Chapter 11
Child Mortality Prediction Using Machine Learning Techniques

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ABSTRACT

This project explores the application of machine learning techniques to predict child mortality by analyzing a dataset of 2,126 cardiotocogram (CTG) measurements, which detail fetal heart rate and uterine contraction patterns and have been meticulously classified by expert obstetricians. The study employs and compares various machine learning models, including logistic regression, decision trees, and neural networks, to assess their efficacy in identifying high-risk pregnancies. By leveraging these advanced predictive models, the research aims to enhance the accuracy of risk assessments and uncover critical patterns in fetal health data that may not be detectable through conventional methods. The ultimate goal is to support early interventions and improve child survival rates through data-driven decision-making in healthcare. This project has significant implications for enhancing predictive modeling and risk assessment in obstetrics, contributing to more effective and personalized maternal and child health care strategies.

1. INTRODUCTION

Child mortality is a critical global health issue, with preterm birth being one of the leading causes of death in children below the age of five. Less weight during birth and premature gestational age are significant risk factors that contribute to neonatal

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mortality, as well as long-term health complications for children. Early detection of fetal health anomalies can significantly reduce the risks associated with preterm births and improve the chances of survival. In this context, predictive models that identify at-risk pregnancies can be vital for providing timely interventions, ultimately saving lives and improving health outcomes for new-borns.

Child Mortality is also called as "under-5 Mortality" refers to the child death who are under age 5. It is often reported as the no of deaths in 1,000 new births and is declining globally in recent years, but still there is lot of work to be done. Infants died who are under 5 in 2022 was 4.9 million which is very low and there is 59% reduction from 1990, when 12.8 million children who are under 5 died. and cause of death of children who are under 5 are due to preterm birth complications (Obermeyer & Emanuel, 2016), pneumonia, birth asphyxia, and malaria.

Healthcare specialists to adopt the following guidelines setup by World Health organization to improve health conditions of newly born child and increase the expectancy during the under-5 age, Improve antenatal and obstetric care, Essential newborn care, Skilled delivery and emergency obstetric care, Promote nutrition, Integrated Management of Childhood Illness, Postnatal care visits, Health education and community engagement and timely vaccination. Antenatal and obstetric care involves ensuring care during pregnancy which can prevent stillbirths and neonatal deaths, hence managing complications early. Newborn care is very essential factor like thermal protection and infection prevention. Obstetric care takes care of child through appointed attendants and emergency care for the child, thereby preventing deaths from birth asphyxia. Vaccinations and nutrition immunizes the child early and protects from several common childhood illness in the so called under-5 criteria and in some cases protection for life. Integrated Management system uses protocol based system to protect child from immediate and simple sickness like pneumonia and diarrhea. Postnatal care conducts intensive care for the first 24 hours after child is born and upto a week to secure its health and make it a stable one. Health education is very desirable for families and for communities in general about newborn care and dangers aftermath. Along side the above few more considerations are as follows, Early initiation of breastfeeding, Hygienic umbilical cord care, Vitamin A supplementation, postnatal care contacts, Special care for low-birth-weight, preterm newborns and therapeutic treatments. Breastfeeding provides sufficient nutrients and immunity protection right after birth. Umbilical cord care prevents infections to both the mother and the newborn. Vitamin A supplement reduces infections that are likely to happen for the newborn. postnatal care contacts in the form of health workers by home visits within few days of birth results in early identification of health issues. Low-birth-weight and preterm newborns monitoring supports hygiene and illness monitoring. Transmittable diseases can be avoided through therapeutic treatments.

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