RISK ANALYSIS AND PREDICTION FOR STILLBIRTH

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Introduction

- A stillbirth is the death or loss of a baby before or during delivery.
- A stillbirth is usually defined as loss of a baby at or after the 20th week of pregnancy, and a miscarriage is loss of a baby before 20 weeks of pregnancy

Stillbirth can result from a combination of maternal, placental, and fetal factors.

A **Maternal factors:**Maternal factors such as medical conditions, infections, substance abuse, and age can lead to stillbirth by compromising the maternal-fetal blood flow or the placental function.

B **Placental factors:** Placental problems such as placental abruption, placenta previa, placental insufficiency, umbilical cord problems, chorioamnionitis, and placental masses can affect fetal growth and development and lead to stillbirth.

C **Fetal factors:** Fetal abnormalities such as chromosomal anomalies, structural defects, and infections can compromise fetal health and lead to stillbirth.

Objectives

- Stillbirth is the end result of a variety of maternal, fetal, and placental disorders, which can interact to contribute to stillbirth.
- This project aims to understand different factors causing stillbirth and provide the risk percentage and increased attention to known maternal risk for stillbirth.
- The goal of this project is to find out the contribution of each factor in determining stillbirth

Research Questions

Our research aims to find stillbirth rates by finding the missing links between stillbirth, the maternal, placental and fetal factors

Our Research Methodology targets on the main areas as:

1. What factors affect stillbirth?
2. What are maternal, placental and fetal factors and how are they different?
3. What are their respective roles in causing stillbirth?
4. What is the risk percentage of stillbirth?

Study Methodology

A **Dataset Building:** Our main research on this project was to collect all features that are affecting for Stillbirth and to create a data set for all those features and data-points.

B **Data Analysis:** After data set creation we analysed it by passing those data through various ML Models and choose the best one out of it.

C **Data training:** After selection of Model we performed Explanable AI on dataset and figured out which factors are contributing the most in the ML Model.

a *Logistic Regression*
b *KNN (K-Nearest Neighbor)*
c *SVM (Support Vector Machine)*
d *XGBoost*
e *Random Forest*

D **Risk Calculator using model with best accuracy:** We completed the analysis and prediction part and after that we finally predicted the chances for Stillbirth with the amount of risk that the patient may have

This workflow explains about how the user will login to our website and enter their details by filling up the form and then the ML model will work in back-end and predict the result for the user.

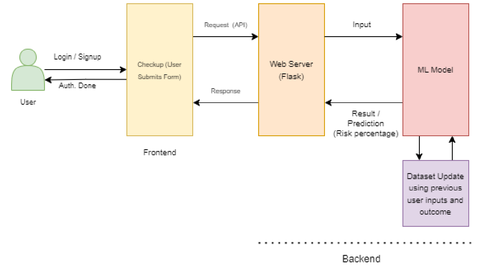

Figure 1. Work Flow of Project

Machine Learning Model Workflow

This Machine Learning workflow explains how our various ml models are taking the data and Explanable AI is being performed on it and after that risk prediction is being calculated and the user data then gets appended to our previous dataset which helps us in data growth.

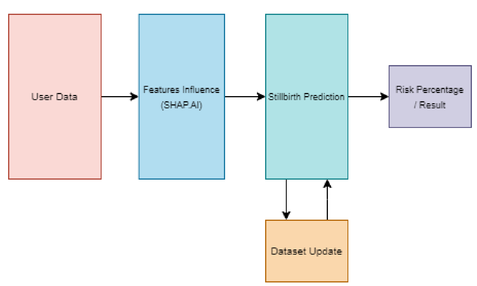

Figure 2. ML Workflow

Results and Discussion

We have applied several machine learning algorithms we have selected logistic and random forest machine algorithms which gave the best accuracy and precision for our prediction.

After we get the prediction from all three models we will merge them to get a final prediction. We categorized the outcome as Low, medium, and high chances of stillbirth.

1. Low chances of stillbirth means chances less than 30%.
2. Mediocre chances of stillbirth mean chances greater than 30% and less than 60%.
3. high chances of stillbirth means chances greater than 60%.

Conclusions

The Conclusions of our project are:-

- After all analysis of data and research on all factors effecting Stillbirth we were finally able to predict the chance of having Stillbirth with the risk factor percentage.
- We have provided a user friendly website so that people can access it easily from anywhere.

What does this study add?

i This study helps us in understanding the influence of different factors on Stillbirth.
ii The use of different ML algorithms helps us to analyze the accuracy and select the best model.
iii This study has helped us in determining the influence of each factor using Explainable AI, Which played an important role in calculation of StillBirth.

Future Research Scope

- More features can be curated and thus better accuracy can be achieved.
- Real time check through the hardware can be done for the fetal factors.

References

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