternal and infant health outcomes, fostering a safer and healthier future for all mothers and their precious unborn children.

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