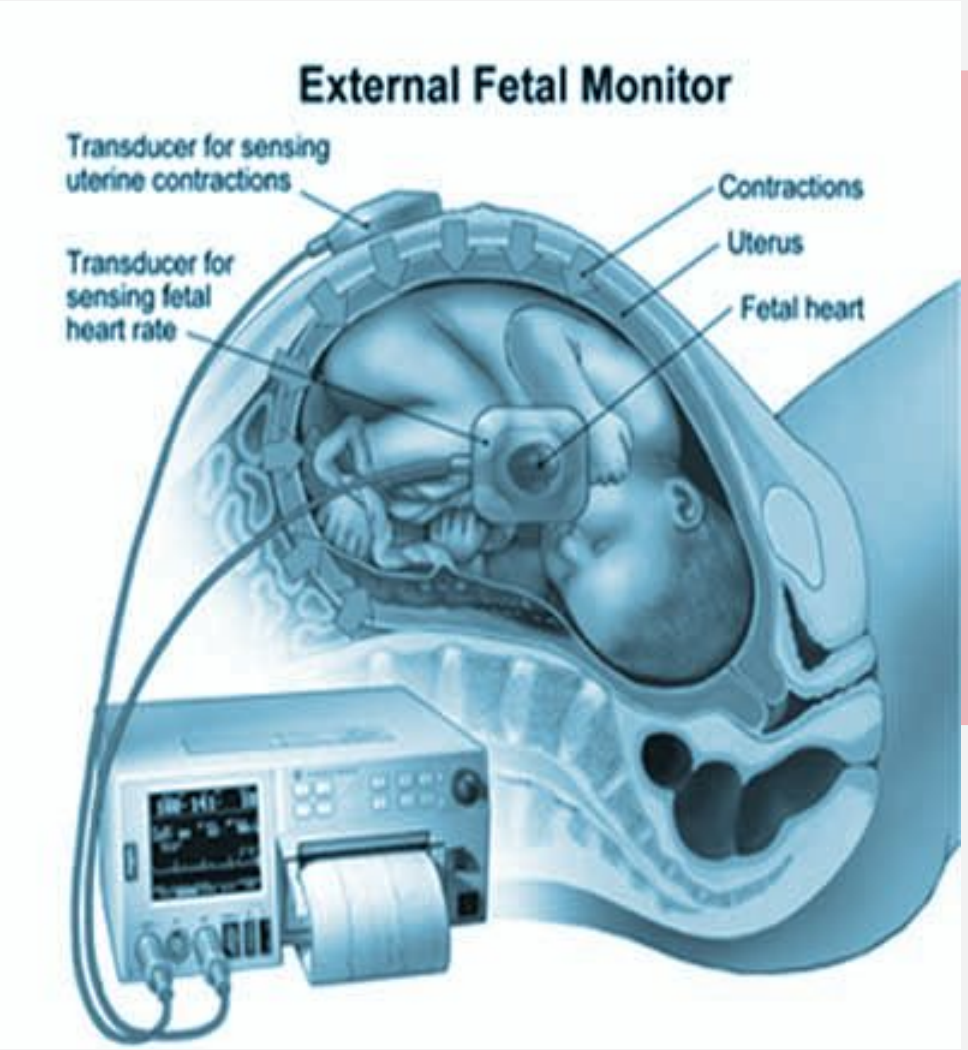
Improving Fetal Health Outcomes by combining Cardiotocography and Data Science Predictions

How can we use machine learning to enhance clinical decisions and increase viability

Rationale

- **Reduction of child mortality is a key indicator of human progress**
- **Global goal to end preventable deaths of newborns and children under 5 years. At least as low as 25 per 1000 births by 2030 (UN)**
- **Decreasing maternal mortality rate, which is currently highest in OECD 26.4 per 100,000 births in the US. The vast majority of these deaths (94%) occurred in low-resource settings, and most could have been prevented.**
- **“Cardiotocograms (CTGs) are a simple and cost accessible option to assess fetal health, allowing healthcare professionals to take action in order to prevent child and maternal mortality. The equipment itself works by sending ultrasound pulses and reading its response, thus shedding light on fetal heart rate (FHR), fetal movements, uterine contractions and more.”**

Ayres de Campos et al. (2000) SisPorto 2.0 A Program for Automated Analysis of Cardiotocograms. J Matern Fetal Med 5:311-318



Cardiotocograph (CTGs)

Variables

Fetal Heart Rate	Accelerations	Fetal Movement
Baseline	Per second	Per second
Uterine Contractions	Decelerations	Fetal Health
Per second	Light, Severe, Prolongued	Normal, Suspect, Pathological

Data Science Process

PHASE 1

Data Cleaning

PHASE 2

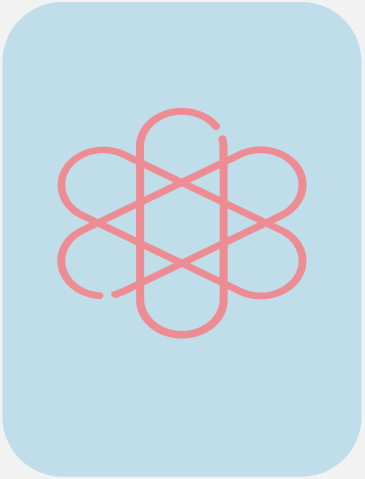
Exploratory Data Analysis

PHASE 3

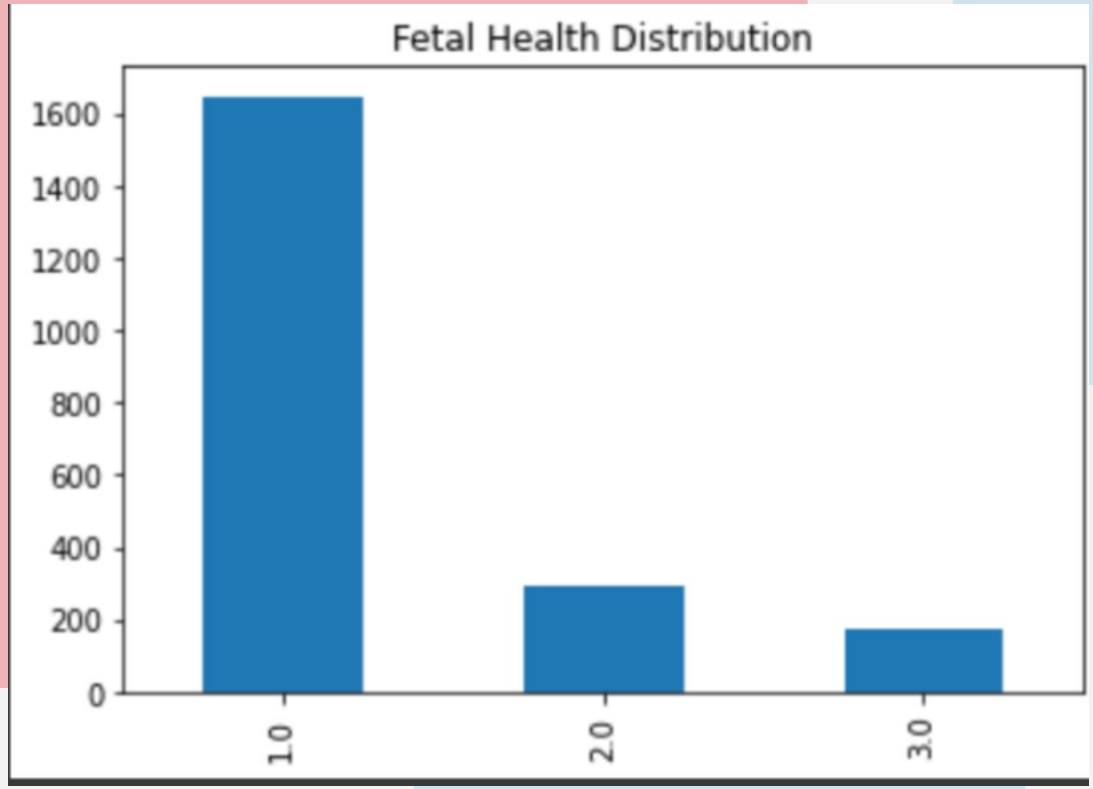
Preprocessing

PHASE 4

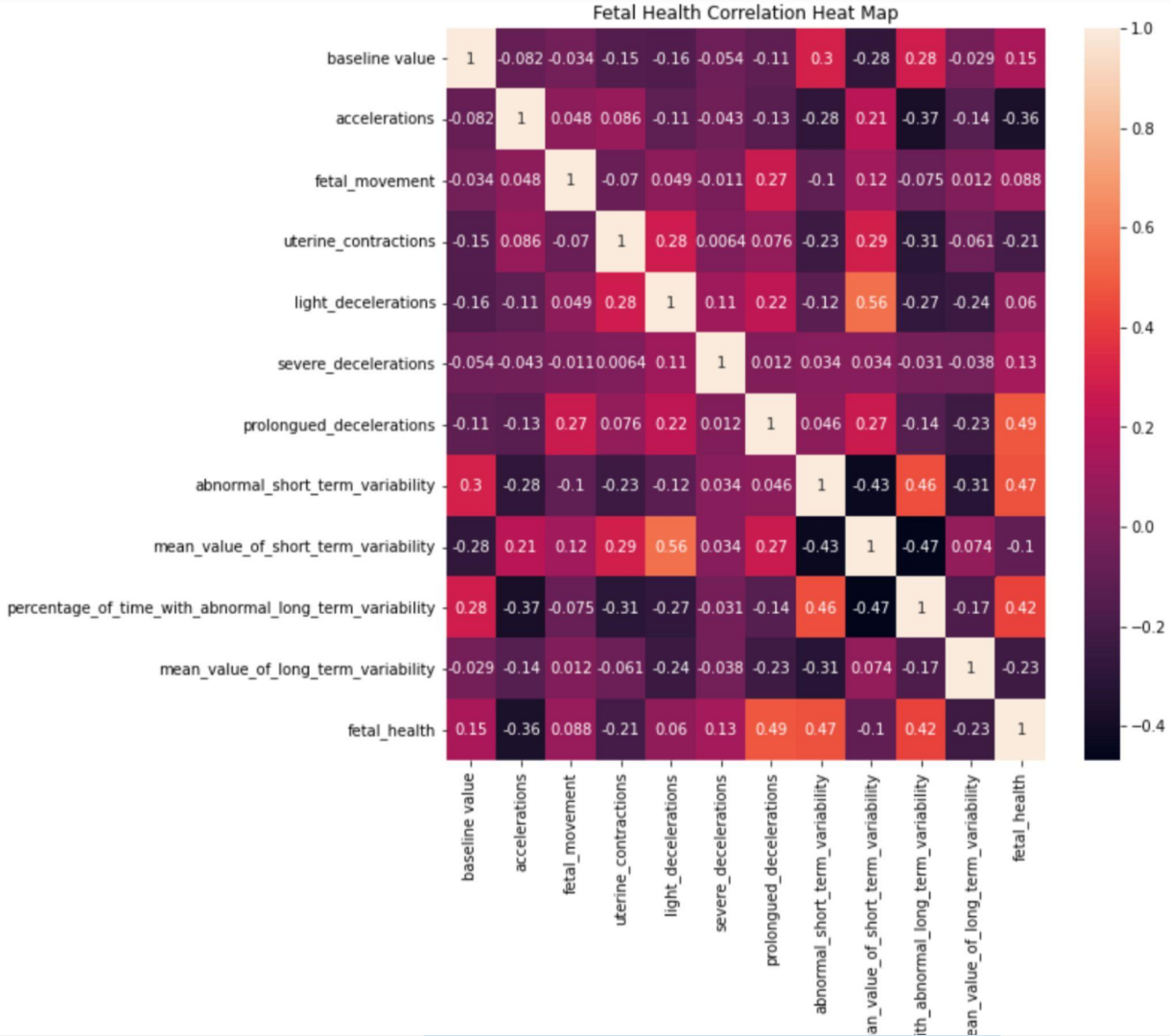
Machine Learning



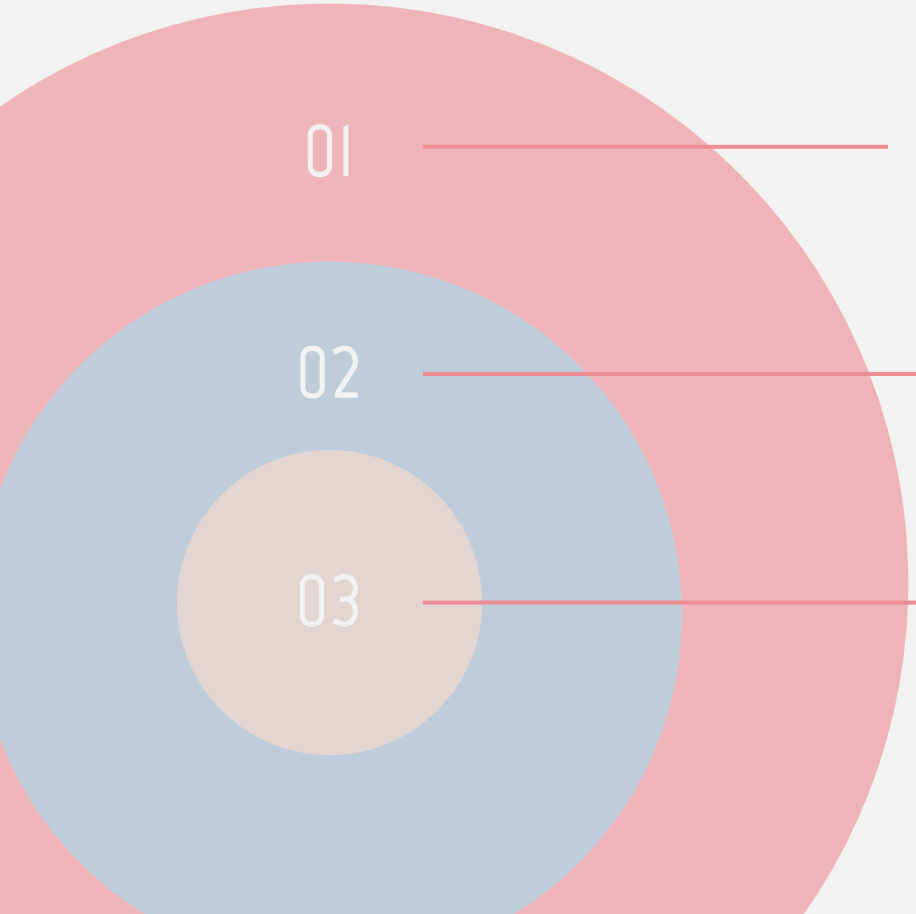
Visualizing Fetal Health Distribution in this dataset:



Visualizing correlations of Fetal Health Data and emerging Fetal Health Predictors



Machine Learning Trials



Random Forest Classifier Model

94% Accuracy

Light Gradient Boost Model

94% Accuracy

XGBoost Model

95% Accuracy

Recommendations

01

Improved Machine Learning Algorithm

02

Develop Automated Analysis Program

03

Implement in Health Care Network

Thank you!

Email questions:
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