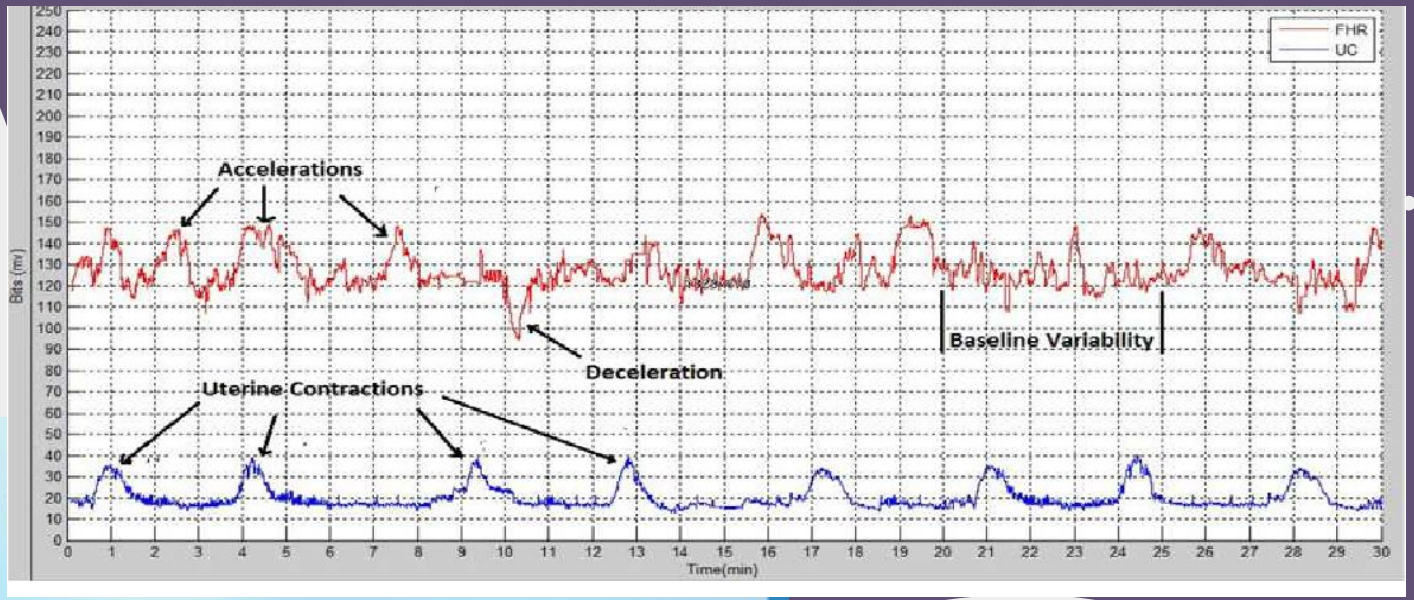
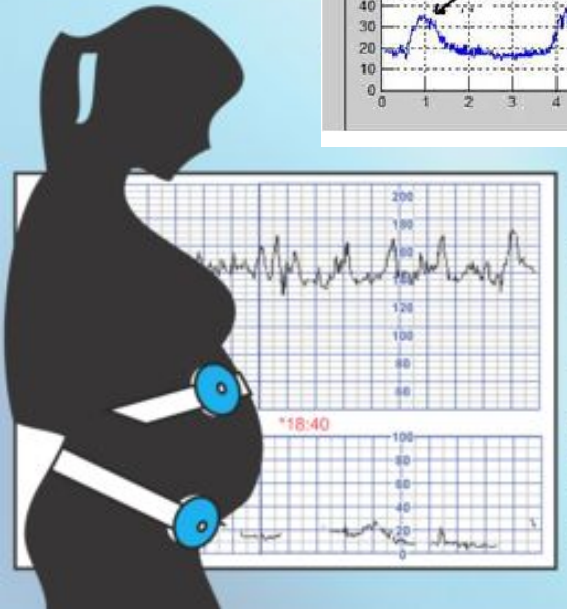
Fetal Health Classification

Using CTG Data

By Diane Tunnicliffe

“Fetal mortality is a major, and often overlooked, public health problem.”





Cardiotocograms

also known as CTGs or fetal trace reports

Methodology

01

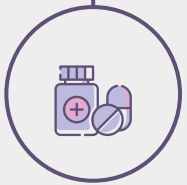
Gathered data from reputable sources

02

Explored, cleaned,, and analyzed the data

03

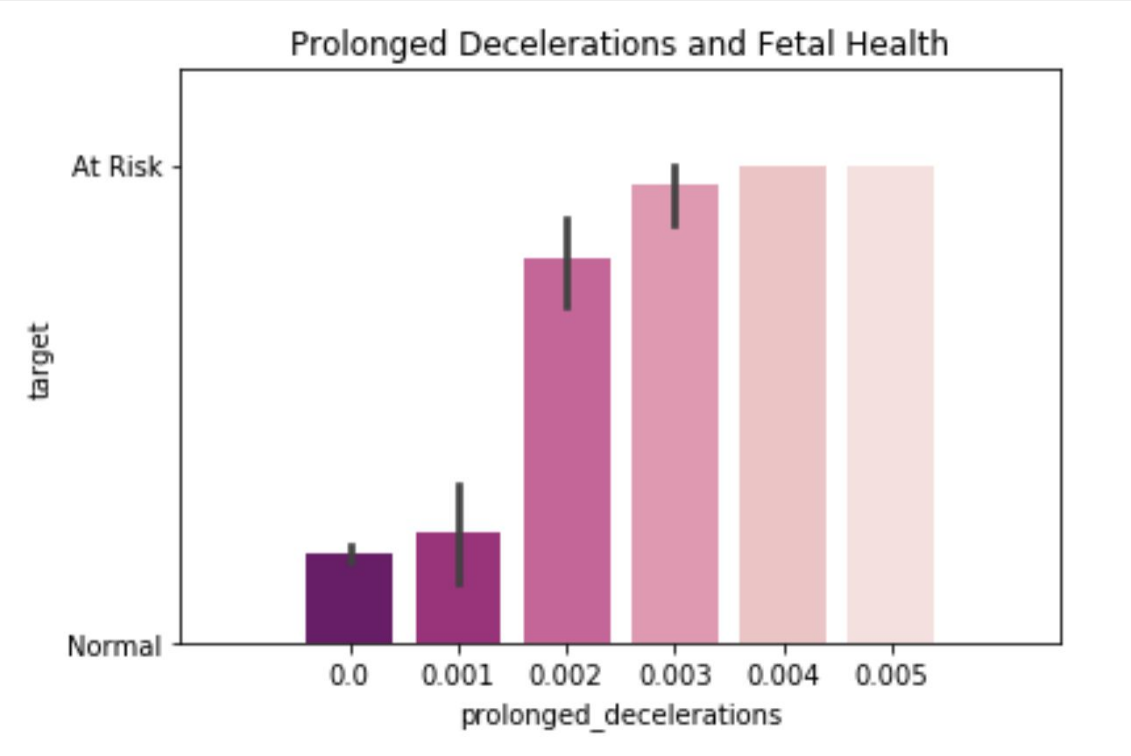
Built predictive machine learning models



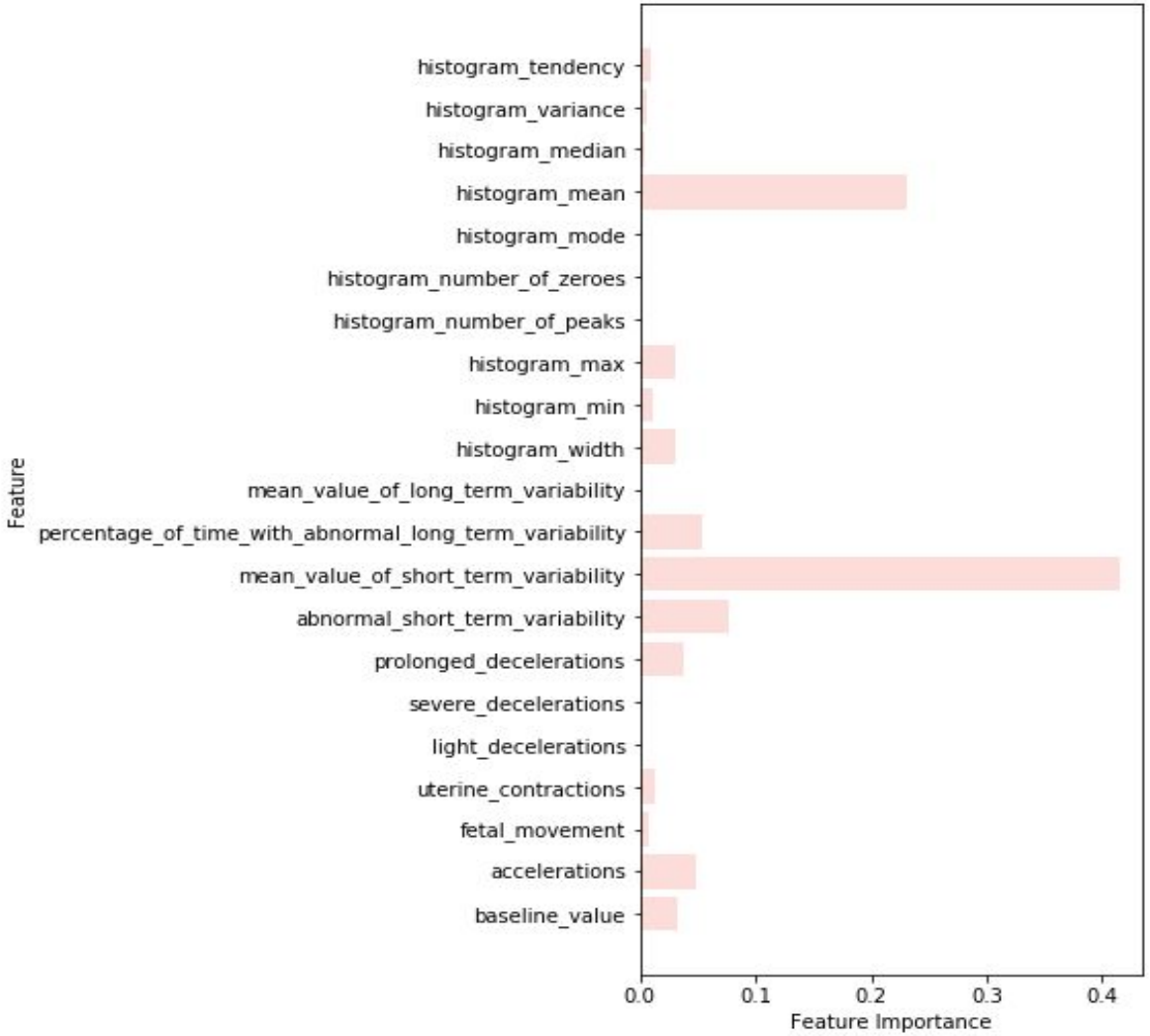
04

Evaluated models to make recommendations

Prolonged Decelerations

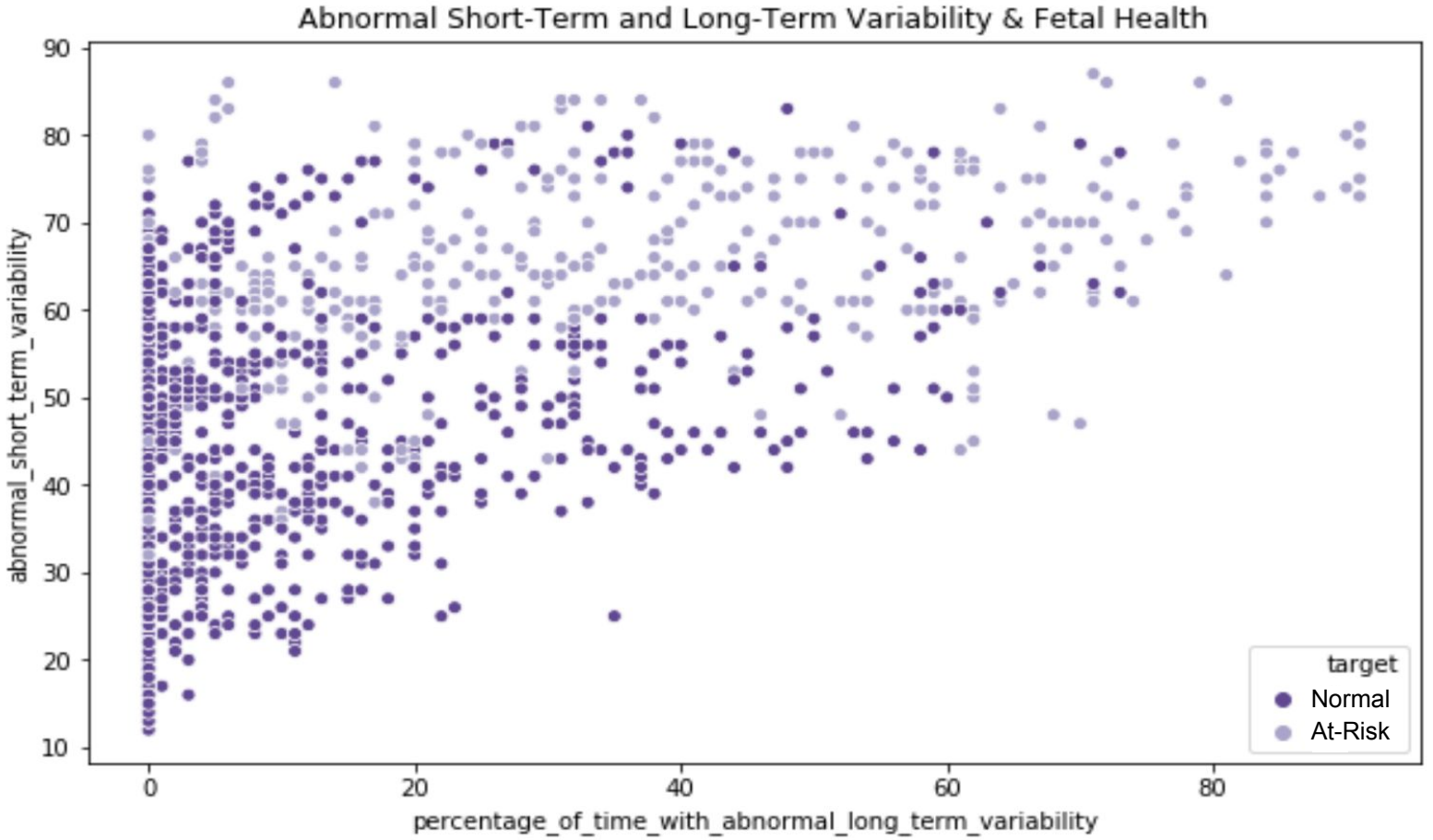


This feature showed the strongest correlation with fetal health outcome.



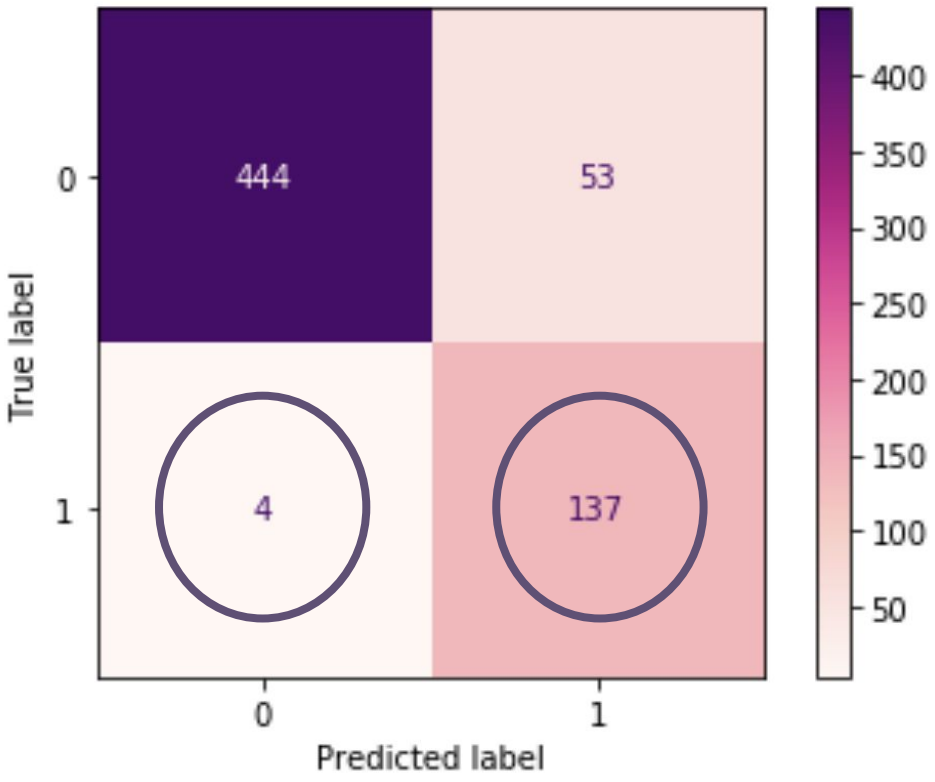
Key Features

These are the features that impacted the original, baseline model most heavily.


Abnormal Short-Term and Long-Term Variability & Fetal Health
abnormal_short_term_variability
percentage_of_time_with_abnormal_long_term_variability
target
Normal
At-Risk
90
80
70
60
50
40
30
20
10
0
20
40
60
80

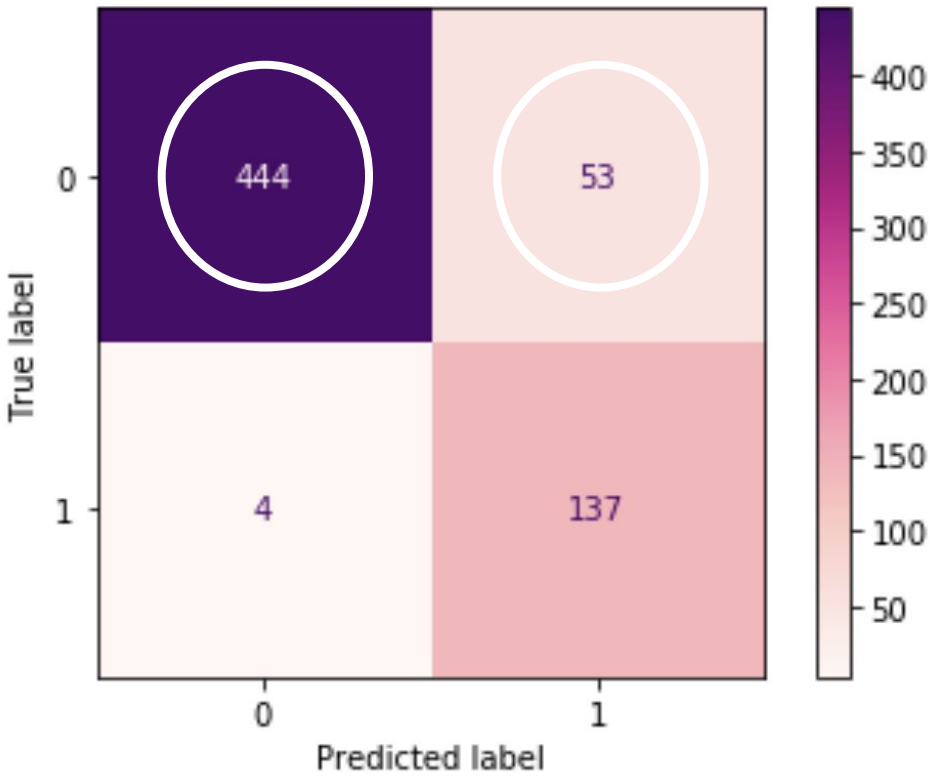
Evaluation

Model is able to predict 97% of the at-risk fetal health group.



Test Results

The Breakdown.



Test Results

The Breakdown.

Sensitivity

97%

Accuracy

91%

Recommendations

01

Perform CTGs often

This is a highly effective way to catch fetal risk

02

Prioritize measures of FHR

Pay close attention to these strong indicators

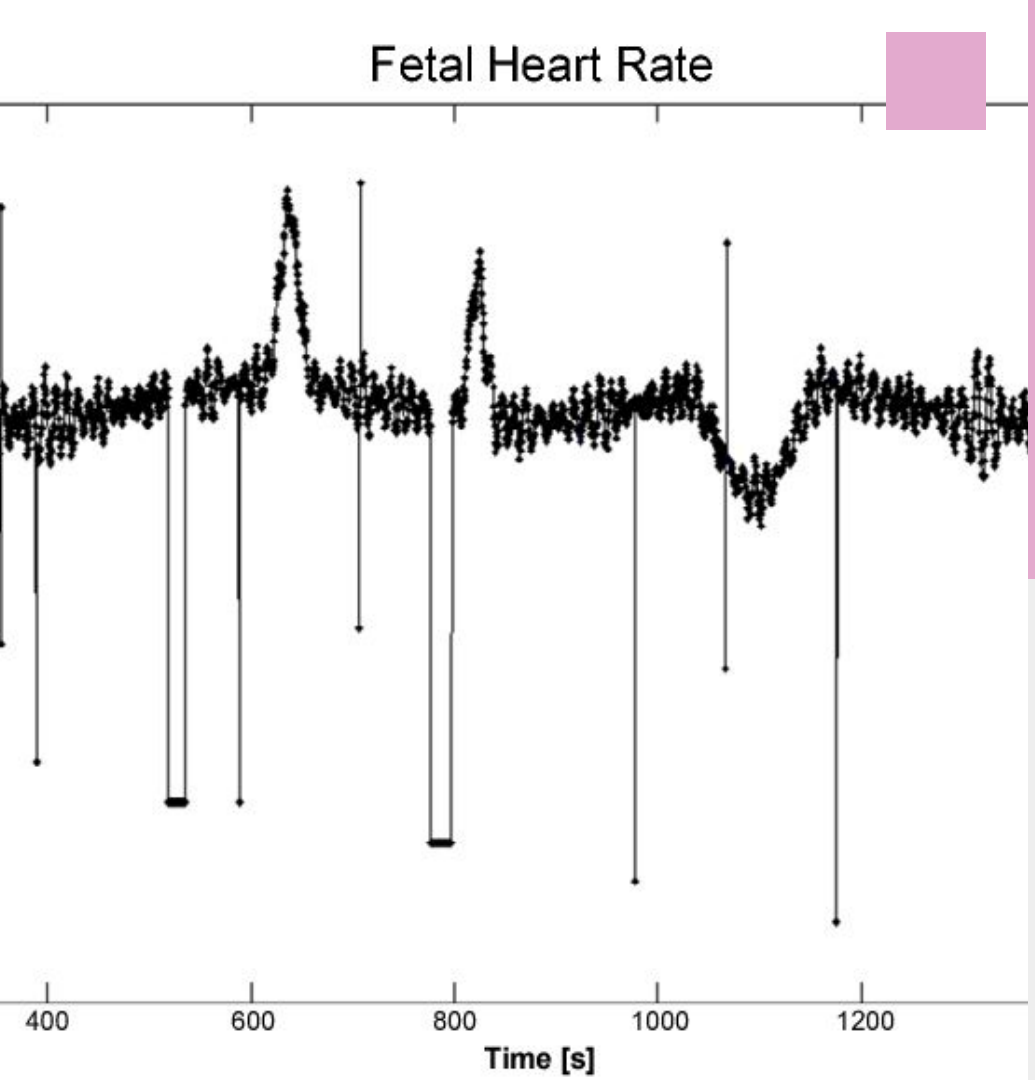
03

Better safe than sorry approach

Treat all indicators of at-risk outcomes with urgency

Perform CTGs often

This has proven to be a highly effective way to catch fetal risk.



Pay close attention to fetal heart rate (FHR) variability

This is a strong indicator for at-risk fetal health scenarios.

Better-safe-than-sorry approach to fetal health

Treat all indicators of at-risk outcomes with urgency.

Future Work

01

More Observations

Obtain more records of patient CTG exams with new criteria to further improve the model

Explore Histograms

02

Learn from CTG-generated fetal heart rate histograms

Thank you!

Do you have any questions?

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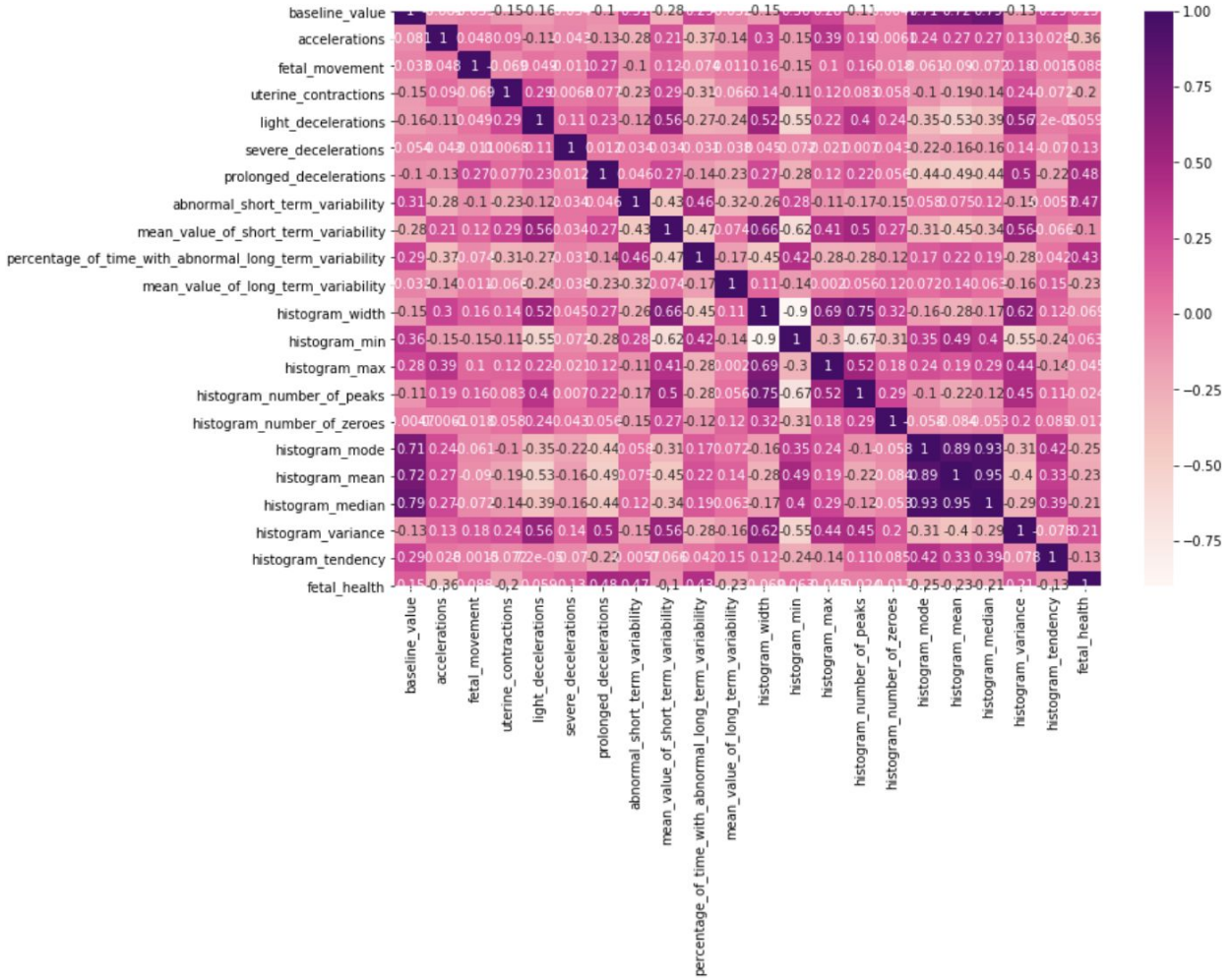
Appendix



Correlation heatmap of all features

Weight	Feature
± 0.1966	accelerations
± 0.1993	abnormal_short_term_variability
± 0.1590	percentage_of_time_with_abnormal_long_term_variability
± 0.1538	mean_value_of_short_term_variability
± 0.0715	histogram_mean
± 0.0817	prolonged_decelerations
± 0.0659	uterine_contractions
± 0.0596	histogram_mode
± 0.0493	histogram_median
± 0.0658	histogram_min
± 0.0437	baseline_value
± 0.0411	histogram_variance
± 0.0454	histogram_width
± 0.0236	histogram_max
± 0.0246	mean_value_of_long_term_variability
± 0.0258	histogram_tendency
± 0.0198	fetal_movement
± 0.0157	histogram_number_of_peaks
± 0.0185	light_decelerations
± 0.0114	histogram_number_of_zeroes
± 0.0068	severe_decelerations

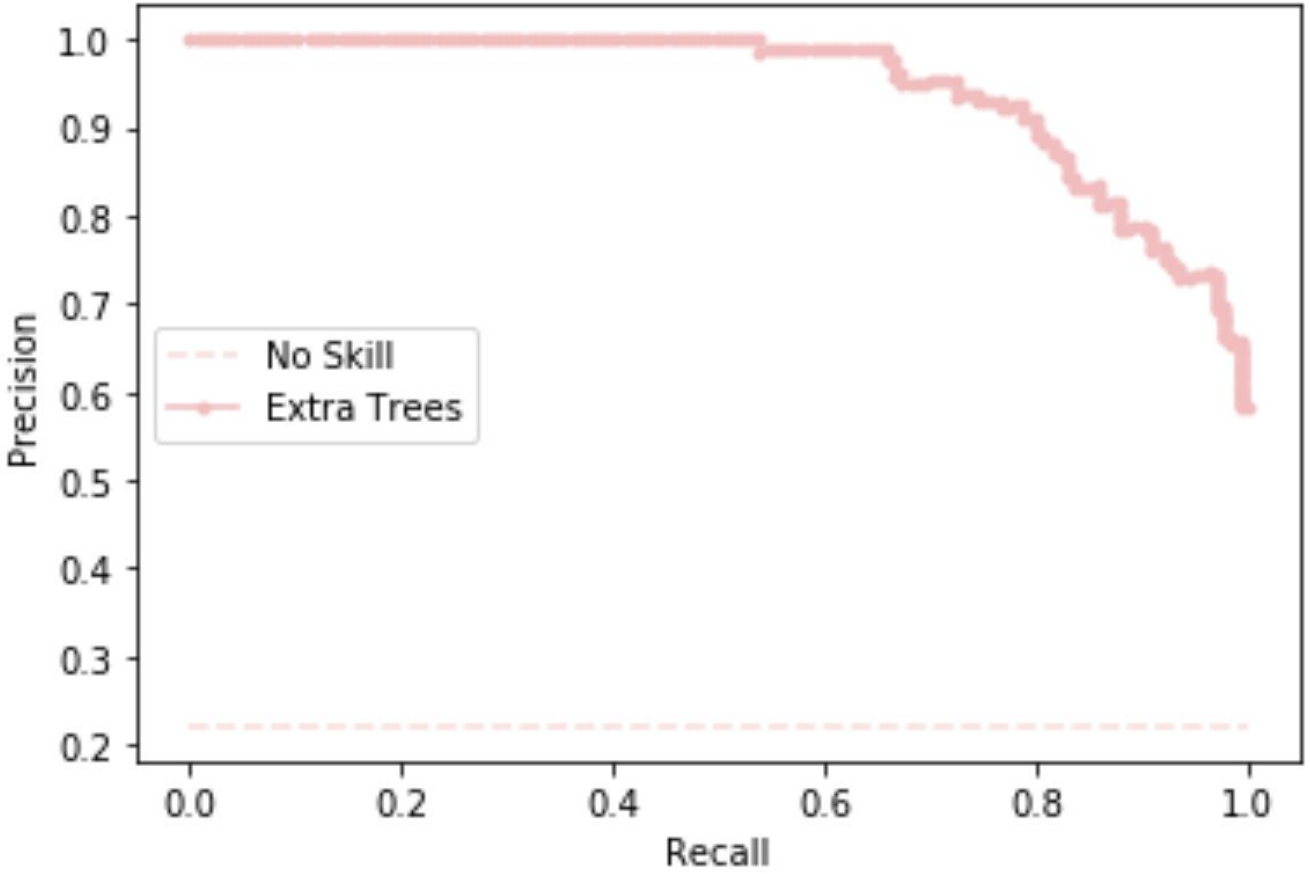
Key Features

These are the features that impacted the best-performing model model most heavily.

Appendix

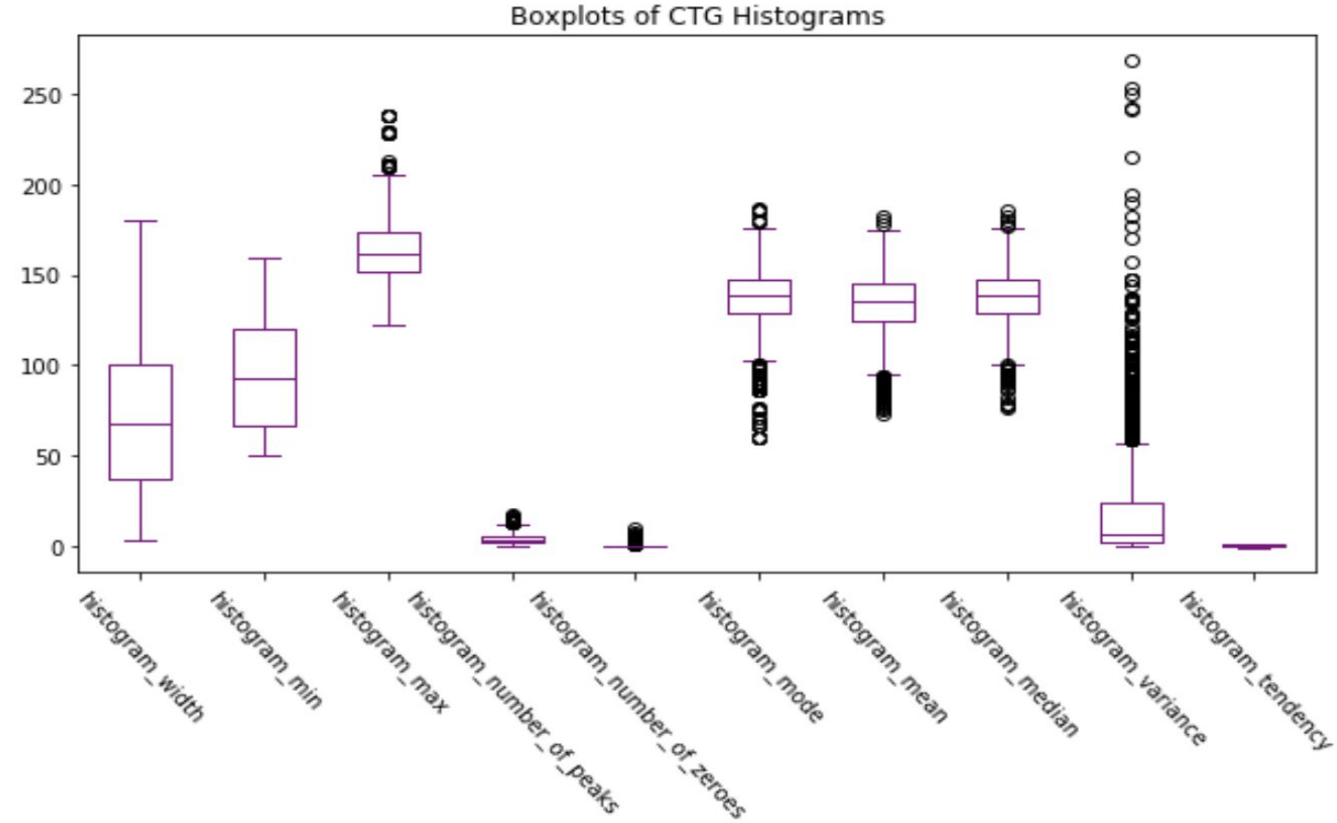
Appendix

F1=0.828, AUC=0.945



Precision-Recall Curve

Appendix



CTG histogram EDA for future work