

Model Development Phase Template

Date	27 July 2025
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Project Title	Fetal Health Classification System
Maximum Marks	5 Marks

Model Selection Report:

Model	Description
Logistic Regression	A linear model for multi-class classification using a multinomial loss function. It is interpretable and effective for balanced datasets with class weights to handle imbalance. In FetalAI, it classifies fetal health (Normal, Suspect, Pathological) based on 21 CTG features, but may struggle with complex relationships.
Random Forest	An ensemble model using multiple decision trees to improve robustness and reduce overfitting. It handles class imbalance effectively with balanced class weights and is suitable for tabular data. In FetalAI, it provides better performance than Logistic Regression but is less efficient for large datasets.
XGBoost	A gradient boosting model optimized for classification tasks, using tree-based learning with regularization. It excels in handling class imbalance and capturing complex feature interactions. In FetalAI, it is used for its high accuracy and feature importance capabilities, making it ideal for CTG-based classification.

Conclusion:

Model Selected	
XGBoost	XGBoost was selected for FetalAI due to its superior performance in initial evaluations, achieving a test accuracy of ~90% and a macro F1-score of ~0.85, outperforming Logistic Regression (~78% accuracy) and Random Forest (~85% accuracy). Its ability to handle class imbalance and provide feature importance insights makes it well-suited for the project's medical classification task.